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EUROPEAN GAS MARKET : STAKES AND PERSPECTIVES

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Abstract

World reserves of natural gas are abundant and expected to increase up to 2050. World gas production is projected to more than double between 2000 and 2050. However, regional disparities in gas reserves and production costs are expected to modify the regional gas supply pattern in 2050: about half of the total gas production will originate from the CIS and the Middle East.

Important uncertainties remain on the EU27 gas demand and supply in the long term. For example, on one hand, the enlargement of the EU modifies the landscape. The question of the penetration of the natural gas in the energy balance is for a "new entrant" an important aspect of their energy policy. On the other hand, the liberalisation of the EU gas market may have important consequences on the strategies of gas producers like Russia.

Introduction

Over the last fifteen years, European demand for gas has grown rapidly for several reasons : price competitiveness, environmental advantages over other fossil fuels and abundant resources. The rise in gas consumption has been particularly remarkable in the power generation sector. Europe's growing demand for gas shows no sign of abating in the long run. According to POLES model, the Reference case projects the continuation of this trend through 2050 – although at a lower pace by the end of the projection period. In this framework the main question is how the projected growing market for gas, combined with the decline of gas production in Europe, will affect the outlook of gas supplies to 2050 and what the impacts will be on the security of supply in the European Union.

The POLES model (Box 1) provides a good description of a balancing gas market for the enlarged EU27. It is commonly accepted that projecting global energy trends to 2050 involves considerable uncertainties not only in the supply but also in the demand side. In order to take into account these uncertainties alternative outlooks will be compared to the Reference scenario.

Box 1 : POLES model

The POLES model provides a complete system for the simulation and economic analysis of three regional markets (America, Europe/Africa, and Asia) so as to account for regional differences in cost and market structures.

The POLES model is a dynamic Partial Equilibrium Model, essentially designed for the energy sector, including also energy markets and GHG emitting activities. The simulation process is dynamic, in a year by year recursive approach that allows de-scribing full development pathways from 2005 to 2050.

The use of the POLES model combines a high degree of detail on the key components of the energy systems and a strong economic consistency, as all changes in these key components are at least partly determined by relative price changes at sectoral level. The changes in international prices of oil, gas and coal are determined endogenously in the model. The international price equations take into account the relevant variables associated to short-term adjustments in price levels, such as the Gulf capacity utilisation rate for oil, and to medium and long-term variables such as the Reserve on Production ratio for oil and gas, or the trend in productivity and production costs for coal.

The POLES model identifies forty seven world regions or countries, with a full description of the energy systems of the European Union and of the largest countries. For each region or country, the model articulates four main modules dealing with final energy demand, new and renewable energy technologies, electricity and other energy transformation sectors, and primary energy supply. Gas supply profiles in the largest world producing countries are dealt with a discovery process model.

The integration of import demand and export capacities of the different regions are ensured in the international energy market module, which balances the international energy flows. The natural gas trade and production is modelled on the one hand on the basis of the capacities from each producer to each sub-regional market and on the other hand on the actual quantities supplied by each producer for the demand simulated by the model.

First the model calculates the total new capacities required by each market. Then, the projected capacities along the different routes depend on the gap between the price on the considered market and a cost benchmark, associated to each route: the larger this gap, the higher the incentive to develop new capacities. A constraint allows limiting the possible “crowding out” effect of new entrants on the different market.

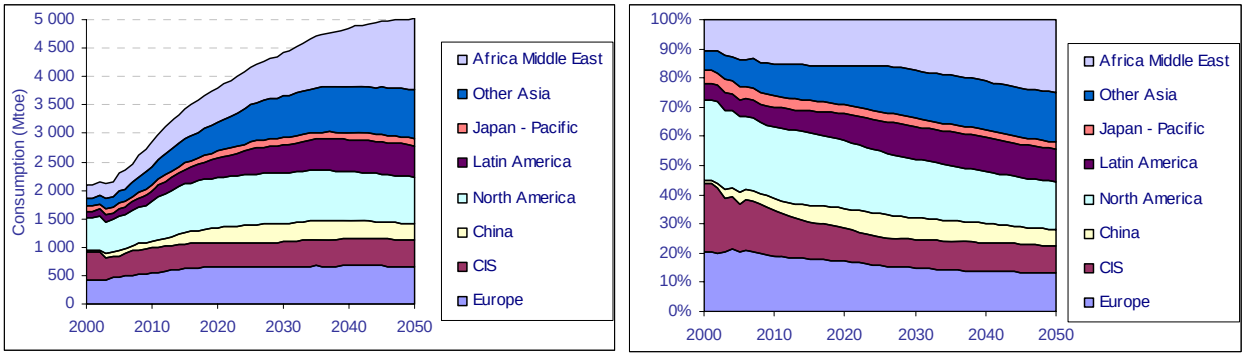
The actual capacities are then derived from projected in the previous five years period, with a constraint ensuring that new capacities will not induce a rapid exhaustion of the available reserves of the considered producer.

Finally the model allocates the market shares of the major exporters on each market, on the basis of the variable transport costs on each route.

European Natural gas market features

The EU gas market is rapidly expanding and growth is expected to continue in the next 50 years. The growth is much more important up to 2020 (2.1 %/year), stabilise up to 2030 and begin slightly do decrease after that date. However EU 27 gas demand in 2050 is 13% higher than in current level. In the world level the EU27 contribution to the gas consumption is expected to decrease steadily.

Figure 1 : World gas consumption by region



The expansion of gas use in the EU27 is determined principally by the rise of gas use for power generation. The share of gas in electricity production has more than doubled in the last ten years and continues to increase to 38 % in 2010, 45% in 2020 and 43% after that.

Table 1 : Overview of EU27 gas market

	1990	2000	2010	2020	2030	2050
Share of gas in gross inlad consumption	16%	23%	25%	29%	29%	27%
Share of gas in electricity production	12%	31%	38%	45%	43%	43%
Share of gas supplies						
Europe	54%	57%	46%	46%	35%	14%
CIS		28%	22%	23%	30%	68%
Africa, Middle east		15%	32%	31%	35%	18%
EU27 external dependence to gas	46%	43%	54%	54%	65%	86%

Another important feature of the EU27 gas market is that the role of the European production decrease steadily. Its part in the European consumption is divided by four at the end of the simulation period (14%). This means that EU27 external dependence to gas increase from 43% today to 65% in 2030 and to 86% in 2050.

Natural gas demand is also projected to increase in the other world regions (see

Figure 1) : some of them with limited or declining gas reserves are expected to become net importers leading to modification of the world gas trade patterns. For instance, the rapid gas demand growth in Asia is expected to have some influence on the EU gas supply pattern which means higher supply risks for the EU. The CIS is expected to be the lead gas supplier of the EU countries during the whole simulation period, its contribution may vary from 28 % today to 68 % in 2050. So it is important to analyze the strategies and the behavior of one of the main European gas suppliers, Russia and its major company Gazprom.

Russian and European gas interdependence: some perspectives in the context of the EU gas market liberalisation

Russia is the main supplier of Europe and more particularly the European Union. In 2005 its exports to this zone (excluding CIS and Baltic countries) amounted to 154 Bcm per year (Giga or billion cubic metres] of which 126 Bcm for the EU (excluding Baltic countries), or nearly 90% of its total gas exports.

- **Russian dependence on exports to Europe in the short and middle terms**

Given the current state of its infrastructure and the terms of sale for its gas on the various markets (Russia, CIS and Europe) between now and 2020, Europe will remain Russia's main, perhaps only export market, a situation reflected in the main targets it has set for its gas exports. According to the long-term Energy Plan of 2003 (Mintopenergo, 2003), total exports will rise from 217 Bcm in 2000, of which 60% for Europe, to 245-275 Bcm by 2010, of which 71% for Europe, then 270-275 Bcm by 2020, of which 74% for Europe.

Europe is the one that allows Russia to obtain the greatest value from its gas production because of low gas prices in its domestic market and the persistence of non-monetary relations concerning some consumers[1]. Exports account for almost 70% of Gazprom revenue, whereas they represented just under 30% of production. Similarly they are a vital source of funding for the Russian state budget. Exports are an essential factor in Gazprom's profitability and its ability to fund investments in line with its various objectives: diversification into oil, international growth, and, of course, development of production and transport infrastructure.

- *Diversification of gas markets in the long term*

The Russian government aims to direct a third of exports to the Asian market by 2010, but this can only be a long-term strategy given the constraints affecting development of new gas fields and installation of the infrastructure required to serve new markets. In any realistic scenario, the constraints associated with building the pipelines and developing the gas fields associated with the first major contract would push back the first deliveries to beyond 2020, always assuming a positive outcome to negotiations before 2010 (Stern, 2005, p.

But in the long term, in view of its gas reserves in Eastern Siberia and in the Republic of Sakhalin, Russia could become one of the major suppliers in this area. Three major areas of reserves can be identified in Eastern Siberia: the Republic of Sakha, the Irkutsk and Kranoyarsk Regions, and the Republic of Sakhalin. In these three areas, the proven and potential reserves of hydrocarbons are very significant as they have been assessed at between 3.7 and 5.3 trilliard m^3 according to source for proven reserves, and at over 50 trilliard m^3 for ultimate reserves[2]. According to Russia’s long-term energy plan, these

[1] In 2006, these prices were $32 per 1,000 m^3 for households and $43 per 1,000 m^3 for industrial units, compared with an average of $255 per 1,000 m^3 for exports to Western Europe.

[2] The International Energy Agency gives proven reserves of 3. trilliard m^3, E. Khartukov proven reserves of 5.3 trilliard m^3, and Petroleum Argus proven reserves of 5.1 trilliard m^3.

reserves allow for anticipated production in 2010 of between 25-30 (conservative estimate) and 50 Gm^3 (optimistic estimate) and production in 2020, of between 55-90 (conservative estimate) and 110 Gm^3 (optimistic estimate) in 2010. The final objective (in the very long term) would be to create a "North-East Asia Gas Pipeline Network" that would link Japan, China and Korea to the productive regions in Sakhalin and Eastern Siberia (Toichi, 2003).

The option that currently has the greatest chance of being realised consists of making supplies to China from the Kovytka Deposit in Irkutsk Region. Feasibility studies have dealt with figures of 20 Gm^3 per year for exports to China, to which 10 Gm^3 can be added for exports to South Korea. The advantages of this solution are many. In particular, the development of the deposit and the gas pipeline could be assured with help from foreign investors, especially BP. Following the creation of a joint venture with TNK (Tyumen Oil Company), BP is now one of the major shareholders in the production company Rusia Petroleum, which holds the licence for the development of the Kovytka Deposit. The main question still unanswered on this project concerns the place to be occupied by Gazprom, which currently holds the monopoly on gas exports.

The development of LNG exports, as yet absent from Gazprom policy, is the only way of really achieving the objective of market diversification in the medium term. However, developing sales of LNG means deploying technology that demands considerable investment, added to which it is a new departure for Gazprom and time-consuming to deploy. It necessitates a partnership with large companies capable of providing the technology and capital to develop the field itself and the infrastructure.

- **Russia faced with the deregulation of the European gas market**

The main market for Russian gas exported, the European Union, is currently undergoing fundamental changes to its organisation, structures, rules and institutions. These changes are compelling Gazprom to make some changes. Its strategy must be structured around two fundamental questions. How can its market share be increased in an environment that will become more and more competitive? How can the export pipelines be secured in order to reach those markets? The disintegration of the Soviet Union has weakened the Russian export route system by increasing the number of transit territories in a politically unstable environment.

- Adapting export and transit infrastructure to suit the European priority

The importance of the European market justified a major drive to secure export routes. Russia quickly doubled up the transit routes to Europe with the Yamal 1 gas pipeline which crosses Belarus and Poland. Gazprom is still increasing transport capacity (currently about 145 Gm^3 per year) by diversifying export channels. This process has been consolidated with the commissioning of the Blue Stream pipeline under the Black Sea to Turkey. Plans for an extension into southern Europe, Greece and Italy are taking shape. The last element in the diversification process will be completed by 2010, with the

Nordstream (former North European Gas Pipeline) under the Baltic to Germany[3]. It follows an agreement signed in 2005 between Gazprom, BASF and E.ON and will be the first direct channel to Europe, doing without the need to pass through other countries.

- *A strategy of downstream diversification*

To maintain its outlets in national markets now open to competition and take a larger share of gas revenue, Gazprom has consolidated the strategy of downstream diversification, which it has been developing since the 1990s (Locatelli and Quast, 1997). This strategy is based on setting up marketing subsidiaries, purchasing shares in local companies and forming joint ventures with national partners in transport, distribution and trading. In the middle of the 1990s Gazprom started Wingas in Germany, a joint venture with BASF-Wintershall, to transport gas and sell it directly. This enabled it to take a 13% share of the wholesale market.

Since then Gazprom has moved into the new EU member states – former Soviet republics (Baltic countries) or ex-Comecon (Poland, Hungary, Czech and Slovak Republics) – taking advantage of privatisation of the gas industry. Its objective is clearly to maintain its outlets in countries that are heavily dependent on its gas. It is now using the same strategy to attack the large European markets, attempting to gain control of major national or regional distributors, as demonstrated by its interest in Centrica or Scottish Power in the United Kingdom in 2006. It may be interested in taking a share in Distrigaz, of Belgium, and strengthening its position in Germany, by buying out local distributors. It is building alliances by swapping assets in sales or distribution, on the one hand, and production, on the other. For instance, the agreement signed in 2006 between BASF and Gazprom will give the former a 25% share in the large Yuzhno-Russkoye gas field in exchange for consolidation of the latter's position in Wingas (share rising from 35% to 50%) and in a marketing company, WIEH. Gazprom is pursuing similar ends through its framework agreement with E.ON-Ruhrgas of July 2006 and the agreement with ENI which provides for direct sales of 3 Bcm per year by 2010, and scope for Gazprom eventually to take a 10% share in ENIpower.

- *Maintaining a system of long-term contracts*

At present, Gazprom is trying to maintain a system of long-term contracts while looking to take benefit from the new market characteristics brought about by deregulation (Komarov, 2004). Its managers have on numerous occasions stressed their preference for long-term contracts while agreeing to the modification of certain clauses in existing contracts and “playing the spot market card” at the right time. The spot sales made by the gas company on the British market in 2003 (almost 3 Gm^3) are indicative of a policy that could develop (especially on the Belgian market). Direct sales are only a secondary

[3] The cost of this route, almost twice that of land-based options (Yamal 2, refurbishing and enlarging the gas pipeline through Ukraine) is the price to pay for independence. To build the pipeline Gazprom, BASF and E.ON set up a joint venture, 51% of which is owned by Gazprom. Gasunie will also be taking a share. The first 27 Bcm a year slice should open in 2010. The pipeline should carry a third of Russian exports to Europe, with capacity culminating at 55 Bcm a year by 2015.

element in the Gazprom's strategy. Such transaction are motivated more by a desire to seize the opportunity of selling when prices are more favourable, for example when spot prices are higher than contract prices. They cannot be used as the main basis of a strategy. If Gazprom's short-term sales are too high, they could upset the current balance between marginal spot markets and long-term contracts by encouraging the consolidation of European spot trading and the credibilisation of hubs as reference markets (Finon, Locatelli, 2007).

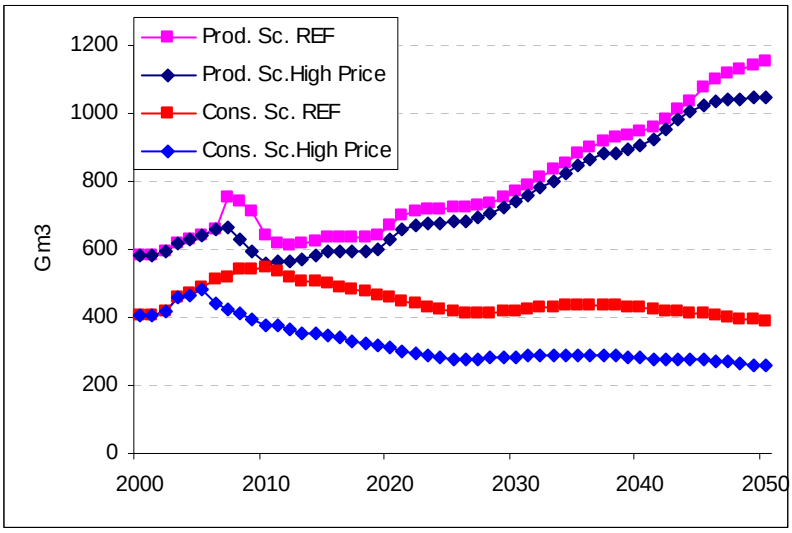
- *Limiting "gas to gas" competition in Russia*

Against a background of increasing instability for traditional suppliers in the EU, it is understandable that the Russian government wants to prevent competition developing between "Russian gas and Russian gas"; this is justification for preserving the gas export monopoly currently held by Gazprom. The Russian oil companies that hold significant gas reserves, such as Lukoil, Yukos and Surgutneftegaz, have on several occasions shown a willingness to export gas to Europe. They would therefore be likely to invest on a spot basis, as well as on a contractual basis, for significant quantities of gas on the European market (Locatelli, 2004). This possibility, however, depends to a considerable extent on an overall reform in the Russian gas industry, and this is not currently on the agenda. It assumes on one hand that the Gazprom's export monopoly will be remove and that free and equal access to its gas pipeline network will be allowed. These two conditions are not currently being fulfilled (Ahrend, Tompson, 2004).

Conclusion

Consumer countries have questioned Russia and Gazprom about future growth in gas production and its ability, beyond 2010, to fulfil its export commitments at the level announced in the long-term Energy Plan of 2003. Its reserves are not in doubt, but Gazprom seems to be dragging its feet before developing new gas fields, in particularly the Yamal field, whereas the three large reserves of Medevhze, Urengoy and Yamburg, which entered production under the Soviet Union are reaching their peak and will soon start to decline. At present Gazprom is only allocating 30% of its investments to developing production. But a significant increase in domestic prices could substantially slow growth in demand and provide additional capacity for exports without a massive increase in production.

Figure 2 : The Russian gas production and consumption in the reference and high price scenarios



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