

# **The case for gas is not self-fulfilling!**

**Clingendael International Energy Programme**

**January 2003**

**Title** : The case for gas is not self-fulfilling  
**Author** : Clingendael International Energy Programme  
**Design** : Van Marken Delft Drukkers / Wilbur Perlot  
**Desktop Publishing** : Christoph Tönjes  
**Copyright** : © 2003 Clingendael International Energy Programme  
**Number** : CIEP 01/2003  
**Published by** : The Clingendael Institute, The Hague

## **Preface**

The European gas market is undergoing substantial changes. These changes are partly due to the increasing imports from third countries and partly due to the liberalization process. The issue that is being addressed in this paper is whether the proposed changes to the market structure, i.e. the completion of the internal gas market, will generate an outcome that meets the requirements of the fundamentals of energy policy. These fundamentals of energy policy are: price, security of supply and protection of the environment. To realize all three fundamentals a certain level of stress, or rivalry, and imperfections must be overcome. In a well-balanced policy environment, however, the market can generate these three elements of energy policy. Policy changes aimed at one of these fundamentals can easily upset the balance. Liberalisation of the market essentially addresses the price issues and if imperfections exist, the market cannot be expected to generate an optimal balance among these three fundamentals of energy policy. These market imperfections can be of a technical-economic nature, be inherent to the type of market and can be government induced. The energy market typically also involves the production of public goods like security of supply. In the past decades, many governments secured these public goods in state or semi-state enterprises in for instance the electricity generation sector and gas sectors. In the new market structure, the public goods are secured with regulation, both at the European and the national level. The transition to a new market structure will be wrought with market imperfections, thought to be temporary, because the various member states come from different points of departure in the national market structure and move at various speeds of liberalization. These temporary imperfections could be considered as an acceptable trade-off for changing to a more efficient system of allocation, if the other two fundamentals of energy policy are not too much and not too long in jeopardy. The end result should be a market structure that allows for a balanced energy policy and that can efficiently and effectively deal with the stress among the three fundamentals. It is these last two arguments that are broached in this paper, and papers that will follow.

These papers are the product of a research project in progress on the development of the European gas market at the 'Clingendael International Energy Programme'. The research staff involved in this project, Aad Correljé (Faculty TBM, TU Delft), Dick de Jong, Coby van der Linde, Christoph Tönjes and Theo Westerwoudt discussed their early draft versions of the paper with various people involved in the gas sector. We would like to thank experts of NAM, Gasunie, Shell, ABN AMRO, McKinsey, and the IEA for sharing their insights with us. Needless to say that the responsibility for the content of this paper lies entirely with the Clingendael International Energy Programme.

Coby van der Linde  
January 2003

## **Contents**

Executive summary .....	7
1. Introduction .....	9
2. Growth in energy use.....	11
3. The potential role for natural gas .....	13
4. Supply Outlook .....	14
5. Unlike oil and coal, gas is not readily available .....	16
6. Is EU energy policy supportive of growth?.....	18
7. Conclusion: A New Arena needs a Different Process? .....	21
References .....	25

## Executive summary

Europe is struggling to reconcile the conditions it wants to create for a competitive internal market with the demands of security of supply, particularly relevant to the challenges of realising a significantly greater role for gas in its energy market.

Natural gas is generally regarded as the “bridging fuel” to a more sustainable energy system, which might be achieved towards the middle of this century.

Given the forecasted growth of energy demand, gas is predicted to provide a larger share in the energy supplies than it currently represents. According to analyses of EC and IEA, the larger share translates in a projected expansion of the gas market in Europe to an annual volume of around 560 mtoe (622 bln m<sup>3</sup>) by 2020 as compared to 340 mtoe (377 bln m<sup>3</sup>) in 2000 (IEA, 2002b, p. 434, CEC, 1999, p.186). Part of these growing gas supplies are destined for the residential and the industrial sectors, but the bulk is predicted to go to the power generation sector.

The reason for such a prediction makes sense. Gas has proven to be a reliable fuel, that is competitively priced and that minimises the environmental damage in the transition to a sustainable energy system. Nevertheless, there are some uncertainties that may frustrate the achievement of this predicted growth:

- The demand may not materialise. Whereas the residential and the industrial markets may well turn to gas as their fuel of choice, the power generation market may not be so easily persuaded. Although gas-fired power-generation today is the most economic option, alternatives like coal-fired and nuclear power generation have historically offered much lower and more stable fuel costs, while gas prices are considered less predictable. If gas supply conditions are not sufficiently supportive generators may not be persuaded to embrace the gas option to the extent the growth projections suggest.
- The supplies may also not materialise. Virtually all of the additional growth in gas supplies will have to be met through new, long-distance pipelines or in the form of LNG from outside Europe. To date, the efforts and costs of accomplishing these projects have been substantial. Yet, the market structure in Europe, through which this was achieved traditionally, is presently being fragmented and dismantled.

In the 1990's, policy making in the European Union focussed predominantly on the creation of the “internal market” and competition among European businesses. The gas market was included in this larger project of deepening integration and was treated fairly much like any other business. Gas, however, depends

for its future growth heavily on supplies from non-EU countries and is an industry that has very large economies of scale. This reinforces the industry's own characteristics and dynamics, which include high up-front costs, long lead times, large-volume increments and supply rigidity. Moreover, these characteristics in general stimulate an oligopolistic market structure, in which only a few large players on the supply and demand side survive. These gas-specific fundamentals were either not properly recognised by policy-makers or it was believed that the introduction of competition would turn the business around. Whatever the reason, the disappearance of the old system and the absence as yet of a new adequate business and policy framework, conducive to realising new gas supplies pose the risk of creating a vacuum for buyers as well as sellers.

In this environment, some doubts have been cast on the ability of the current market players to identify and aggregate demand, to acquire new supplies and to ensure that investments are made to support a timely and efficient growth of the market. Potential external suppliers have expressed concerns about the conditions of the EU market after the present restructuring process will be finished. They have started to develop other potential markets, probably also because they are concerned about the security of demand that they require for their investments.

There is no question that new supplies of gas will continue to come to the European market, whatever the market regime, but the obstacles can be such that the aspired levels will not be achieved. That the wish to secure new gas supplies can be in conflict with market liberalisation seems to be reluctantly recognised: for example, we are now observing a grudging acceptance among policy-makers of long-term contracts as an inevitable feature of the gas business. The uncertainty with regard to these and other proposed changes in the market structure and the process of piece-meal concessions do not construct a sound regulatory climate for an industry that is supposed to expand and offer sufficient long-term security of supply.

The paper discusses the changing roles of government in the member states and the difficulties in creating cohesion in European policies with regards to future gas supplies, partly due to the inaction as a result of the uncertainty about the role of the EU viz. member states in instigating policies, and partly due to the focus on liberalisation that is overshadowing other policy issues.

In conclusion, if the EU wants to see gas perform the role of "bridging fuel" to the fullest extent, it needs to acknowledge the specific characteristics of the European gas business in its policies. Furthermore, "security of supply" and "security of demand" should be on the political agenda alongside market liberalisation. Such an approach should ensure that a more balanced set of priorities decides policy-making and that a framework is created to facilitate the imports of new gas supplies.

## **The case for gas is not self-fulfilling!**

This paper is the first of a series of CIEP publications dealing with the European Gas Business. In this paper we explore the consequences of the process of liberalisation governed by EU directives and the subsequent transformation of the industry. We also highlight some concerns with regard to the specific characteristics of the gas business in relation to the new market circumstances and consider which ideas, issues, processes and uncertainties will impact the future gas market developments. In this first paper, we intend to provide an outline of an agenda for further analysis, without providing any quick or easy answers to the complex issues under review. Some issues will further be analysed in separate papers that follow this first one. The relevance of the proposed extensive analysis of the gas business lies in the widely anticipated prominent role of gas in the European energy market in the next 20-50 years because gas is the most likely “bridging fuel” in the transition to a sustainable energy system. Since this gas cannot be produced domestically, the subsequent growing demand for gas will have to be satisfied with increasing volumes of imported gas from suppliers that are located at an increasingly great distance from the European market.

The expected development of the European gas market must nevertheless match with the three essential elements of energy policy: market economy, environment and security of supply. This paper argues that the over-emphasis on the market economy, so far, has created an imbalance in policy-making that needs to be restored urgently, at the risk of failure to obtain the aspired level of future gas supply in Europe.

### **1. Introduction**

In less than 40 years natural gas has become a household word in many European countries. The rapid development of the gas market was due to the discovery of major gas fields in and around Europe, starting with Groningen, in 1959, and was supported by the establishment of an effective supply and distribution industry. The convenience and price competitiveness of gas enabled it to take over the heating market in all regions where a gas infrastructure could be economically established. Natural gas now has reached a significant share in both the home and industrial heating markets in many countries and continues to make further inroads in these market segments elsewhere. In the power generation sector gas has been a late starter. For quite some time gas was considered a noble fuel that should not be burned in electricity plants. This principle was laid down in the 1970s EU Directive against the use of gas for power generation. Nevertheless, in 2000, gas-fired power generation accounted for some 12% of total electricity generated in the European Union and it is the power sector in which gas is generally considered to have the greatest potential to grow (IEA 2002a).

The case for gas seems clear according to many European and global energy studies (IEA, 1995; IEA, 2001a and b; CEC, 2001): Europe should continue to significantly increase the share of gas in its energy supply portfolio in order to benefit from a clean, low carbon, energy supply with clear economic advantages.

It is widely recognised that a transition to a sustainable energy economy will take a long time, possibly another fifty years. This means that the world, and thus also Europe, must accept a continued and increasing use of fossil fuels during that period. Of these fuels, natural gas properties and applications have the least environmental impact. Moreover, natural gas and the gas infrastructure offer the best opportunities to develop a hydrogen economy. Hence, natural gas is widely presented as the *bridge to a sustainable energy system*. In this paper, a number of issues that underpin this future perspective are queried. The main reason for such a critical review is that future natural gas growth will have to develop in a context that is radically different from that of the past. The main distinctions are:

First, the EU gas industry is in a process of radical restructuring, as a consequence of the implementation of the 1988 EU *Single Energy Market* project (CEC 1988). Shaped by the 1994 Hydrocarbons Directive (94/92/ EC, 30 May 1994) and the 1998 Gas Directive (98/30/EC, 22 June 1998), this process fundamentally changes the behaviour and strategic outlook of the various actors in the gas market, including governments, up- and down-stream gas and other energy enterprises, financing institutions and consumers.

Second, a more significant role for natural gas will have to emerge in a situation in which the indigenous supply of gas is assumed to decline - possibly in absolute terms, but surely in terms relative to demand. Increasingly, the future will require steady supplies of gas from far away sources, external to the EU, to fill the predicted gap between supply and demand.

Both issues, within their own right, have been discussed in the analyses referred to above and in many other papers (Stern, 2001, 2002; Hough, Concha, 2000; EGRF, 2002). By and large, the conclusion of these studies is that we will need those extra supplies and that the emerging market and industry structure will take care of their supply, *if the right institutional and economic context is provided*. This, of course, is a truism... But what is the *right* institutional context? What kind of policies and strategies facilitate the growth in demand and required supply? Are these approaches currently adopted and implemented at the European Union and the Member States' level? Energy policy does not appear very high on the agenda of EU countries and the present national policies do not show much consistency. What happens when *the right institutional context* is NOT provided? Is there a potential future energy supply gap, which - if left to the market - will be filled with coal and oil, at an economic and environmental cost? Or is there something worse?



Most studies and analyses that underpin the predictions regarding the performance of a future liberalised European gas market draw on economic theory (see section 6) that is empirically supported by past experience and analyses of developments in the US and the UK gas markets and a variety of non-gas markets. Several problems emerge from this analytical approach that make the application of those theories on the continental European gas market less robust. The main problem is that the physical, geo-political and economic characteristics of the US and UK markets (like self-sufficiency, many producers and short distances to market) radically differ from those in the European gas market. Particularly the reality that considerable amounts of gas will have to be produced far away, beyond the borders of the expanded EU, complicates the understanding of what a liberalised market may lead to.

## **2. Growth in energy use**

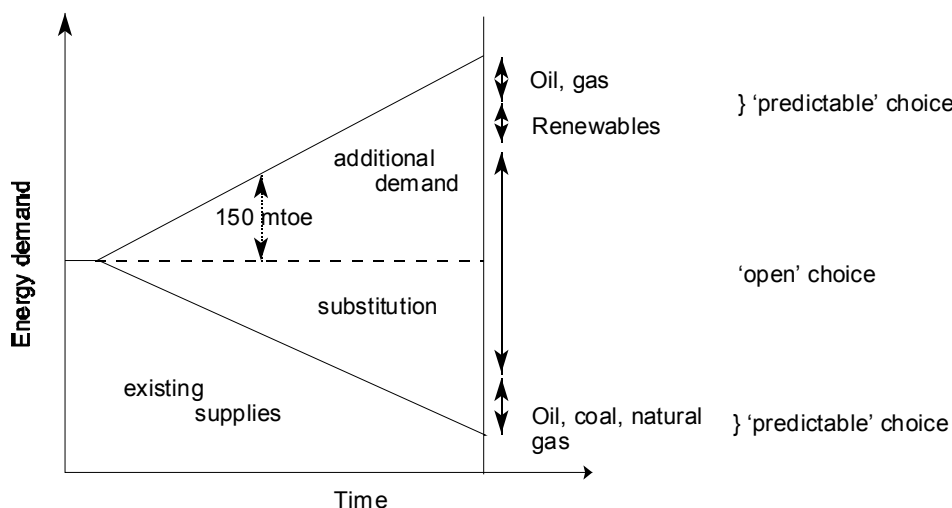
In spite of the significant energy savings and improvements in energy efficiency that have been realised in almost every market segment, there appears to be reasonable consensus that Europe will continue to need more energy over the next 50 years, with growth of demand ranging from 0.5 to 1.5% per year, over the next 20-30 years, depending on economic growth (see EIA, 2002a; IEA, 2002b, 185; CEC, 1999). Yet, there will be quite a large variation among individual countries, regarding the patterns of efficiency improvement, industrial restructuring and the consequent growth in energy demand. Focussing on the current EU-15, a reference-case estimate predicts total primary energy demand to grow by around 11% from 1,454 mtoe in 2000, to around 1,600 mtoe by 2020 (CEC, 1999, 186). The residential and service market accounts for 40%, the transportation market for 39% and the industrial market for 21% of the growth in final energy demand. Since the share of electricity in final energy demand increases, electricity generation will rise by almost 40 %, requiring substantial increases in investments in generating capacity (with more differentiation between peak-load and base-load generation capacity) and taking up around 110 mtoe of additional fuel inputs.

Figure 1 illustrates how energy demand develops. 'New' demand for energy in the EU emerges from two segments. The first of these, "substitution", involves the replacement of old energy appliances and equipment by households and industry and retired plants by the power sector, with the consequential choice of fuel. The second segment involves the additional demand for energy associated with the ongoing growth of the economy and the population, the resulting expansion in the transport sector, in the productive sectors of the economy and in the domestic households, and the inherent energy requirements. In both segments decisions have to be made with regard to the choice of fuel. In some cases, the decisions are reasonably predictable, as is explained in section 3 below. For example, for households and industry, in most cases where gas is an option, the choice should inevitably point to gas. In other cases,

*The case for gas is not self-fulfilling!*

notably in the power sector, the decision to switch to gas is not such a foregone conclusion.

**Figure 1. Composition of new energy demand from growth and substitution**



The development of the aggregate additional demand for natural gas in Europe is a function of a range of interacting factors shaping the use of energy and gas in Europe's local markets. These include the considerations underlying the timing of replacement of old stock, local economic growth, fuel options and preferences of the consumers, or relevant gatekeepers, based not only on economic evaluations but also on additional factors, such as convenience, the outlook on an effective CO<sub>2</sub>-abatement policy, other (local) policies and the *security of supply* for specific fuels. These factors, in turn, are appreciated differently among the various types of consumers and for different local environments.

It is obvious that major uncertainty exist regarding the impact and the precise timing of all those specific factors affecting the development of future aggregate gas demand in the EU's regional fuel markets. Of course, this is generally recognised by planners and analysts when they make projections of future demand. However, what can be useful as a general planning tool for policy developments, cannot be regarded as a plausible and properly timed estimate for the EU's future local natural gas requirements. Particularly not when these estimates must be used as a basis for decision making for gas producers in Norway, Russia, Algeria and other potential sources. Those producers generally need to be assured of the sales of large incremental quantities of supplies, as investments in *dedicated* production and transmission capacities for specific regional markets are only economically feasible when realised on a large scale. Only detailed insights in the determinants of demand in a local market allow for an accurate evaluation of the 'security of demand', an essential element for the planning of the production and the size and routes of the supply systems, at the penalty of large economic losses.

Also in the future, some sort of a way is needed to identify the size and pattern of demand for gas in all local sub-markets and to aggregate the individual 'orders', in such a way that a 'contractable' supply portfolio emerges, for which the buyer(s) can 'partner' with suppliers in the process of managing risks and uncertainties.

### **3. The potential role for natural gas**

As already stated, for reasons of efficiency, environment and convenience, natural gas should indeed be the fuel of choice. And indeed, the analysts and planners of many future supply/demand projections point to gas, as the bridging fuel towards a more sustainable energy economy. But will the future buyers of fuels behave in accordance with these forecasts? If they have a choice of fuel, will they choose gas? Let's start from the premise that there is currently no political support for nuclear growth (or better, too much resistance), and that renewables will be allowed to play their role to the fullest extent (see below). For the remaining future demand, three fossil fuels could be considered to satisfy the additional fuel requirements: oil, coal or gas. Not every consumer, however, can freely choose between these three. Most do not have a choice. The **automotive market** is, at least for the next decade, the preserve of gasoline and diesel. The existing gas-fired **home heating** market is a captive market for gas. In the **industrial market**, there is relatively little dual firing capability, because most industrial customers connected to a gas grid have normally opted for gas only. This has been reinforced by the tendency in many industries to install CHP equipment, for which gas is by far the preferred fuel. It, therefore, can be assumed that also the industry sector is a captive market for gas, insofar as it is linked to a gas grid, and provided gas will continue to offer the same value proposition.

Whereas the **power sector** as a whole has the ability to switch fuels *operationally*, most of the existing individual power stations are married to a single fuel. Consequently, the *strategic* choice of fuel in power generation is made when replacement of retired stations is due and/or when incremental capacity is needed. The potential new generating capacity (from substitution and growth in demand) is estimated at some 300 GW (IEA, 2002a), contributing 10-12% of total primary energy consumption in the EU-15 or around 200 mtoe of potential additional gas by 2020 (CEC 1999, 186), if mostly all new as well as the replacement capacity for decommissioned coal plants was gas-fired. But, this growth in gas demand is not as certain as is often assumed, notwithstanding the fact that, even at today's relatively high gas prices, the choice for gas-fired plants has an overall cost advantage (CEC 2001, 87-91; EIA 2002b, 73; IEA 2002b, 110; OECD 1998). Many generators, however, are still uncomfortable with the high fuel costs of gas. In today's power market, particularly with excess capacity, low wholesale power prices across various parts of Europe are substantially slowing down the construction of new gas-fired power plants and with it the growth of gas consumption in power

generation. Long-term forecasts show this demand recovering but currently we are in a period of considerable uncertainty. High marginal fuel costs also force existing gas-fired plants down in the merit order of power supply and possibly limit the use of gas for base-load generation. Operators are also concerned about the uncertain future of gas prices, in which rising prices will reduce the competitive position of newly constructed gas-fired plants. And not without reason: in Europe there are still mothballed gas-fired power plants that were rendered uncompetitive by increases in gas prices in the 1970s.

To alleviate the latter concerns, gas suppliers and power generators, in a number of cases have concluded long-term gas sales agreements for new power plants with price indexation, designed to provide long-term assurance of price competitiveness. Particularly independent power producers (IPPs), often operating with a single plant, at a small risk margin, may need contracts with these contractual pricing features. Without these, IPPs may not be willing to enter the market, while large-scale power generators may prefer coal-fired generation as a safer long-term bet or at least as a continuing, significant part of their generating portfolio. Obviously, the absence of IPPs would reduce competition in the power market significantly. In short, this implies that, to support a transition to natural gas in the power industry, the regulatory and policy environment should allow buyers and sellers of gas to create such assuring contractual conditions.

#### **4. Supply Outlook**

Increasing gas use in the EU could imply that a high dependence on oil imports is replaced by a high dependence on both oil and gas imports, because Europe won't be able to supply sufficient gas from indigenous resources. Recently, the growing dependence on imports of fuels from outside Europe has gained attention again. This, however, has not yet translated in clear and consistent positions or policies across the European Union member states, as was made apparent in the several EU and IEA publications (IEA 2001, 2002; CEC 2001). Per country, there is a wide variation in import-dependence of different fuels, thus it is not easy (or appropriate) to develop policies at the level of the EU. Moreover, the actual options available to reduce this dependence are limited.

**Oil and oil products** are still the most important fuel in the European energy market. For more than 20 years EU member states have actively sought to reduce their dependence on oil, to its current share of around 40% across the EU. With regard to security of supply, oil is a global commodity that can easily be transported and stored. Imports for the EU 15 plus Norway account for more than 50%<sup>1</sup> of total oil consumption and this figure will increase further with falling

---

<sup>1</sup> The EU-15 itself depends to more than 70% on imports.

indigenous production (BP 2001). The advantages of oil are clear. With an extensive infrastructure and low transportation and storage costs, it still provides the most convenient and price-competitive fuel for the automotive market. It is not likely, though, that oil products can regain ground in the residential heating market, while in the power generation sector the share of oil has been reduced for reasons of security, environmental concerns and price competitiveness. Altogether, the opportunity and justification for oil and oil products to take a bigger share of the future energy market seems limited so long as gas is available at competitive prices. It should be noted that taxation and levies are a crucial element in the prices of the several oil products.

Ambitious targets are set for **Renewable energy** in Europe's future energy portfolio, with a doubling of its share by 2010 from the current 6% (CEC, 2001). With that increase, amounting to some 100 mtoe, it would be the relatively fastest growing source of energy, but it will fall short of meeting the growth of European energy demand. There is considerable political agreement on the desirability of promoting renewable sources of energy as part of the future fuel mix of Europe, as it contributes to two of the three pillars of energy policy, namely the *environment* and *security of supply*. However, given the current state of technology, the cost of renewable energy is still high and increasingly also environmental downsides of some of the preferred alternative fuels, like biomass, become more important. Tax incentives and subsidies are provided for the development of renewable options, sometimes funded by levies on other fuels. Such policies have their limits, however, as they are not sustainable and Europe aims to achieve low, competitive energy prices in the global market. In the absence of technological breakthroughs, renewable energy will be struggling to achieve those targets in the medium term.

Only twenty years ago, in response to the two oil price increases in the 1970s, the EU Council set a target to cover more than 70% of the EU electricity needs by means of nuclear energy and solid fuels. Sentiments have changed a lot for both forms of electricity generation: the accidents around nuclear power stations brought into focus the dimensions of the safety risks of this technology, while environmental concerns went against coal-fired power generation. Today, **nuclear power stations** installed in the EU provide 36% of the Communities electricity needs (IEA, 2002a). The future of nuclear energy in Europe remains uncertain, because the trade-off is complex. On the upside, nuclear energy contributes to security of supply and deals radically with one particular environmental concern, CO<sub>2</sub> emissions. On the downside, it is quite expensive relative to electricity from fossil fuels. Until the industry and the public come to grips with the safety risks (further brought into focus by the post-11/9 war on terrorism) and the problem of long-term storage of waste, there appears not to be much chance for a significant comeback.

**Coal** can only play a role in power generation. From a security of supply point of view, coal is an excellent performer. Notwithstanding

the fact that virtually all new coal supplies will have to be imported from outside the EU, there is international trade with a choice of coal suppliers and a surplus of production capacity; supplies can originate from diversified sources and buyers can fairly easily switch between suppliers. New supplies can be developed at relatively low incremental costs. As a result the coal prices have shown more stability than oil prices. Nevertheless, the construction of new coal-fired power stations in Europe has slowed down substantially, because the advantage of coal only applies to existing plants. As stated before, it will be more expensive to build and operate new coal-fired than gas-fired power stations (under all but the most extreme price scenarios for gas and coal), even without taking a future carbon tax into account.

## **5. Unlike oil and coal, gas is not readily available**

Unless Europe radically changes its position on nuclear energy, increased dependence on fossil fuels imports will be a given for the foreseeable future. By 2030 Europe will need to arrange at least 70% of its energy requirements through imports of fossil fuels (IEA, 2002b; CEC, 2001), if we assume that natural gas would become the preferred fuel for power generation. This would lead to a share of gas in the EU primary energy portfolio of close to 30% by 2020, but individual countries may show very high dependencies on natural gas.

This raises security questions that are often best addressed on a country-by-country basis, given the large differences per country in fuel mix and import dependence. The risks around this aspect of security of supply are dependent on diversity of fuels and supply sources and the political and technical security thereof. High dependence on fuel imports in itself does not need to pose insurmountable risks. Japan, as the second economy of the world, has managed to cope well with its very high dependence on imports and may provide some lessons on the consequences of import dependence. Over time it has developed and maintained strong economic and political ties with the countries on which it depends, always with an open eye to the interests of the supplying countries. Security and policy aspects require further analysis and attention. For gas specifically, the first question to be asked is whether the higher volumes needed to support the assumed growth in demand will be available at all. The answer is that, in principle, there is enough gas within economic reach of the EU to meet Europe's additional demand for energy for the foreseeable future. Indeed, generally the impression given is often that Europe has many potential suppliers of gas and that it thus does not need to worry about its future supply. European countries generally support the development of new indigenous sources and it is true that there are a number of countries interested in exporting their gas to Europe through pipelines, with Russia as the key provider and possibly a diversified portfolio of imports from the Caspian Sea area and/or Iran.

A second potential source of additional gas supply may come in the form of Liquefied Natural Gas (LNG). There is a lot of activity on the

LNG front and, indeed, this could continue to help to supply a growing part of Europe's gas requirements, but because of limitations in scale LNG will not be able to satisfy more than a portion of future demand. The bulk of new gas supply will have to come through pipelines.

These solutions, however, will probably never materialise if policy-makers in the consumer countries fail to accept the conditions necessary to bring this gas to the EU markets. The identification of the large gas fields in the Russia, the Caspian Sea region and the Persian Gulf, on the one hand, and the forecast for significant demand growth in Europe, on the other, are not sufficient conditions alone to bring the gas to the market. This is because fundamental differences exist between the exploitation of gas, oil and coal resources. Because there exists an international and mature market for oil (and, to a lesser extent, for coal), and transportation of oil is relatively cheap, oil producers can bring new fields into production, even from remote places, knowing that the fuels can always be sold somewhere, at the going price. The exploitation of remote natural gas resources, however, does not offer the assurance that a market can be found somewhere. This is because of the need to construct an expensive *dedicated* pipeline infrastructure from the remote fields to the market, which interconnects suppliers and consumers in a delicate relation of interdependence, also including transit agreements. The alternative to pipelines is a complex LNG chain, which is also characterised by very high investment costs for liquefaction, transportation and regasification. For both pipeline gas and LNG, the per-unit-of-energy cost of long-distance supply could be a factor 6-8 higher than that for oil. The development of such gas supply arrangements is quite complex and involves long lead times of between 5-8 years, normally. The size of the investments, their timing and the quantities of gas involved in the new developments are such that producers and suppliers from outside the EU cannot undertake these ventures without a high degree of certainty that the gas will be accommodated in the market (and if so, at the right price), when the gas is produced. This implies that such supplies need be carefully arranged with the contractual (and other) support of those buyers in the market, that have the scale and the ability to evaluate and aggregate the many small parcels of demand in local markets. The uncertainties around price, the timing and volume of gas demand over the medium term and the ability of the market to absorb large incremental quantities of gas is a key issue in the complex relationship between gas suppliers and their markets.

Of course, in its development over the past 40 years, the European gas industry has faced many of the same uncertainties. In response, it has developed a number of instruments to reduce these. On the supply side, the economic risks of 'security of demand' were covered by the long-term supply contracts with provisions on take-or-pay basis, providing limited flexibility, and price indexation ensuring the competitiveness of gas in the specific markets, by means of destination clauses. Supply and demand organised in this particular

way, required large players that could take on these types of contracts. At the same time, this market organisation allowed for insight regarding the development of new demand in specific markets that could easily be 'transmitted' through the system and aggregated, and thus formed the foundation for the consequent planning and construction of the transportation systems. Indeed, by its joint-ventures, its shared responsibilities in transmission and retail trade and its contractual structures that provided 'bankable' purchasing power, the industry as a whole achieved a high degree of co-ordination *and* flexibility, that reduced and covered economic, political and technical risk. It, thus, allowed for a more or less continuous growth of the supply system, a high degree of security of supply and a great stability and profitability of the industry involved. The challenge was whether this was always the most cost-efficient industry structure, providing the best value to consumers. At the moment, this specific structure is being dismantled in the belief of achieving a more efficient one. New market conditions are created that promote short-term competitive business transactions. Such a new market structure requires a national regulator to safeguard this new market structure and at the same time guarantee the public interests.

A key issue for the future development of a liberalised gas industry is the question as to how the 'market' will be able to timely perform the functions of evaluation and aggregation of demand mentioned above, and offer an acceptable financial and demand security, in terms of an acceptable level and distribution of price and volume risk, to justify the huge investments required. In fact, this process of identification and evaluation of demand is becoming even more relevant as a consequence of the shift towards a different target customer base in the future. So far, the European customer base was developed, primarily, through consumption growth in the residential and the industrial sectors. These sectors are relatively captive and predictable markets, compared to the power sector, the main target for future growth of the gas market. The dynamics of power sector development provide only a limited certainty about the timing of investments and the fuel of choice, while the size of potentially required additional 'chunks' of supply are very large.

## **6. Is EU energy policy supportive of growth?**

Traditionally, energy policy has been the domain of the EU member states and energy was deliberately left out of the Maastricht Treaty. Given the different interests, positions of self-sufficiency, fuel supply portfolios and political priorities and preferences, it was considered that the definition and implementation of energy policy should remain at the level of the individual Member States. Over time, however, the Member States have come to recognize the increasingly international dimension of many current energy issues and the consequent need to harmonize policies and to define objectives and measures at the EU level. Particularly, the movement towards an internal European market has raised aspects of energy-policy-making to a European



level. Unfortunately, the resulting process of multi-level policy-making is complicated and fraught with gaps and imbalances, at the EU and national level. A number of aspects are important in this respect.

To start with, a major problem of this 'grand design' of liberal energy market restructuring is that it is justified by reference to a rather specific framework of economic theory. This framework is built upon a set of rather demanding assumptions underscoring the superior workings of 'the market', as a device of co-ordination (See for example: Armstrong *et al*, 1995; Newbery, 2001; IEA, 2001: 68, 82, 109). These assumptions, outlined in every modern economic textbook, address aspects like the structure of markets, the accessibility and transparency of knowledge and information, the absence of adjustment and transaction costs, the internalisation of security and uncertainty as risk in the process of price formation in the 'free' market, etc. The problem with these assumptions is that they are hardly ever met in real-world markets, and certainly not in capital intensive, network-based infrastructure sectors with remote sources of production, a long lead-time for investments, considerable political risk and only a few players involved, like the gas industry (see also Newbery 2001, 343-384). The differences in this respect with the liberalised telecom industry that often serves as an example are huge. In this paper, it is further not dealt with the (debatable) proposition that liberalization of the natural gas industry can be considered as an effective means to re-dress and slim-down businesses without harmful side-effects for *mature* gas supply systems in which the capacity present is sufficient to supply the (near future) gas requirements. But even though the European market contains some 'provinces' that seem to have reached a *mature* status, it seems more sensible to consider the European gas system as a whole as an *emerging* system, in which gas markets and their supporting infrastructure need to grow substantially to deliver the environment in which gas can perform its expected role as the bridging fuel towards a sustainable energy system. For such a perspective, there is the pressing need for the ability to integrate future demand and secure new supplies from expensive sources, which are far away from the centres of demand.

Rather than moving in the direction of co-ordinated new supply and demand, the competitive market approach that is prevailing in the EU at the moment, implies that a system is being developed in which the links of collective interests and the co-operative exchange between parties are deliberately cut. Competition between suppliers is to be brought about by the unbundling of the supply chain and by the creation of a business environment aimed at competition, rather than co-operation between entities involved in transmission, distribution and (retail)trade. This, however, also implies that the newly formed businesses are effectively isolated from market information, like patterns of energy use and investments by other parties, necessary to overview their own position in the gas sector. This is also true because this strategic information is increasingly treated as sensitive and confidential. Unbundling, moreover, causes the merchant gas

companies, the traditional engines of aggregation and co-ordination in the system, to lose the use of their network assets as an integral part of their financial strength and hence reduces significantly their ability to absorb the risks associated with major gas acquisitions. It is true that the new draft EU directive prescribes the legal (not ownership) unbundling of the *system operator*, so that integrated gas companies won't have to divest their pipelines. Yet, such companies will be in a constant struggle with the regulator and courts to prove their non-discriminatory behaviour. This perspective has led various countries to move into the direction of full unbundling, as is illustrated by the examples of the UK, Spain, the Netherlands and Belgium. Recently, an awareness is growing that the simple dismantling of the traditional market institutions, like patterns of ownership and long-term contracts and so on, does not produce an 'appropriate' competitive market in the gas industry. Indeed, as argued before, the natural gas supply industry is a capital intensive, network-based infrastructure with remote production facilities, involving long lead-times for investments and a considerable political risk, with only a few players involved. Gradually, it is being 'discovered' that in the gas industry, an extensive regulatory system is needed to 'mimic' the (in theory) positive effects of a competitive market. In response, all kinds of remedies are proposed. New tools, conditions and systems of trade, including exchanges, auctions, and regulatory approaches regarding the costing and pricing of infrastructure exploitation, are deemed necessary to bring about competition in the gas market.

It can be doubted, however, whether the (potential) gains from 'artificially created' competition in the gas market will justify the risks of not securing future supplies in a timely manner. Important consequences arise from the development sketched above. First, it did cause an imbalance in policy-making, as the attention became fully geared towards the instrumentation and institutionalisation of the liberalized gas system, without much regard for substantial elements of energy and gas policy, like (longer-term) security of supply, expansion; not to speak of agreement on the meaning of these concepts. The latest rediscovery by national governments and the IEA and EU, of security of supply issues has questioned the prudence of this decision-making.

Secondly, following the principle of *subsidiarity* in implementing the EU Gas Directive, member states are responsible for the development of these instruments. This results in a sharp fragmentation of the institutional framework of the European gas market, reflecting national differences in ideologies, in technological characteristics, in resource endowments and in the location of countries. It also brings about a functional policy gap, as (some) national governments do not articulate their national energy policy anymore, while co-ordinated action across the EU has not yet been agreed upon. Indeed, issues of short-term security of supply were deliberately left to intergovernmental cooperation through the IEA. The recent proposal for a EU Directive on Security of Supply tries to capture that ground, but this initiative is quite 'dirigiste' rather than aimed at promoting

market efficiency and also focuses primarily on short-term disturbances. The essence of the problem arising from this fragmentation is in the absence of shared agendas, to discuss longer-term objectives and solutions for the future supply of gas. Indeed, the current process of regulatory trial and error causes large uncertainties regarding the market rules and the business environment and a situation is emerging in which policy-making is dangling in between the theoretical blue print of an ideal market and the nasty characteristics of a real-life market situation. The gas producing countries, particularly Russia, Algeria and Norway, and some of the large oil companies and financing groups involved, are un-mistakenly showing signs of confusion and discontent with these developments. For example, at conferences in Algiers, in May and September 2002, producing countries – with exception of Norway and the Netherlands - made clear that the concepts that have emerged from the process of liberalization are not helpful in creating the environment for a further expansion of the gas market (Gas Briefing International, September 2002; WGI, September 4, 2002, p.5; WGI, September 11, 2002, p.5).

Meanwhile, few of the importing countries have taken steps to secure their longer-term requirements. A national *alleingang* is hardly feasible; there is no accepted co-ordinated approach at the Community level as yet, except for the Commission's recent short-term *Security of Supply* proposal. Essential in this respect, is that the arena of the discussion on secure future gas supplies is quite different from the arena where the liberal restructuring of the gas market is being contemplated. The same could be argued regarding the development of environmental policy, of course. An obvious expression - and possibly a cause of this phenomenon - is the traditional struggle over tasks in energy policy-making between departments involved with *market* and *competition* issues, and departments dealing with substantive energy policy, including environmental and security aspects. This is true in respect of the EU and in quite a few of the Member States. In line with modern policy paradigms, the remaining social and environmental public policy objectives are conceived as an add-on to a principally 'market-based' system: "*First get the prices right, then we deal with policy...*" The highly un-practical result of this separation is a defensive, uneasy international patchwork of ad-hoc compromises, based upon the theory of competitive markets, but (necessarily) diluted by the requirements of day-to-day policy-making.

## **7. Conclusion: A New Arena needs a Different Process?**

A main observation of this paper is that clarity is needed in defining areas of responsibility between EU and member states and also in recognising the fundamental problems arising out of the potentially conflicting objectives of liberalisation and the need for many of the Member States to secure additional future gas supplies. To date,

many of the conditions needed to ensure a successful growth of the gas market conflict with the measures introduced, and envisaged, regarding the liberalisation of the market. Indeed, it is even argued that market liberalisation may inspire the producing countries to turn their *Forum of the Gas Producing Exporting Countries* into a GASPEC, and that, paradoxically, it is precisely the liberal market situation that allows for the potential effectiveness of such a cartel. At the same time, of course, GASPEC could be a most effective means to block any attempts to further producer-consumer co-operation, if its institutionalisation is provoked by deliberately non-co-operative behaviour from the side of the importing countries.

Objectives and policies towards *liberalisation* and *security of supply* do not mix easily. The acceptance by the Commission and national regulators that long-term contracts do have a role to play, suggests that it has been recognised that the tendency to leave long-term supply issues to the liberalised market may result in difficulties to secure these incremental volumes of gas. But this may not be enough to ensure that the gas will find its way to the European market. For example, the same acceptance will be required for long-term capacity contracts for infrastructure. Moreover, the market has to be given sufficient room to develop a new system with the capabilities and the financial strength to aggregate demand, and purchase or deliver gas to the market in time for gas to fulfil its potential as the bridging fuel. If such room is not allowed, European markets players may opt for the easily available fuels, and fill the growth gap with more oil or coal, with their more adverse effect on the environment (and possibly on costs). The penalty of not fully achieving the objective of a high degree of gas penetration is considerable. Every 14 mtoe of gas (equivalent to about 18,5 billion m<sup>3</sup> of gas) used for new gas-fired power generation, instead of newly built coal plants, saves Europe 35 Mt of CO<sub>2</sub> emission, equivalent to 10% of the EU 2010 reduction target on an annual basis. Moreover, when fuel cells and the hydrogen economy will achieve the conditions of commercial viability, gas will be the logical feedstock for hydrogen manufacturing. It is obvious that an adequate supply of gas can facilitate such a rapid transition. However, without concerted action on the part of governments, regulatory bodies and industry to develop both indigenous and remote resources and to create the market conditions for commercial viable activities, the growth of the gas business will be stunted. The achievement of long-term security of supply and demand, stable prices, and a sound investment climate, can only be effectively realised when these objectives of energy policy are securely embedded in the market system. This implies that the various parties that develop the market and that wish to realize a stable long-term policy environment, should all share this perspective. These parties include the national regulating agencies, the gas industry and the governments of countries on whose future gas supplies the EU will depend. Indeed, the EU should avoid a too much single-minded pursuit of liberalisation by its bodies concerned with the gas industry (e.g. the Madrid Forum), but instead ensure that its marching orders to these

*The case for gas is not self-fulfilling!*

bodies are consistent and based on a framework of objectives and priorities, that are derived from the broader policy issues, including long-term security of supply and the promotion of gas utilisation.

## References:

- Armstrong, M., Cowan, S., Vickers, J. (1995) *Regulatory Reform: Economic Analysis and British Experience*, The MIT Press, Cambridge Mass., London, England, pp. 362;
- BP (2001) *Statistical Review of World Energy*, June 2001.
- CEC (Commission of the European Communities) (1988), *The Internal Energy Market*, 2 may 1988, COM (88) 238 final.
- CEC (1999), *European Union Energy Outlook to 2020*, Luxembourg.
- CEC (2001), *Green Paper: Towards a European Strategy for the Security of Energy Supply*, 29 November 2000, COM (2000) 769 final plus Technical Document.
- EGRF (European Gas Regulatory Forum), (2002), *A Long-Term Vision of a Fully Operational Single market for Gas in Europe: A strategy Paper (Draft)*, Prepared by the Joint Working Group of the European Gas Regulatory Forum, 28 January 2002 (<http://europa.eu.int/comm/energy/library/strategy-paper-draft-28-01-2002.pdf>).
- EIA (Energy Information Administration), (2002a), *International Energy Outlook 2002*.
- EIA, (2002b), *Annual Energy Outlook 2002*.
- Gas Briefing International, September 2002.
- Hough, D., Concha, R., (2000), *The European Gas Directive: Will it Lead to an Open and Competitive Market in Gas?*, NERA Energy Regulation Brief 5, June 2000, National Economic Research Associates, London.
- IEA (International Energy Agency), (1995), *The IEA Natural Gas Security Study*, OECD/IEA, Paris.
- IEA, (2001a), *Regulatory reform of European gas*, OECD/IEA, Paris.
- IEA, (2001b), *World Energy Outlook, 2001 Insights*, OECD/IEA, Paris.
- IEA, (2002a), *Electricity Information 2002*. OECD/IEA, Paris.
- IEA, (2002b), *World Energy Outlook 2002*, OECD/IEA, Paris.
- Newbery, D.M. (2001), *Privatization, Restructuring and regulation of Network Utilities*, The MIT Press, Cambridge Mass., London, England.
- OECD (1998), *Projected costs of generating electricity – Update 1998*, OECD, Paris. 1998.
- Stern, J. (2001), *Traditionalists versus the new economy: Competing Agendas for European Gas Markets to 2020*, Briefing Paper No. 26, November 2001, Royal Institute of International Affairs, Energy and Environmental Programme.
- Stern, J. (2002), *Security of European Natural gas Supplies: The impact of import dependence and liberalization*, July 2002, Royal Institute of International Affairs, Sustainable Development Programme.
- WGI (World Gas Intelligence), various issues.