

Short term trends in the gas industry

Due to sustained competition between energy sources and an economic and geopolitical climate that is still unstable, gas growth has slowed. The year 2013 looks very mixed for the gas industry, particularly on the upstream side. Constraints on the supply of gas and the increased dependence on imports in consumer markets increase the vulnerability of the gas markets to the vagaries of geopolitical risks and result in tensions on the international market. In an environment full of uncertainties about future prices and contractual terms, investors are slow to initiate the projects necessary for a global gas balance in this decade.

The world gas expansion had already shown its limitations in 2012. The marketed gas offering had actually increased by 2.3% (source: Cedigaz), down from an average sustained growth of 2.8% per year in the last decade. But 2013 seems to confirm a sharp slowdown in the growth of gas. According to very preliminary data from Cedigaz the global supply and demand for gas could see a modest growth of approximately 1.5% in 2013.

As was the case in the last ten years, interregional trade of natural gas was supposed to increase much faster than demand, due to the increasing dependence of consumer markets on increasingly distant production sources, sometimes located in economically and politically unstable areas. Thus, the geopolitical scale is continuing to grow on the international gas scene.

These global trends mask significant discrepancies between markets, not only between continents but also within regions. These discrepancies relate to the specific characteristics of the markets that focus on the maturity of the gas network, the structure of the energy mix, the energy and regulatory policy, the basic pricing and the supply structure.

Despite the efforts made by many countries to exploit new resources (conventional and unconventional gas) and to develop the necessary infrastructures, gas production

barely meets demand in most emerging markets that are expanding. This reflects two phenomena:

- the fast growth of gas in the energy mix. Demand for gas is stimulated by a program of subsidies that regulates domestic prices at relatively low levels;
- the lack of investment at all stages of the chain in a lackluster regulatory environment.

To this end, reforms to deregulate prices, the upstream and downstream markets and promote private investment have already started in most emerging markets.

Gas reserves are not sufficiently exploited

Worldwide proven reserves of natural gas remained stable in 2012 and reached 199.9 trillion cubic metres (Tm³) on January 1, 2013. The relatively modest growth observed in some countries (China, Iran, Malaysia, etc.) were not sufficient given the declines in other countries, particularly in the United States where gas reserves were revised downwards due to low prices.

The proven gas reserves are highly concentrated in certain areas where they are otherwise underexploited. The OPEC countries hold 48% of total reserves, ahead of the CIS (32%), although they only represent 19% of global production. At the national level, three countries

Short-term trends in the gas industry

have more than half of the total supply, namely Russia (24%), Iran (17%) and Qatar (13%). They are followed by Turkmenistan (5%) and the United States (4.5%).

Note that Cedigaz includes in its proven reserves 3,775 Gm³ of shale gas in North America, and 2,471 Gm³ of coalbed methane (CBM), of which 62% is located in Asia-Oceania, 27% in North America, and the rest in Europe and Russia.

According to Cedigaz, proven reserves of natural gas in the world have increased by 15% over the last 10 years, representing an increase in volume of 26.5 Tm³. The largest increase is from the CIS (+11.7 Tm³), under the leadership of Russia and Turkmenistan, followed by the Middle East (8.5 Tm³) where important discoveries were made in Iran (+7.1 Tm³) and, to a lesser extent, in Saudi Arabia (1.6 Tm³). In the rest of the world, the United States experienced strong growth in gas reserves during the last decade due to the increase in shale gas. Europe is the only region in which reserves declined, down 36% (-2.7 Tm³) over the period, with an average decline of 4.3% per year due to the depletion of mature fields, particularly in the North Sea (Tab. 1).

Table 1

Revised-up estimates and gas discoveries, 2003-2013
The top ten countries

		Variation (Gm ³)	Variation (%)
1	Turkmenistan	7,287	272
2	Iran	7,090	27
3	Russia	4,720	72
4	United States	3,806	24
5	Saudi Arabia	1,589	83
6	China	1,447	83
7	Venezuela	1,377	33
8	Australia	1,122	44
9	India	579	77
10	Egypt	528	32

Source: *Natural Gas in the World*, Cedigaz (2013)

Shale gas: immature development outside the United States

The potential in shale gas appears significant. In a recent report published by the U.S. Energy Information Administration in June 2013, so-called technically recoverable resources are estimated at 207 Tm³. Although shale gas exploration was launched in several countries outside the United States, it is still in its infancy. The most advanced drilling activities to date are in four of these countries: China, Australia, Argentina and Poland.

If the number of wells drilled reaches approximately 140 in China, 100 in Argentina, 60 in Australia and 40 in Poland, these very conservative figures should be put into perspective in relation to the number of drilled wells in the United States since only 2011, which is approximately 55,000.

These developments are a sign of slow and progressive development of shale gas during this decade, but the multiplying industrial and political initiatives across the globe point to much higher production growth starting in 2020. In its Reference scenario, Cedigaz expects an increase in shale gas production of 275 Gm³ in 2012 to over 700 Gm³ by 2030, which would cover 15% of global production in this timeframe.

World production of natural gas is increasing moderately

In 2012, the world marketed production reached a volume of 3,350 Gm³, broken down as follows: 26% in North America, 24% in the CIS, 16% in the Middle East, 15% in Asia-Oceania, 8% in Europe, 6% in Africa and 5% in Latin America. In recent years, the growth in production has been most rapid in emerging markets (+5.1% per year), particularly in the Middle East, whose share in the world total increased from 12% in 2007 to over 16% today.

In 2012, the production of shale gas and coalbed methane accounted for only 8% and 2% of the world total respectively. The entire production of shale gas is centred in North America. In the United States, shale gas already accounts for more than 40% of national gas production. Small amounts are also used in Canada (approximately 3 Gm³ per year).

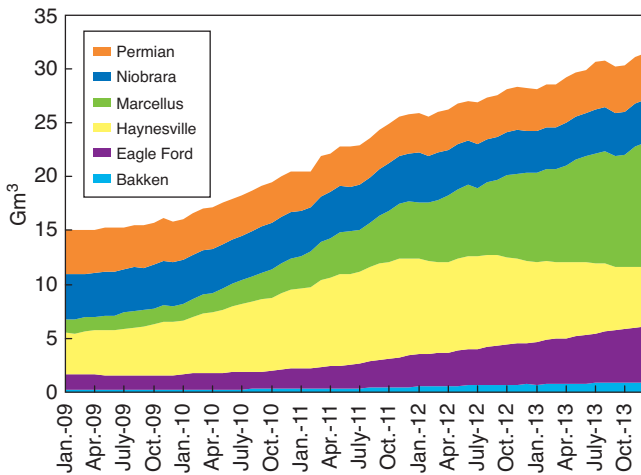
For 2013, Cedigaz believes that the growth in global gas production will be very moderate, at approximately 1.5%. Negative growth is even likely in Europe and Africa.

In North America, growth in production in the United States is estimated at 1.5% in 2013, reaching a new record, despite low prices at the wellhead and a sharp decline in drilling activity. This increase is explained by the performance of highly productive basins (Fig. 1) with high liquid content. Thus, the dramatic growth in production of the vast Marcellus field offset declines at the Haynesville field and offshore production (Gulf of Mexico).

However, the pace of growth in United States gas production has slowed down (Fig. 2). This slowdown is due to a sharp decline in drilling activity on many shale

Short-term trends in the gas industry

Fig. 1 – Gas production trends in the United States from seven key shale deposits (Gm³)



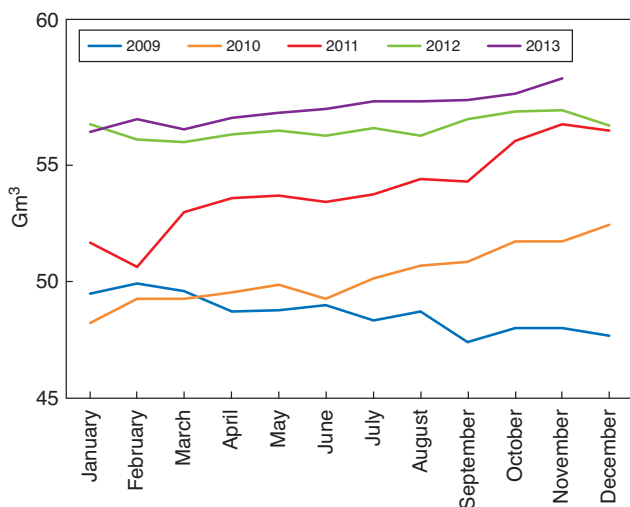
Source: Energy Information Administration (December 2013)

gas fields poor in condensates and therefore less profitable in the context of current prices, in contrast to prospective shale oil drilling.

Total CIS production has increased sharply (by approximately 3% in 2013) in response to the increase in external demand that has led to a sharp increase in pipeline exports from Russia to Europe and from Central Asia to China.

In Europe, production is declining. The decline in British production is estimated at 8% in 2013. In addition, Norwegian production has dropped and is down 5% over the first ten months of the year. In contrast, the Netherlands significantly increased their production up 10% over the first three quarters, taking internal and external needs into consideration.

Fig. 2 – Gas production trends in the United States (Gm³)



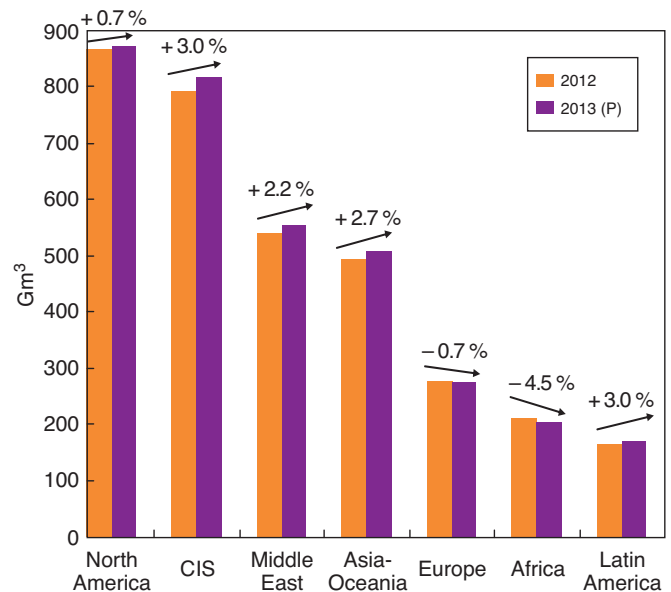
Source: Energy Information Administration (November 2013)

In Africa, production fell heavily, being affected by internal political tensions that led to damage to infrastructure and to force majeure in Libya, and particularly in Nigeria, where production plummeted by 30% during the first six months.

In the Middle East, production is continuing its upward trend in 2013, with expected annual growth of over 2%. Despite the good performance expected in some countries, production growth was more moderate than in the past, particularly in Qatar. In March 2013, we should remember the start of production at the Tamar field in Israel, which has a capacity of 10 Gm³ per year.

Production in Asia-Oceania increased by approximately 2.7% in 2013, with the backdrop of the rise of Australian and Chinese production. Since this growth was insufficient to meet demand (+5%), regional dependence on imports increased sharply.

Fig. 3 – 2013 outlook on marketed gas production by region (Gm³)



Source: Cedigaz

Cedigaz recorded a significant annual growth of approximately 3% in production in Latin America, which is primarily explained by the growing appetite of Brazil, particularly in electricity consumption when hydroelectric power fails. Besides the soaring Brazilian production, Bolivian production has also been experiencing very rapid growth in the last two years under pressure from domestic demand, estimated to have increased by 5% in 2013, and external (Brazil, Argentina). This growth was made possible by the development of new projects, including the Margarita and Huacaya fields (Fig. 3).

Short-term trends in the gas industry

Gas demand is being driven by the Asian market

Over the past five years, Asia-Oceania was the fastest growing market, accounting for almost half of the increase in global demand. In 2013, the Asian market even became the main contributor to growth in global demand. The most significant growth rates were recorded in China and in Southeastern Asia, where natural gas is gaining ground in the electrical and transportation sectors, at the expense of oil.

In China, gas is experiencing a significant revival in the residential and transportation sectors in the context of urbanization and industrialization. The authorities have encouraged substitution from coal to gas in these areas, with the goal of reducing pollution in large cities. The country is facing a growing shortage of gas which is becoming problematic during peak winter demand. During the first three quarters of 2013, gas consumption in China jumped 14%, or 5 points higher than production. The external dependency of the country should grow from 27% in 2012 and 30% in 2013.

In North America, natural gas consumption increased by more than 2% in the United States. It is increasing more rapidly in Mexico, where gas is making a breakthrough in the industrial and electrical sectors, taking advantage of the economic growth and relatively low import prices for U.S. gas. In the United States, rising gas prices compared to 2012 has often made coal more competitive and penalized gas consumption in the electrical sector, estimated to have fallen by 10% (EIA, January 2013) in 2013. It should be remembered that an exceptional growth of over 20% in gas consumption was recorded in this sector in 2012.

After acknowledge two successive drops in 2011 and 2012, European gas consumption is expected to stagnate in 2013. This slight improving trend will be mainly due to abnormally low temperatures, particularly during the months of March and May.

While the decline in the use of gas in the industrial sector is a basic trend over the last ten years in Europe, the dramatic fall since 2010 is mainly due to the substitution of gas by coal and/or renewable energy in the electrical sector. Combined cycle data centres have lost their technical and economic advantages due to high fuel prices and a historically low price for CO₂. The decline of gas in this sector continued in 2013, while industrial consumption showed signs of recovery.

In 2013, gas consumption was heterogeneous in EU countries. During the first three quarters of this year,

gas consumption increased by 11.5% in Germany, 4% in The Netherlands, 3.5% in the United Kingdom and 2.8 % in France, but dropped by 8% in Italy and 9% in Spain.

Trade growth in LNG constrained by the offer

After a record drop of 2.5% in 2012, the marketed production of LNG continued to decline in the first three quarters of 2013, but much more moderately. It could at best stagnate or register a slight increase for the year.

The growth of the LNG supply was hampered by a lack of gas available (North Africa, South East Asia), damage to infrastructure that may be caused by a deterioration of security in politically unstable countries, and various interruptions or technical malfunctions that affect the normal operation of the plants. In the first half of 2013, it is estimated that the marketed production of LNG in North Africa accounted for only 40% of full capacity from liquefaction plants. In Egypt, the Damietta plant closed for an indefinite period, whereas the Idku plant is operating at less than 50% of its capacity.

LNG imports in Europe are still slumping, whereas the global LNG supply is still limited, being redirected to the more demanding markets of Asia and Latin America. Cedigaz predicts a 25% drop in LNG imports in Europe in 2013, which contrasts with a rapid growth of 7% in Asia-Oceania. Re-exports from Europe grew strongly and were primarily directed to Latin America.

Asia's leadership on the LNG market is confirmed. Its share of the market should continue to grow, from 63% in 2011 to 70% in 2012 and over 74% in 2013.

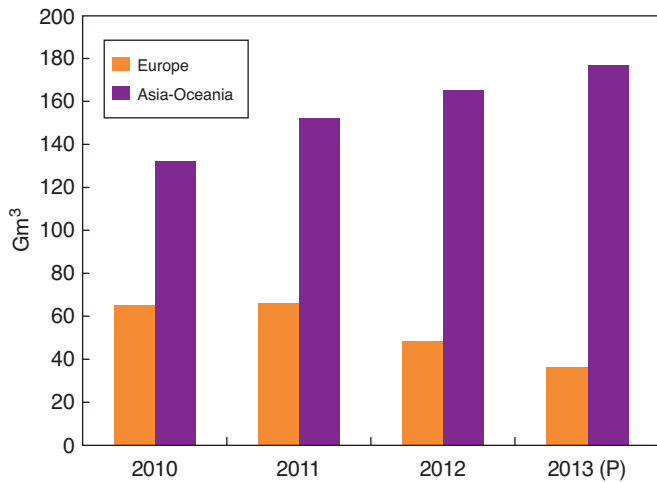
The Japanese demand for LNG declined in the first three quarters of 2013 (-2.3%), showing a trend reversal that appeared in the first quarter after continued growth since March 2011. This situation, which is partly the result of energy savings, evolved in the last quarter due to the maintenance period on the two reactors in operation and a colder than normal winter. South Korea recorded strong growth in LNG imports, an increase of 7% over the first three quarters, which is mainly due to the suspension of several nuclear reactors following the revelation of a nuclear scandal.

But the growth in the LNG market is mainly driven by the enormous needs of emerging markets, such as China and the South East Asian markets (Fig. 4):

- China had an increase of nearly 25% in LNG imports this year to meet growing consumption and peak seasonal demand;

Short-term trends in the gas industry

Fig. 4 – Trends in LNG demand (Gm³) Asia versus Europe



Source: Cedigaz

- in South East Asia, Malaysia and Singapore started their LNG purchases in the first half. The South East Asia market grew significantly and now represents more than 2% of world trade in LNG.

Moderate increase in trading via gas pipelines

In 2012, international trade by pipeline represented a total of 709 Gm³, of which approximately 55% was concentrated in Europe. Cedigaz expects a significant increase of 3.5% in total pipeline shipments in 2013, mainly for Northern European countries, China and Brazil.

Gazprom exports to Europe (including Turkey) increased sharply in 2013. During the first three quarters of 2013, they increased by over 15% compared to the same period in 2012. This trend is explained by cold waves in the first half, restocking in the summer and fall deliveries of LNG and Norwegian gas. In fact, after reaching record highs in 2013, Norwegian exports to Europe are in decline, down 3.6% over the period from January to October 2013.

Exports from Algeria to Southern Europe are estimated to drop 10% in 2013. Note, for instance, the strong decline (39%) expected in supplies to Italy via the Enrico Mattei gas pipeline. In the third quarter of 2013, gas production at the In Amenas site remained lower than over half the previous level before the terrorist attack in January. Furthermore, gas deliveries from Libya to Europe fell heavily, affected by internal conflicts that led to declarations of force-majeure on gas exports at the end of the year.

Within the CIS, Russian exports to the Ukraine show a significant decrease for the second consecutive year. In addition to the litigation that relates to the cost of importing Russian gas, the economic crisis and a relatively temperate climate have had a downward impact on Ukrainian demand.

In the United States, the growth in production driven by shale gas has reduced dependence on imports of Canadian gas for five years. In 2013, they were down about 5%, to approximately 79 Gm³. In contrast, the United States continues to boost their exports to Mexico.

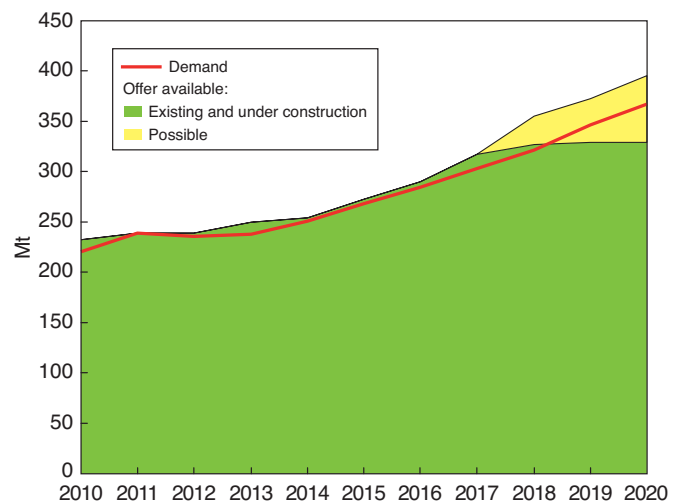
In addition to LNG deliveries, China is significantly increased its pipeline imports, which jumped 30% in the first three quarters of 2013. The year 2013 marks the beginning of gas imports from Kazakhstan (July) and Burma (September).

In Latin America, deliveries from Bolivia to Brazil and Argentina resulted in a very significant increase of over 15%.

Tensions in the LNG market are likely to endure

In the short term, the LNG supply should remain limited in relation to demand, which will still be boosted by the Asian market. Currently, projects under development and for which final investment decisions have been made represent a capacity of approximately 100 million tons per year (of which 63 Mt is in Australia). But because these projects have been delayed due to technical and economic constraints, the LNG market looks particularly tight in 2014 and 2015.

Fig. 5 – Outlook on global LNG market (Mt)



Source: Cedigaz

Short-term trends in the gas industry

Additionally, these units are insufficient to meet demand during this decade (Fig. 5). Attention therefore turns to other projects, the most advanced of which are located in the United States, where now four plants with a total capacity of 50 Mt have received government approval to export to countries that have not signed a free trade agreement, but also in Asia-Oceania (Australia, South East Asia), Canada, Africa (Nigeria, East Africa), the Eastern Mediterranean, the Middle-East and Russia. These projects that are awaiting a final investment decision have a major role to play in ensuring the security of the overall gas supply in 2020.

In 2013, just three projects had achieved Final Investment Decision: Yamal LNG's three-train in Russia and two project expansions – train 3 and 4 at Cheniere's Sabine Pass project and Petronas's train 9 at Bintulu in Malaysia.

Divergence of gas prices within a regionalized market

Existing discrepancies in gas prices on different regional markets reflect specific fundamentals that determine price levels and how they are determined. In the United States, prices have been rising since 2013. However, these remain relatively low as long as there is no pressure on the U.S. supply. In its latest projections, the EIA expects an increase in the Henry Hub annual average price of 37% to \$3.8 per MBtu in 2013. In Japan, the LNG price is expected to be high at approximately \$16/MBtu in 2013, the latter being determined by direct reference to the oil market.

In Continental Europe, indexing referring to the spot price, which is still cheaper for the buyer than indexing on oil, plays an increasing role on the average price of long-term contracts. The renegotiation of long-term contracts and the proliferation of arbitration procedures have contributed to significantly reduce the gap between spot prices and prices on long-term contracts. In 2013, the average price of imported gas in Germany, mainly based on long-term contracts, showed a clear convergence with the average spot price, which is expected to be approximately €27.5 per MWh for the year, up 9% compared to 2012. Given the tensions in the international LNG market, the high spot prices in Asia have had an upward impact on average spot gas prices in Europe.

The discrepancies between international spot prices, which can exceed the additional costs of transportation, reflect the regional imbalances in the context of a restricted supply on the part of suppliers, and on a certain degree of inflexibility in the gas chain, particularly in Asia-Pacific. In the absence of a Hub in Asia, it should be noted that the current spot price in Japan is not the result of a real gas/gas competition, but bilateral negotiations between the seller and the buyer. In this respect, the prospect of a global gas market still seems very far off.

In view of strong growth in future gas demand, these commercial developments raise a major challenge which consists of ensuring both the safety, flexibility, efficiency and accessibility of supply at an affordable cost.

*Armelle Lecarpentier – armelle.lecarpentier@ifpen.fr
Final draft submitted in December 2013*