

Short-term trends in the gas industry

In an environment marked by slowing economic growth in emerging markets and developing countries, trends in gas market fundamentals varied widely across the regions during 2015. Structural economic factors stifled growth in natural gas demand, which was unable to take up all the excess supply, leading to imbalance in the global gas market and price weakness which is expected to continue in the short and medium-term.

According to Cedigaz forecasts, 2015 was characterized by a recovery in global demand for natural gas, currently estimated at 1.5% compared with 2014. However, this performance was strongly tied to climatic events during the first few months of the year (Europe) and remained concentrated within a small number of countries, notably the United States. The US market maintained momentum and strengthened its leadership in terms of both production and demand.

Production rose significantly in certain Middle Eastern countries (Iran), where it is primarily intended for the domestic market. On the other hand, production growth in Asia-Oceania significantly exceeded additional demand, triggering a "gas bubble" that will benefit importing countries in Europe thanks to arbitrage in the Liquefied Natural Gas (LNG) market.

Rebounding gas consumption in Europe led to growth in extra-regional imports by LNG carriers and gas pipelines. As a consequence, international natural gas trade trended upward during 2015, after falling by 2.5% in 2014.

In addition, excess supply on the global market, record levels of storage and exceptionally mild weather conditions led to sharply declining prices on the international markets. This imbalance between supply and demand is expected to continue during 2016, and even until the end of this decade.

Aside from the US market, gas hardly increased its share of the energy mix due to competition from all

other energies, including fossil fuels, especially as coal and oil prices declined sharply between 2014 and 2015.

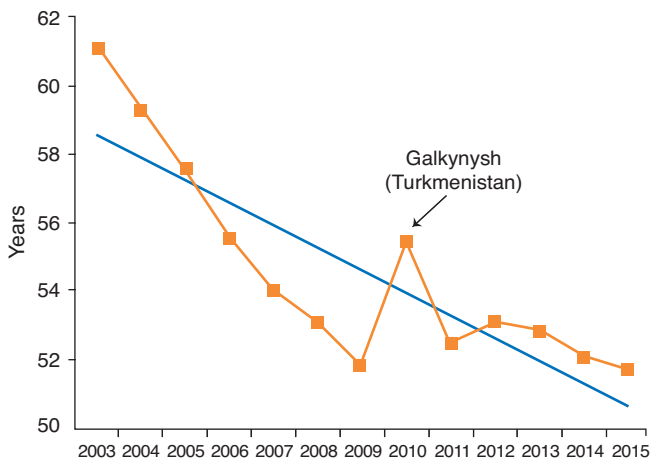
Gas reserves continue to rise very slowly

As of January 1, 2015, proven natural gas reserves had risen to nearly 200 Tm³, a slight increase compared with 2014. New discoveries and re-assessments of existing fields (Russia, United States, etc.) made it possible to replace production at a level of 117%. During the past ten years, gas reserves have risen substantially in two regions, the CIS (+11.9Tm³) and the Middle East (+7.3Tm³), which currently account for 33% and 40% of the total amount. At the national level, four countries have experienced especially strong growth during this period: Turkmenistan (+7.2Tm³), Iran (+6.5Tm³), Russia (+5.1Tm³) and the United States (+4.5Tm³). Russia, Iran and Qatar currently hold more than half of global reserves. They represent a reserve life of 52 years at current consumption levels. The reserves-to-production (R/P) ratio has been declining since the start of this millennium (Fig. 1).

During the first decade of the 21st century, this trend meant that certain emerging countries faced challenges in developing new deposits to meet consumption, in a political, fiscal, regulatory and economic environment unfavorable for investment. More recently, many exploration and production projects have been postponed or even cancelled, in view of current market conditions characterized by excess supply and low prices.

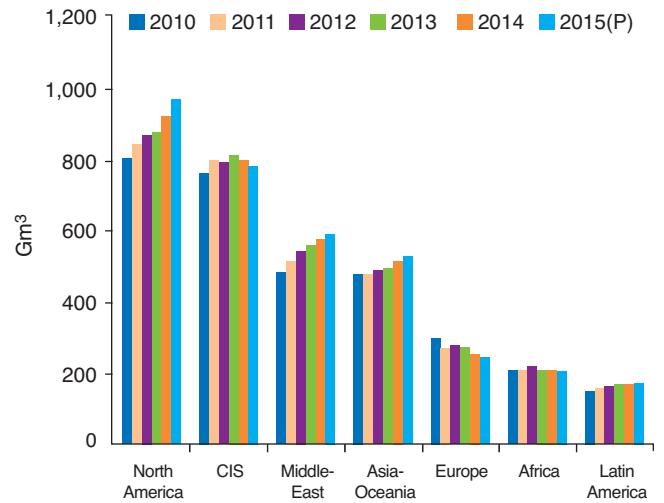
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Fig. 1 – Change in R/P* ratio



*R: Reserves and P: Gross output – reinjection
Source: Cedigaz

Fig. 2 – Change in marketed gas production by region (preliminary estimate)



Source: Preliminary estimates, Cedigaz

Trends in global natural gas production varied from region to region

Cedigaz projections for 2015 point to an increase in global production of approximately 1.5%. This masks significant disparities between the regions (Fig. 2).

Much like previous years, global gas production was driven by shale gas production in the United States, particularly in the Marcellus and Utica shale basins, where improved productivity and well efficiency offset the falling rig count and the decline of historical wells. In 2015, US production is expected to rise significantly, on the order of 6%, and the portion of shale gas in the total volume should exceed 52% in 2014 and 56% in 2015.

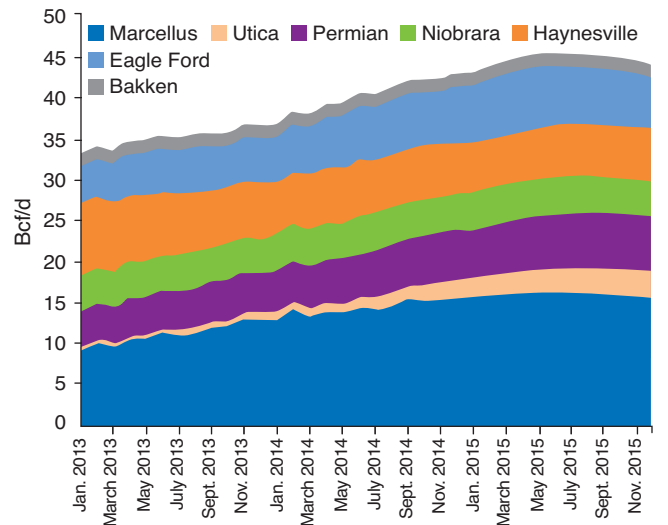
Growth in shale gas production began to slow during the final months of the year due to very low prices (<\$2.50/MBtu) which jeopardized the economic profitability of numerous deposits. Nevertheless, this environment seems unlikely to excessively reduce production. On the contrary, adjustments through reductions of cost could sustain an elevated level (Fig. 3).

The US market continued to have excess supply in 2015, enabling it to reduce dependence on imports while increasing exports to Mexico.

In the rest of the region, Canadian production rose by 2% over the first three quarters, while Mexican production fell by 8%. In total, North American production is expected to rise by approximately 5% in 2015, similar to 2014.

On the other hand, gas production fell in the CIS, the region with the second highest production worldwide, with Russian production falling by around 2% during the

Fig. 3 – Gas production trends in the United States from seven key shale deposits



Source: EIA

first ten months of 2015 as compared with the previous year. This trend can be explained by a notable decline in exports to the Ukraine and a downturn in domestic consumption (–3.6% between January and October) in an unfavorable economic and geopolitical climate. Gazprom continues to lose market share to oil companies (Rosneft) and independents (Novatek), which continue to sharply increase gas production associated with oil production.

In the Middle East, production is expected to rise 2.5% in 2015, driven by Iran and to a lesser extent by the United Arab Emirates (commissioning of the Shah project in Abu Dhabi). These developments offset the April 2015 disruption of LNG production in Yemen as a result of its civil war.

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The increased production of the South Pars deposit enabled Iran to displace Qatar, becoming in 2014 the third leading producer after the United States and Russia.

Asia-Oceania should achieve similar growth in 2015, with increased LNG exports by Australia and Papua New Guinea. Chinese production rose at a slower pace compared with past years, with an expected increase of only 3% in 2015, compared with an annual average rise of 9% recorded during the previous five years.

European production declined in 2015 by approximately 3.5%. This resulted from the new cap imposed on the Groningen deposit in the Netherlands. Production in the Netherlands is expected to fall by 20% in 2015, leading to the lowest production levels recorded during the past four decades. On the other hand, production in Norway is poised to achieve record levels in 2015, estimated to reach 115 Gm³. This performance resulted from the resolution of technical issues on the Troll deposit, which represents about one-third of national production. Production in the United Kingdom rose by 5% over the first ten months of the year, an unusual positive trend given the ongoing structural decline between 2000 and 2012 (before a slight increase in 2013). Performance in the United Kingdom can be explained by improved operation of existing plants following maintenance shut-downs in 2014, as well as an increase in production at the Juliet and Kew deposits.

Production was fairly stagnant in Latin America during 2015, despite the development of pre-salt offshore projects in Brazil and the commissioning of the massive Perla gas deposit in Venezuela, due to the decline of mature fields in Argentina and Trinidad & Tobago.

Production in Africa was relatively stable during 2015. The ongoing decline of mature fields in Egypt was offset by an increase in Nigeria. In addition, Algerian production was estimated to have risen slightly over the first ten months of the year. Egypt shifted from an exporting to an importing market in order to address the local gas deficit which is affecting the country's energy security. In recent years, gas production in Africa has been impacted by military conflicts, technical issues and delays in developing new upstream projects. In 2015, production should reach a level close to that achieved in 2010.

Growth in gas consumption in 2015 was stimulated by the United States and Europe

During 2015, global gas consumption rose by 1.5%, according to provisional estimates, driven by the US and European markets. On the other hand, demand in Asia

for natural gas slowed for the second consecutive year, weakened by more competitive coal and by the increase in power capacity through nuclear and renewable sources. Mild temperatures further explain the decline in consumption – estimated at 1% –, for the year according to Cedigaz preliminary estimates. If this is confirmed, the downturn in Asian demand during 2015 would mark a historical break from the exponential growth of the past four decades.

After recording 9% growth in 2014 – already lower compared with previous years – Chinese natural gas demand is expected to rise only 3% in 2015, below annual GDP growth which is projected to reach 6.8% according to the latest IMF forecasts. This slowdown in China can be explained by the reduced competitiveness of natural gas when compared with cheaper oil in the industrial sector, the expansion of non-carbon energy sources (nuclear, renewable) and improvements in energy efficiency within an economic model that is shifting from production in energy-intensive sectors toward services.

In Europe, natural gas consumption rebounded by 9% during the first half of 2015 (source: Eurogas), after four consecutive years of decline. This was closely tied to the weather, due to exceptionally mild temperatures in the first quarter of 2014. Because of mild temperatures and further improvements in energy efficiency during the second half of the year, Cedigaz predicts a 5% rise in European consumption for 2015. The 2015 turnaround was also explained by a slight recovery in industrial activity, stable electrical consumption (after falling in 2014) and a decline in hydraulic consumption in certain countries.

North American demand was driven by the United States, where consumption is expected to rise by approximately 4% in 2015 to reach record levels. This growth is attributable to the increase in gas-fired power generation, which is more competitive than coal since gas prices have fallen below \$3/MBtu. In the spring of 2015, for the first time, natural gas surpassed coal to become the leading source of power generation, with 31% of the electricity mix (30% for coal and 20% for nuclear).

Trading via LNG carriers gained ground due to abundant supply

After modest growth in 2014, the international trade of LNG rose by roughly 2% in 2015, a considerable amount given the abundant supply.

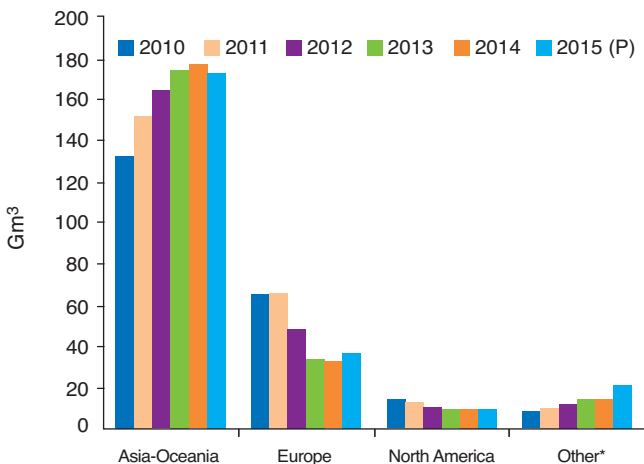
LNG supply entered an expansion phase with the start of the first projects in Australia (Queensland Curtis and Gladstone LNG), the commissioning of the Donggi-Senoro

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plant in Indonesia and the first year of full operation of the LNG plant in Papua New Guinea. The resurgence of LNG production in the Pacific basin largely offset the declining exports from the Middle East which resulted from the shutdown of the liquefaction plant in Yemen. In addition, exports from other Middle Eastern countries are limited by growing domestic needs.

In terms of demand, LNG imports in Asia are expected to fall significantly in 2015 (Fig. 4), provisionally estimated down 3%, a marked reversal when compared with the solid growth of the previous four years. The principal importing countries recorded falling imports due to weak domestic demand. Over the first three quarters of the year, LNG imports fell by 11% in South Korea, 3% in Japan and 4% in China. Pakistan emerged as a new importing country in 2015, lacking the natural gas needed to meet its energy requirements.

Fig. 4 – Trends in LNG demand



*Other: Middle East, Latin America and Egypt

Source: Preliminary estimates, Cedigaz

The Pacific basin contributed 53% of supply to the Asian market over the first three quarters of 2015, compared with 47% over the same period in 2014.

Against this background, LNG supply from the Middle East (Qatar) and the Atlantic basin was redirected toward Europe, where net imports rebounded by 14% during the first three quarters. In addition, Egypt and Jordan began to import LNG during the second quarter, after the commissioning of floating regasification terminals that can be built quickly and offer greater flexibility.

Gas pipeline trade was generally stable

After falling by 4% in 2014, gas pipeline trade, which represents nearly 70% of the natural gas trade, rose

slightly over the first three quarters. The increase in inter-regional trade, dominated by exports from Russia to Europe, offset the decline in intra-regional trade related to exports from Russia to the Ukraine.

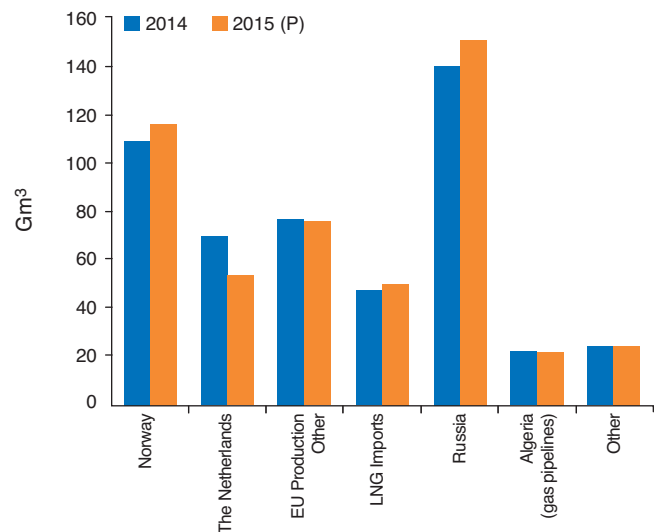
2015 trends in international gas pipeline trade included:

- a jump in Russian gas exports to Europe (+13% for the January to November 2015 period compared with the same period in the previous year);
- a substantial reduction in Russian exports to neighboring countries within the CIS (-35%), notably the Ukraine;
- a resumption of exports from Algeria to Europe, with a significant increase in deliveries to Spain (+10% over the January-November 2015 period) and Italy (+7%);
- a reduction of around 30% in net imports by the United States, following the boom in domestic production.

Increase in the European market's external dependence

Faced with a significant drop in Dutch production, Europe (including Norway) recorded an increase in its dependence on external sources (Fig. 5). This is expected to rise from 47% in 2014 to 50% in 2015 in response to growing demand. Dependence on Russian natural gas in particular should rise one point to reach 31%. LNG contributes 10% to the European natural gas supply.

Fig. 5 – Trends in European* supply by source



*Production + gross extra-regional imports

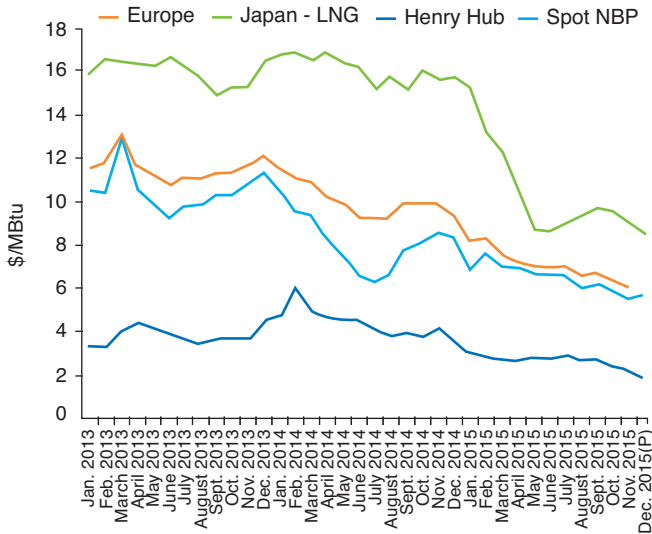
Source: Preliminary estimates, Cedigaz

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International natural gas prices have fallen considerably

In 2015, international gas prices declined sharply in direct or indirect relation to falling prices of other fossil fuels, in a market characterized by excess supply (Fig. 6).

Fig. 6 – Change in international natural gas prices



Sources: Cedigaz, EIA, Reuters

The NBP spot price in Europe has trended downward since February, falling below \$6/MBtu at the end of the year, the lowest levels in the past six years. Falling coal prices, which reached approximately \$50/t in November, contributed in part to this decline.

Impacted by the falling price of Brent, the average price in Europe was close to spot price levels in the second half of the year, which has made Russian gas exported via long-term contracts competitive. Cedigaz forecasts point to an average price (estimated with indexation to the 60% NBP spot price) of \$6.8/MBtu in 2015, compared with \$10/MBtu in 2014.

In 2015, the average price of LNG in Japan, almost entirely indexed to the price of oil, is expected to be approximately \$10/MBtu, compared with \$16/MBtu in 2014.

Spot prices in Asia remained within the \$7 to \$8/MBtu range due to falling oil prices, the possibility of arbitrage between Europe and Asia, weak demand coupled with abundant supply and high levels of stocks.

In the United States, rising production, high stock levels and the expectation of a mild winter helped bring the Henry Hub natural gas price to its lowest recorded level since 1999. It fell around an average of \$2.6/MBtu in 2015, compared with \$4.4/MBtu in 2014.

Outlook for the gas market

Aside from climatic events which have significantly impacted the natural gas market during the past three years, economic factors slowed the expansion of natural gas demand and will continue to have an effect over the short and longer term.

They include:

- the economic slowdown in emerging and developing countries;
- the drop in energy intensity (relationship between energy consumption and GDP), reflecting progress in energy efficiency;
- China's economic transformation, with emphasis on consumption and services;
- competition between natural gas and other fossil energies (oil, coal), whose prices have declined in an oversupplied market;
- expansion of renewable and, in certain countries, nuclear energies.

Considered to be the future driver of worldwide natural gas expansion, China is the clearest example. Prospects for growth in natural gas demand by 2020 were revised downward for the past two years by the authorities and industry, given the slowdown in economic activity and the drop in competitiveness of natural gas following implementation of domestic price reforms. However, the direction of Chinese energy and environmental policy suggests a promising future for natural gas, with the prospect of a more diversified and environmentally-friendly energy mix. In its most recent five-year plan adopted in October 2015, China expressly plans to replace coal with cleaner energies by promoting the use of natural gas (including shale gas), among others. In this context, one month later, the government decided to lower the price of gas for non-household consumers to boost gas consumption in the country.

Coal remains a major competitor of natural gas across the rest of Asia. In addition, demand for natural gas in Japan and Korea has likely reached a peak, given the future growth of renewable energy and the rebound in nuclear power.

In Europe, the price of gas in the United Kingdom has become competitive with coal in the electricity industry (including the carbon tax); but, in the rest of the continent, coal remains less costly, leading to a downward impact on natural gas demand in the region, at least in the short term.

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On the supply side, shale gas production in the United States showed resilience in the face of falling prices, thanks to optimized well efficiency and cost reductions, especially in the cost of services. Even today, the EIA is counting on a 2% increase in total natural gas production for 2016, at a Henry Hub price of just \$2.4/MBtu.

A real surge in LNG supply is expected in 2016 (+6.5% according to Cedigaz), driven by Australian projects and the arrival of US LNG on the market.

In Russia, production is primarily surplus, with Russian exports remaining profitable at a floor price of \$4/MBtu. Thus, surplus Russian gas intended for export is also a factor depressing the price of gas in Europe, in combination with availability of stocks and progress in energy efficiency.

Solid growth in production is expected in Iran during the coming years. This should initially benefit the local market and neighboring countries whose production does not cover rising growth.

Given these developments, in both supply and demand, and assuming the absence of major geopolitical tensions, the global natural gas market is expected to retain excess supply until the end of this decade, against a background of depressed market prices.

Conclusion

Recent trends in the gas markets highlight the structural challenges facing the gas industry. With regard to supply, the prospect of long-term low gas prices requires a reduction in upstream costs to ensure necessary investment and respond to growing demand.

Competition with coal remains strong, especially in the electricity production sector. But a suitable environmental policy would promote natural gas, an energy source likely to play a key role in the transition to a low carbon economy.

While recent events have been marked by a collective awareness of environmental issues and the signing of the historic COP21 accord intended to limit the temperature increase to 1.5°C by the end of the century, it should be noted that natural gas can play a major role in the fight against global warming, due to its low carbon content and its synergy with renewable energies.

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