



CEDIGAZ, the International Association for Natural Gas

The 2015 Natural Gas Year in Review

First Estimates

April 2016



About CEDIGAZ

CEDIGAZ is an international not for profit association dedicated to natural gas information, created in 1961 by a group of international gas companies and IFP Energies nouvelles. With a track record of more than fifty years, CEDIGAZ has a well established reputation of reliability, accuracy and independence among gas analysts and is considered a key source of unbiased fundamental industry data.

CEDIGAZ has around 90 members in 40 countries, associating most of the leading international oil and gas companies, national and international organizations, banks, consultants, engineering companies and equipment suppliers.

Contact

CEDIGAZ
1 & 4 avenue de Bois Préau, 92852 Rueil-Malmaison Cedex, France
E-mail: info@cedigaz.org
Tel : + 33 1 47 52 67 20
www.cedigaz.org

Photo Credits: ENGIE/Dupont Cyrille; ENGIE/BESTIMAGE/Werdefroy Yann; ENGIE/Dureuil Philippe

TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	6
1. GLOBAL MARKETED NATURAL GAS PRODUCTION GREW 1.6% IN 2015, LED BY THE UNITED STATES	8
2. BUOYANT EXPANSION OF INTERNATIONAL GAS TRADE, UP 2.8%.....	21
2.1 After dropping in 2014, international pipeline trade rose back in 2015.....	29
2.2 Global LNG trade has entered a new era of expansion	39
2.3 The LNG infrastructures in 2015	47
3. THE EUROPEAN GAS SUPPLY IN 2015.....	49
4. GAS PRICES WERE ON A DOWNWARD TREND IN A CONTEXT OF HEALTHY SUPPLY .	51
5. GAS DEMAND GROWTH REMAINED MIXED	53

LIST OF TABLES

TABLE 1 - MARKETED PRODUCTION OF NATURAL GAS IN 2015 (BCM)	16
TABLE 2 - EVOLUTION OF INTERNATIONAL GAS TRADE IN 2015 (BCM)	22
TABLE 3 - NATURAL GAS TRADE IN THE WORLD IN 2015 – BREAKDOWN BY IMPORTING COUNTRY (BCM).....	23
TABLE 4 - NATURAL GAS TRADE IN THE WORLD IN 2015 – BREAKDOWN BY EXPORTING COUNTRY (BCM).....	25
TABLE 5 - NATURAL GAS PIPELINE TRADE IN THE WORLD IN 2015 – BREAKDOWN BY IMPORTING COUNTRY (BCM)	32
TABLE 6 - NATURAL GAS PIPELINE TRADE IN THE WORLD IN 2015 – BREAKDOWN BY EXPORTING COUNTRY (BCM).....	33
TABLE 7 - TOTAL PIPELINE IMPORTS BY SOURCES IN EUROPE IN 2015 (BCM).....	34
TABLE 8 - EVOLUTION OF NET LNG IMPORTS BY COUNTRY IN 2015 (BCM)	43
TABLE 9 - EVOLUTION OF LNG SUPPLY BY COUNTRY IN 2015 (BCM).....	44
TABLE 10 - LNG LIQUEFACTION CAPACITIES, AS OF END-2015	47
TABLE 11 - LNG REGASIFICATION CAPACITIES, AS OF END-2015.....	48
TABLE 12 - EVOLUTION OF INTERNATIONAL PRICES (\$/MBTU).....	52
TABLE 13 - EVOLUTION OF EUROPEAN ACTUAL GAS CONSUMPTION IN 2015 (BCM)	59
TABLE 14 - APPARENT GAS CONSUMPTION IN 2015 (BCM).....	60
TABLE 15 - WORLD NATURAL GAS BALANCE IN 2014 (BCM)	63
TABLE 16 - WORLD NATURAL GAS BALANCE IN 2015 (BCM)	63

LIST OF FIGURES

FIGURE 1 - US GAS PRODUCTION TREND FROM KEY SHALE DEPOSITS.....	9
FIGURE 2 - EVOLUTION OF GROSS NATURAL GAS PRODUCTION IN MEXICO	9
FIGURE 3 - GAZPROM PRODUCTION, 2003-2016	10
FIGURE 4 - MARKETED GAS PRODUCTION BY REGION IN 2014	18
FIGURE 5 - MARKETED GAS PRODUCTION BY REGION IN 2015	18
FIGURE 6 - EVOLUTION OF MARKETED PRODUCTION BY GEOGRAPHIC ZONE	19
FIGURE 7 - EVOLUTION OF MARKETED PRODUCTION BY ECONOMIC ZONE	19
FIGURE 8 - TOP-10 NATURAL GAS PRODUCERS (BCM)	20
FIGURE 9 - RECENT TRADE IN INTERNATIONAL GAS TRADE (BCM)	22
FIGURE 10 - INTERNATIONAL IMPORTS BY GEOGRAPHIC ZONE IN 2014	26
FIGURE 11 - INTERNATIONAL IMPORTS BY GEOGRAPHIC ZONE IN 2015	26
FIGURE 12 - INTERNATIONAL EXPORTS BY GEOGRAPHIC ZONE IN 2014	27
FIGURE 13 - INTERNATIONAL EXPORTS BY GEOGRAPHIC ZONE IN 2015	27
FIGURE 14 - TOP-10 NATURAL GAS IMPORTERS (BCM)	28
FIGURE 15 - TOP-10 NATURAL GAS EXPORTERS (BCM).....	28
FIGURE 16 - PIPELINE TRADE VARIATIONS (BCM), 2015 vs. 2014	35
FIGURE 17 - TOP-10 PIPELINE GAS IMPORTERS	35
FIGURE 18 - TOP-10 PIPELINE GAS EXPORTERS	36
FIGURE 19 - INTERNATIONAL PIPELINE IMPORTS BY GEOGRAPHIC ZONE IN 2014	37
FIGURE 20 - INTERNATIONAL PIPELINE IMPORTS BY GEOGRAPHIC ZONE IN 2015.....	37
FIGURE 21 - INTERNATIONAL PIPELINE EXPORTS BY GEOGRAPHIC ZONE IN 2014	38
FIGURE 22 - INTERNATIONAL PIPELINE EXPORTS BY GEOGRAPHIC ZONE IN 2015	38
FIGURE 23 - LNG TRADE VARIATIONS (BCM), 2015 vs. 2014.....	45
FIGURE 24 - TOP-10 LNG IMPORTERS	45
FIGURE 25 - TOP-10 LNG EXPORTERS	46
FIGURE 26 - LNG EXPORTS BY ZONE	46
FIGURE 27 - EUROPEAN GAS SUPPLY IN 2014.....	50
FIGURE 28 - EUROPEAN GAS SUPPLY IN 2015.....	50
FIGURE 29 - EVOLUTION OF INTERNATIONAL GAS PRICES	52
FIGURE 30 - NATURAL GAS SUPPLY IN CHINA	54
FIGURE 31 - EVOLUTION OF NATURAL GAS CONSUMPTION IN JAPAN	55
FIGURE 32 - US GAS DELIVERIES TO CONSUMERS IN 2015 (BCM).....	56
FIGURE 33 - EVOLUTION OF ACTUAL CONSUMPTION BY GEOGRAPHIC ZONE (BCM).....	58
FIGURE 34 - EVOLUTION OF ACTUAL CONSUMPTION BY ECONOMIC ZONE (BCM)	58
FIGURE 35 - EVOLUTION OF APPARENT CONSUMPTION BY GEOGRAPHIC ZONE.....	62
FIGURE 36 - TOP-10 NATURAL GAS CONSUMERS	62

EXECUTIVE SUMMARY

2015: A Third Year of Moderate Growth in Gas Demand

Natural gas demand grew by 1.6% in 2015 according to Cedigaz after having stagnated in 2014. However, this apparent, if modest, resumption of global gas market growth can be misleading as the higher growth rate is essentially the result of a weather driven recovery in the EU where demand rebounded by 4.5% after having dropped by 11% in 2014. For the rest of the world gas demand growth was actually lower than in 2014 (1.2% vs. 2%) and was pulled by a limited number of countries led by the US. The inability of natural gas demand to keep pace with an accelerated supply growth led to an imbalance in the global gas market and to a price weakness which is expected to continue in the short and medium-term, amid a sluggish economic environment.

The year 2015 saw considerable changes in macroeconomic and price factors. Economic growth stood at 3.1%, lower than at any time since 2012 (3.3/3.4%) and also lower than the 10-year trend (3.8%). This was the result of the relatively modest growth of the emerging countries (4% compared with 6% over ten years), although western countries' growth rate exceeded the 10-year average (1.9% compared to 1.5%). International crude oil prices fluctuated to new lows, with Brent averaging 52/bbl, down by 47% from the previous year.

Many events had a major impact on natural gas market developments in 2015: the decline in prices for all fossil fuels, the slowdown of China's economic growth (+ 6.9%), the renewal of nuclear energy in Asia together with a booming expansion of renewable energy capacity, the fast decline of Chinese energy intensity, the curtailment of Groningen gas field production, the decline in Asian gas premium and the gas pricing reform in China. The weakness of the oil price impacted that of long-term LNG contracts, the majority of which is still indexed on oil. The falling oil price also acted as a cap on spot LNG in Asia, through oil switching in the power and industrial sectors. Overall, regional gas prices tended to converge except for North American prices which remained significantly lower than in the rest of the world.

With a weakened economic outlook in emerging countries and increased inter-fuel competition and mild weather conditions in Asia, 2015 was characterized by a moderate growth in world gas consumption, up 1.6% to 3472 bcm, according to Cedigaz first estimates. Demand growth remained concentrated in a small number of countries with the North American market, under the impetus of the United States (US), and the Middle East providing the largest contribution, followed by Europe. In the US, record low gas prices alongside environmental policy initiatives is encouraging coal-to-gas switching. Strong growth was also recorded in the Middle East, under the impulsion of Iran and the UAE. In Europe, the recovery of gas demand in 2015 was essentially due to the return to normal weather conditions in the first months of the year, following a mild winter in 2014. Reversely, gas consumption growth came to a halt in Asia with strong declines recorded in Japan and South Korea and a marked slowdown of consumption growth in China. Strong consumption decline was also registered in the Commonwealth of Independent States (CIS), especially in Russia, where GDP contracted by 3.7% in 2015.

In spite of depressed gas prices, production grew strongly again in North America (+ 4.1%), where gas supply continues to be boosted by unconventional gas. Production also increased significantly in Asia-Oceania (+ 3.3%) and the Middle East (+ 3%). Reversely, it stagnated in Latin America and dwindled in Europe (- 2.7%), the CIS (- 0.6%) and Africa (- 2%).

After falling by 4.4% in 2014, international natural gas pipeline trade resumed growth in 2015, up 2.9%, according to Cedigaz estimates. This growth was mainly due to a rebound in Russian gas exports to Europe, where surging consumption combined with falling indigenous production resulted in a growing dependence on extra-regional imports.

LNG production growth in Asia-Oceania quickened, whereas LNG demand was constrained by economic factors and inter-fuel and pipeline gas competition, causing a growing imbalance inside the Asian market (with declines of LNG imports in Japan, South Korea and China) and an LNG glut which benefited Europe. In this context, LNG trade returned to growth (+ 2.8%) after three years of stagnation.

Recent trends on gas markets highlight some of the structural economic factors which stifled growth in natural gas demand. Moderation of gas demand has been caused by intense competition with cheap coal (and more recently oil in China) in both industrialized and emerging markets, the development of renewables and nuclear, as well as increased energy efficiency and slower economic growth. Overall, except in the United States and a limited number of countries, essentially located in MENA and Southeast Asia, the future of gas faces many challenges.

1. Global marketed natural gas production grew 1.6% in 2015, led by the United States

- **North America: the US market maintained momentum and strengthened its production leadership**

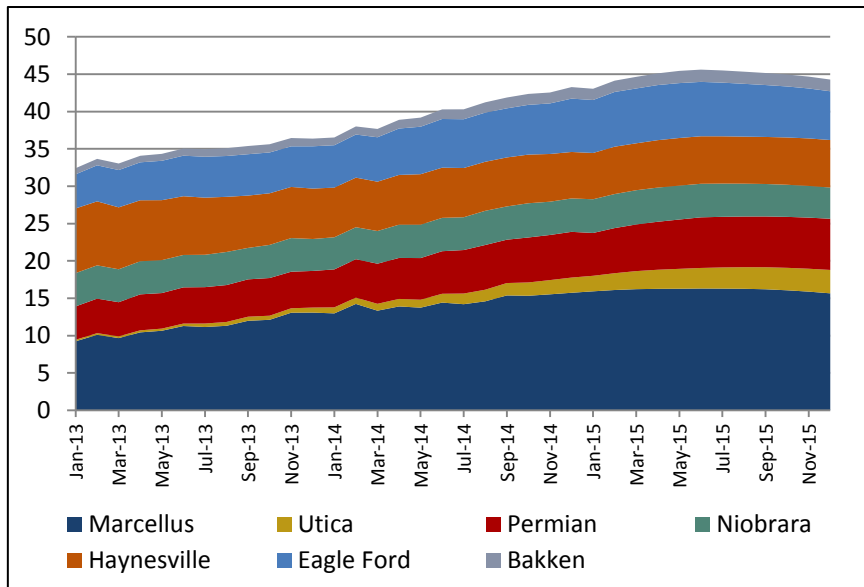
In North America (Mexico included), marketed gas production pursued strong growth, up 4.1 % to reach 958 bcm, under the impulsion of the US. Regional marketed gas production in North America has followed a strong uptrend since 2005 and has taken momentum since 2010, soaring at 4%/year, due to the exponential growth of US shale gas. In 2015, production covered 99% of regional consumption, versus 98% on the previous year.

The decline in oil prices since mid-2014 has impacted the North American natural gas market in the form of reduced revenues, constrained cash flows, and significantly less gas-targeted drilling. Yet, in 2015, US marketed (dry) gas production, which accounted for 80% of regional output, continued surging, up 5.3% to 767 bcm, despite low prices and falling rig counts. Production from five states - Pennsylvania, Ohio, West Virginia, Oklahoma, and North Dakota - was responsible for most of this growth, offsetting declines in much of the rest of the US. The continued rise in US natural gas production is largely due to the shale gas production burst in the Marcellus and Utica basins (Figure 1), where improved productivity and well efficiency offset the falling rig count and the decline of historical wells. In 2015, production of shale gas is estimated to have accounted for 56% of the total gas output (52% in 2014). However, it is worth noting that growth in shale gas production began to slow down during the final months of the year due to very low gas prices (< \$2.50/MBtu) which jeopardized the economic profitability of numerous deposits.

Marketed production in Canada is estimated at 154 bcm in 2015, up 2% from 2014, driven by the provinces of Alberta (+ 2.3%) and British Columbia (+ 4.9%), which shared respectively 68% and 28% of national output. The remainder of Canadian natural gas production is supplied by Nova Scotia, Ontario, the Northwest Territories, New Brunswick and Yukon. Marketed production in British Columbia and Alberta was propelled by the Montney tight gas play, while conventional production (no tight) pursued a structural decline, estimated down 7% in 2015. The share of tight gas in total Canadian production is expected to climb from 48% in 2014 to 52% in 2015.

The North American natural gas market continued to be oversupplied in 2015. By April 2015, the remaining storage deficit from the winter of 2013-2014 was replenished and inventories returned to levels near the five-year average. In the US, robust growth in production and normal weather in the summer led to record-high storage levels in November. Deliverability is expected to keep outpacing demand in 2016.

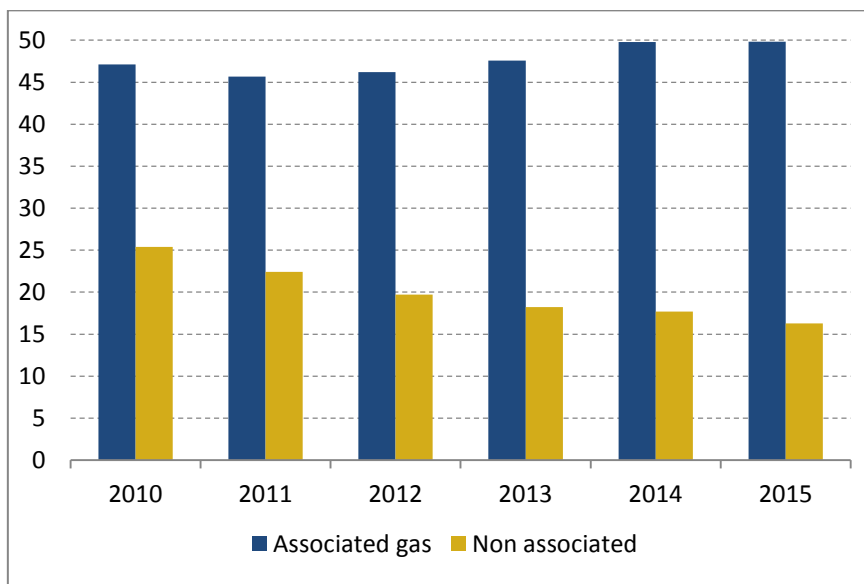
FIGURE 1 - US GAS PRODUCTION TREND FROM KEY SHALE DEPOSITS (BCM)



Source: US Energy Information Administration

In Mexico, marketed production fell by 10% to 37 bcm in 2015. Despite an increase in gross offshore associated gas production, marketed production declined year-on-year as a largest amount of associated gas was flared (+ 3 bcm). On the other hand, onshore non-associated gas production in the Northern Region continued its natural trend decline.

FIGURE 2 - EVOLUTION OF GROSS NATURAL GAS PRODUCTION IN MEXICO (BCM)



Source: PEMEX

- **The CIS production edged lower on Russia’s decline**

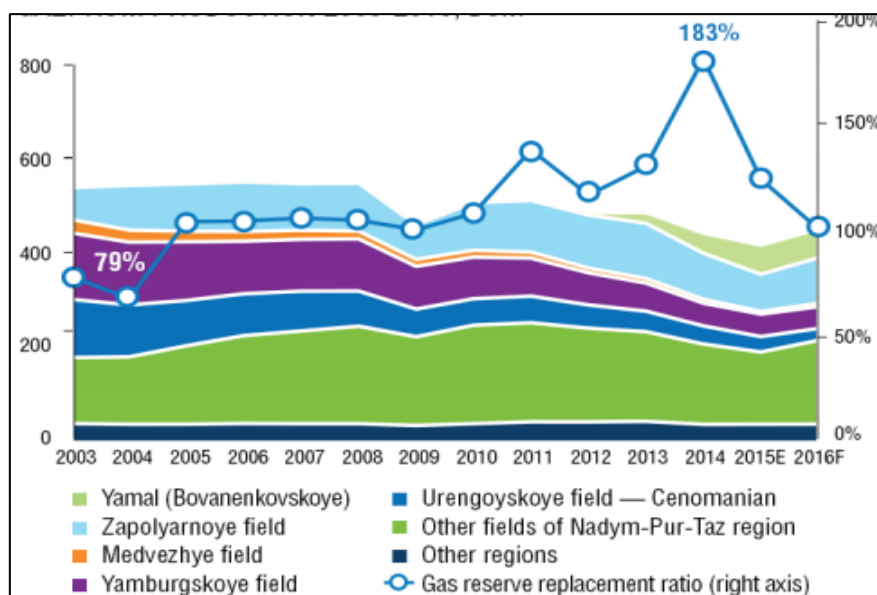
Production in the CIS inched down by 0.6% to 792 bcm¹ in 2015, as the Russian decline was not compensated by the good performances of Turkmenistan (+ 4.3%) and Kazakhstan (+ 5.2%).

In Russia, the 1% production decline appeared moderate considering the unusually warm weather in the last quarter, erratic supplies to Ukraine and poor economic conditions. In fact, production dedicated to European consumers increased sharply in 2015 and this growth was compounded by the significant export losses to Europe in the 4th quarter of 2014. In addition, the negative effects of the declining oil and gas prices were offset by an almost synchronically depreciating rouble, which drove down costs in US\$-terms.

The 8.3% rise in associated gas production failed to compensate for the 2.2% drop in non-associated gas production. In recent years, the production of dry gas has lost ground to the profit of associated gas, which is mainly exploited by “non-Gazprom gas producers”.

As in 2014, the national output decrease in 2015 was driven by Gazprom, which reduced its production by around 6 % to an all-time low of 391 bcm. In response to lower domestic needs and fierce competition from independent producers, production from giant fields in western Siberia’s Nadym Pur Taz centre fell most sharply. However, production from the Yamal’s largest field, Bovanenkovskoe, continued to ramp up (Figure 3).

FIGURE 3 - GAZPROM PRODUCTION, 2003-2016 (BCM)



Source: Gazprom Investor Day (Feb. 2016)

The other companies increased their output by 10.2% to 203.5 bcm. The largest independent, Novatek, produced 64 bcm in 2015, up 9.3% over 2014.

¹ Cubic metres of natural gas in the CIS have been converted to be taken in international standard conditions.

Gas production registered a significant decline in Uzbekistan (- 4.8%), which reduced exports to Russia as commercial constraints led Gazprom to cut Central Asian gas purchases.

In Kazakhstan, marketed gas production is estimated up 5.2% to 21 bcm. This growth is due to the start of the Shagyrly-Shomyshty gas field in Mangistau district in February 2015. The field's reserves are estimated at 32 bcm. The commissioning of the Beineu-Bozoi pipeline allowed the beginning of gas deliveries from western Kazakhstan to the east.

In 2015, Turkmenistan's marketed gas production is estimated to have risen by 4.3%, on growing domestic demand. Natural gas exports to China continued to increase, but were much lower than initially anticipated amid slowing Chinese gas demand growth. In the end-2015, Turkmenistan commissioned its 30 bcm/year capacity East-West gas pipeline, designed to join up the various elements of the Turkmen gas network and improve the country's gas export efficiency.

In Azerbaijan, marketed production gained 0.2 bcm to reach almost 18 bcm, sustained by both Shah Deniz and Azeri-Chirag-Guneshli fields' associated gas. However, gross production (including flared and re-injected gas) lost 0.2 bcm to amount to 27.6 bcm.

In Ukraine domestic output was on the decline (- 2.7%), as the positive results posted by private companies failed to offset the negative performance of Naftogaz Ukrainy's companies. Private companies accounted for almost 20% of national output in 2015 and are expected to boost production by 25-30% in 2016.

- **Asia Oceania: marketed production pursued a robust growth**

Marketed production in Asia-Oceania posted a strong growth of 3.3%, in line with the past five-year average, taking total regional output to a new record of 532 bcm. This result is linked to the start-up of two Australian CSG-to-LNG projects as well as Papua New Guinea LNG's ramp up, which compensated for production shortfalls in India and Southeast Asia.

In Australia, marketed production surged by 12.6% to exceed 60 bcm in 2015. The year 2015 marks the start of a wave of 60 mmtpa of new Australian LNG capacity set to come online over the next three years. LNG production was up 24% year on year and jumped almost 50% in the fourth quarter 2015. This performance was mainly explained by higher output from the Surat and Bowen basins in the eastern state of Queensland. Natural gas production was also 4.4% higher in Western Australia, reaching a record of 9 bcm.

In 2015, China's gas output only progressed by 2.9%, the slowest growth in at least ten years, marking a net deceleration as compared to the previous years. Natural gas production growth was constrained by demand and was also squeezed by contracted LNG and pipe gas imports. As domestic gas demand was hit by slowing economic growth and inter-fuel competition, excess contracted LNG supplies from Qatar and Papua New Guinea as well as piped gas from Central Asia have left China with a surplus, which is set to last for the rest of this decade. In 2015, PetroChina achieved a marketable natural gas output of 81 bcm, corresponding to an annual increase of 0.8%. The MoxiLongwangmiao gas field project, located in the Sichuan - Chongqing gas area and holding a capacity of 11 bcm/y was completed. The second largest national company, Sinopec, increased gas

production by 2.6% to 21 bcm, partly thanks to shale gas development. Natural gas production from the national company CNOOC increased more strongly by around 14% to 7.6 bcm. Shale gas production in China is estimated to have tripled from 1.4 bcm in 2014 to 4.3 bcm in 2015, boosted by the development of Sinopec Fuling field, which accounted for around 3% of national output. However, this level remains below the production target of 6.5 bcm set by the government.

In Thailand, marketed production declined by 5.4% to 40 bcm, according to provisional estimates. Thailand has planned to cut domestic gas production in the Gulf of Thailand and rely more on LNG imports to meet growing domestic demand. The move is aimed at preserving the resources which are fast depleting.

In Indonesia, natural gas production is estimated down 3.4% to 71 bcm in 2015, reflecting the decline of mature fields and project delays. The depletion of mature fields has caused a national gas shortage in a context of growing demand for industrial firms, power utilities and fertilizer producers, especially in North Sumatera region. Natural gas production in Indonesia is expected to keep on declining in 2016. The country is likely to keep around 61% of its total output for domestic use this year, up from around 55% in 2015. As an illustration of the growing allocation of gas for the domestic market, the Arun liquefaction plant was converted into a receiving terminal. The Arun LNG terminal started delivering natural gas to gas power plant PLTGU Belawan in March 2015. The LNG from Arun LNG was taken from the Tangguh liquefaction plant.

In Myanmar, production soared by 15.6% to 17.5 bcm, boosted by export-oriented sales (China, Thailand). In Malaysia, natural gas production decreased slightly by 1.4%, mainly due to natural decline of mature fields and lower domestic sales in Peninsular Malaysia.

Natural gas production in Bangladesh is estimated to have surged by 8.4% to 26 bcm. Activities continued on the Bibiyana Compression Project during 2015. In December, Chevron started producing gas from two new wells in the state of Sylhet, aimed at easing the country's chronic energy shortages. The company will initially produce around 3.7 Mcm/d from the Jalalabad field. Bangladesh currently faces up to 5 bcm/y of gas shortage.

Production in India dipped further, down 3.4% to 32 bcm in 2015. Since peaking at 60 Mcm/d in 2010, production from the KG-D6 block operated by the company Reliance has dwindled as a result of persistent recovery issues. In March 2016, the government finally acted to revitalise the upstream sector by approving a series of key policy changes, which introduce enhanced pricing for challenging gas projects aiming to reverse declining gas production.

- **Europe: Dutch Groningen field cut pushed regional production down**

Marketed gas production in Europe² slumped by 2.7% to 248 bcm in 2015. The continued output restriction at the Groningen field in the Netherlands was the main reason for this negative result.

² CEDIGAZ includes in Europe the EU-28, Turkey, Norway, Switzerland and central European countries (Bosnia & Herze., Croatia, Serbia, Albania, FYROM).

In the second quarter of 2015, the Minister of Economic Affairs of the Netherlands announced a further reduction in the Groningen production for 2015 to 30 bcm (42.5 bcm in 2014) in an effort to diminish the potential for seismic activity, while allowing a further 3 bcm to be taken from the Norg underground storage to ensure security of supply. Although the sharp reduction in Groningen production was partly compensated by a significant rise in output from Dutch small fields, total gas production in the Netherlands reached in 2015 its lowest level in four decades, down 23% to 53 bcm, according to provisional estimates. In November 2015, the State Council set the Groningen production limit at 27 bcm for the gas year 2016, until the Minister takes a new resolution on NAM's production plan.

Reversely, Norwegian's marketed gas production jumped 8% to achieve an all-time high of 117 bcm. This performance resulted from the resolution of technical issues on the Troll deposit, which represents about one-third of the national output.

In the United Kingdom, marketed gas production grew strongly by 6% to 37 bcm, the largest increase since 2000. Whilst maintenance issues depressed production in 2014, this growth rate is notable and is a result of increased production from existing terminals, the opening of the Juliet and Kew gas fields in 2014 and also the Jasmine and Breagh fields at the end of 2013.

The other countries (Germany, Denmark, Italy) posted production losses, a reflection of the decline of mature fields.

The three largest European producer countries, Norway, the Netherlands and the United Kingdom, now cover respectively 47%, 22% and 15% of regional production, versus 43%, 27% and 14% in 2014.

- **Africa: production remained constrained by a lack of gas**

Marketed production in Africa remained affected by a supply shortfall in North Africa, especially in Egypt. It is provisionally estimated to have declined by 2% to approximately 205 bcm in 2015.

In Algeria, production edged lower, down 0.9%, as new upstream developments barely compensate dwindling output from mature fields. Production has shown signs of lagging, while domestic consumption of natural gas was stimulated by the petrochemicals sector and residential usage. Since Sonatrach's foreign clients lifted less LNG, Algeria's LNG exports fell by 4.9%. Sonatrach hopes to boost gas production by 2.6 bcm in 2016.

In Egypt, the production decline that has occurred since 2008 was still dramatic in 2015: marketed production collapsed by 9% to 44.5 bcm, which was below the government's target. The downtrend in production is expected to reverse in the next few years. The Egyptian government has a five-year plan to reduce the supply gap that envisages the addition of 6 Bcf/d (62 bcm/y) of gas production over the next five years from fields such as Salamat, Atoll, West Delta Deep Marine and Zohr.

In Libya, marketed production declined by 8% to 11.5 bcm and remained well below the pre-conflict output level.

In Nigeria, marketed production is estimated to have increased by around 6% to 46 bcm, of which 55% was export-oriented. But security issues and acts of sabotage attacks on gas pipelines continued to pose a major challenge to meet growing natural gas domestic needs, especially for power generation. Disruptions of oil production due to security issues also have a dramatic impact on power supply, because 45% of gas supply is associated with oil production.

- **Middle East: continued rapid growth but production still lags behind demand**

In 2015, production rose by 3% in the Middle East, reaching 593 bcm, backed by certain Middle Eastern countries (Iran, UAE, Israel), where increased output was primarily intended for the domestic market. These developments offset the April 2015 disruption of LNG production in Yemen due to the civil war.

Iran posted the largest production gain (+ 9 bcm), taking marketed national output to 184 bcm in 2015. Just as the previous year, the expansion of production at South Pars gas field in Iran continued apace with the commissioning of new phases (Phases 15 & 16) and the production ramp up from existing projects (Phase 1). At the beginning of 2016, South Pars produced an estimated 460 Mcm/d from phases 1-10, 15 and 16, while Phases 12, 17 and 18 were not fully operational.

In the UAE, natural gas production increased also strongly (+ 8.4%), bolstered by the commissioning of the Shah sour gas project in Abu Dhabi, which reached full production capacity of 10 bcm/y. The project is expected to process sour gas into 5 bcm/y of usable gas. Natural gas production in the UAE is expected to keep growing in 2016. The Zora gas field, located in the Sharjah Western Offshore Concession, commenced production in the beginning of 2016. The field is expected to achieve a flow rate of 40 Mcf/d (0.4 bcm/y). In the current low oil price environment, Shell has pulled out of the Bab sour gas project, which was expected to produce 5.2 bcm/y when fully developed by 2020.

In addition, Israel's production ramp-up from the Tamar field continued. Marketed production is estimated up 7.6% in 2015, thanks to good reservoir and facility performance. Natural gas sales were boosted by strong seasonal weather demand and higher power generation needs.

Shortage of gas has occurred in most countries of the Middle East as more gas has been allocated to petrochemicals while power demand has soared. Some reforms have started to be implemented to reduce subsidies and encourage upstream activity. Saudi Arabia is a striking example. Marketed production in 2015 is provisionally estimated at 108 bcm, showing an annual growth rate of 5.4%, on par with the previous five-year average. In late 2015, Saudi Aramco began initial flows from a gas scheme at its giant Shaybah oil field, almost two years behind schedule. The Shaybah NGLs project is designed to process 2.4 Bcf/d (25 bcm/y) of low-sulfur sweet gas. However, production continued to fall short of domestic needs due to delays in the development of new fields, mainly the Al Wasiit Gas Project. This latter is expected on line in summer 2016 and implies the development of two offshore non-associated gas fields in the Arabian Gulf, Arabiyah and Hasbah, and the construction of the large Wasiit gas processing facility. It will be one of the largest non-associated gas processing plant built by Saudi Aramco, with the capacity to process 27 bcm/y of non-associated gas from the two fields. It is expected to supply some 17.9 bcm/y of marketable gas. Saudi Aramco plans to almost double production of natural gas in the coming decade. In 2015, the company allocated \$10 billion to gas

exploration, focusing on deepwater areas of the Red Sea, shale gas plays in the north and tight gas around its huge oil fields.

In Qatar, marketed production edged up 1% to 163 bcm, according to provisional estimates. The output from Qatar's two liquefaction plants was higher than in 2014 because of less scheduled maintenance. Qatar expects to start operations at its Barzan gas project in 2016 with full output the following year. The project was originally expected to come online in 2014. It will serve Qatar's own growing energy needs. As a result, the share of gas production for domestic use is projected to increase to 31% by 2017 from an estimated 25% in 2015.

- **Latin America: production flattened on contrasted developments among countries**

Production in Latin America remained relatively unchanged at 171 bcm in 2015 and witnessed very contrasted developments among countries. Production surged in Venezuela and was unusually up in Argentina, compensating for a continued decline in mature areas of Trinidad and Tobago and Colombia.

After eight years of structural decline due to the depletion of mature fields, Argentina's marketed production turned higher in 2015, mainly due to state company YPF. But this increase is specifically attributable to the Vaca Muerta shale area in Neuquén.

In Bolivia, production flattened at 22 bcm as the continued ramp up from the Margarita-Huacaya field was counterbalanced by declining output from the San Alberto field. Bolivian gas production is concentrated in three fields: Sabalo (31%), Margarita-Huacaya (28%) and San Alberto (13%).

In Brazil, marketed production remained flat in 2015. Among main facts, production increased on the Papa Terra field, which is located 110km off the coast of Brazil's Rio de Janeiro state. In addition, Itaguaí came on stream in Iracema Norte, which is located in the Lula field in the Santos pre-salt basin.

In Peru, natural gas production went down by 3.2% to 12.5 bcm, impacting down LNG exports.

A continuing shortage of natural gas in Trinidad & Tobago pushed natural gas production down 5.8% to 38 bcm in 2015. The gas shortage that started in 2013 worsened in 2015. Supply restrictions have affected LNG exports from the Atlantic liquefaction complex and have also troubled the petrochemicals sector.

After two years of relative stagnation, marketed production in Venezuela is believed to have jumped in 2015. In July 2015, Eni and Repsol started production of the Perla gas field located in the Cardón IV Block in the Gulf of Venezuela. The field is located in the Cardón IV Block. Claimed to be the largest offshore gas field discovered to date in Latin America, the field is expected to have a production capacity of 450 Mcf/d (4.6 bcm/y) in 2015 and 1200 Mcf/d (12.4 bcm/y) in 2020. Eni estimates the field to have 480 bcm of gas in place. The produced gas is sold to PDVSA until 2036 for primary use by the domestic market.

TABLE 1 - MARKETED PRODUCTION OF NATURAL GAS IN 2015 (BCM)

	2014	2015	Annual Change (%)
North America	920.5	958.0	4.1%
Canada	151.2	154.2	2.0%
Mexico	41.1	37.0	-10.0%
United States	728.2	766.8	5.3%
C.I.S.	796.8	792.0	-0.6%
<i>of which:</i>			
Azerbaijan	17.5	17.7	1.1%
Kazakhstan	20.2	21.2	5.2%
Russia	601.0	594.8	-1.0%
Turkmenistan	80.1	83.5	4.3%
Ukraine	19.5	19.0	-2.7%
Uzbekistan	58.5	55.7	-4.8%
Middle East	576.1	593.4	3.0%
<i>of which:</i>			
Bahrain	16.0	16.6	3.7%
Iran	174.5	183.7	5.3%
Israel	7.9	8.5	7.6%
Kuwait	15.0	15.7	4.5%
Oman	28.7	29.8	3.8%
Qatar	161.6	163.2	1.0%
Saudi Arabia	102.4	107.9	5.4%
UAE	54.3	58.8	8.4%
Yemen	9.7	2.9	-70.7%
Asia Oceania	515.2	532.1	3.3%
<i>of which:</i>			
Australia	53.7	60.5	12.6%
Bangladesh	23.8	25.8	8.4%
Brunei	11.0	11.6	5.4%
China	126.9	130.5	2.9%
India	33.3	32.1	-3.4%
Indonesia	73.5	71.0	-3.4%
Malaysia	65.4	64.5	-1.4%
Myanmar	15.1	17.5	15.6%
New Zealand	4.9	4.6	-7.1%
Pakistan	39.1	41.2	5.5%
Thailand	42.1	39.8	-5.4%
Vietnam	9.0	9.4	4.6%

Source: CEDIGAZ First Estimates

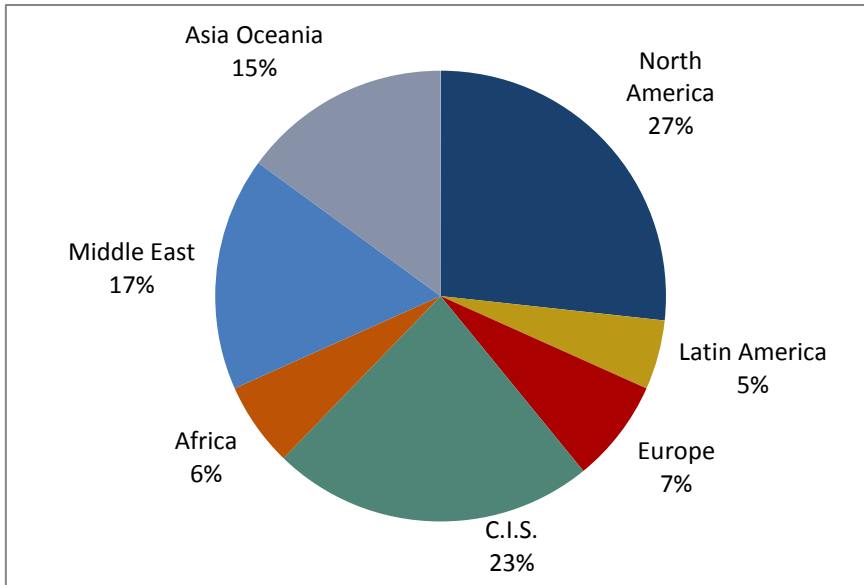
TABLE 1 - MARKETED PRODUCTION OF NATURAL GAS IN 2015 (BCM)

	2014	2015	Annual Change (%)
Europe*	254.8	248.0	-2.7%
<i>of which:</i>			
Denmark	4.6	4.6	-0.2%
Germany	9.2	8.5	-7.1%
Italy	7.0	6.6	-5.3%
Netherlands	69.6	53.5	-23.1%
Norway	108.8	117.2	7.7%
Poland	4.2	4.2	0.0%
Romania	10.5	10.5	0.0%
United Kingdom	34.9	37.0	6.1%
Africa	208.7	204.5	-2.0%
<i>of which:</i>			
Algeria	83.3	82.5	-0.9%
Egypt	48.8	44.5	-8.9%
Libya	12.5	11.5	-8.1%
Nigeria	43.8	46.3	5.6%
Latin America	171.1	171.3	0.1%
<i>of which :</i>			
Argentina	35.5	36.5	2.7%
Bolivia	21.7	21.6	-0.3%
Brazil	20.4	20.4	0.3%
Colombia	12.7	12.1	-4.6%
Peru	12.9	12.5	-3.2%
Trinidad & Tobago	40.0	37.7	-5.8%
Venezuela	25.6	28.1	9.9%
World	3443.3	3499.4	1.6%

* Europe: EU 28, Norway, Switzerland, Turkey and Central Europe

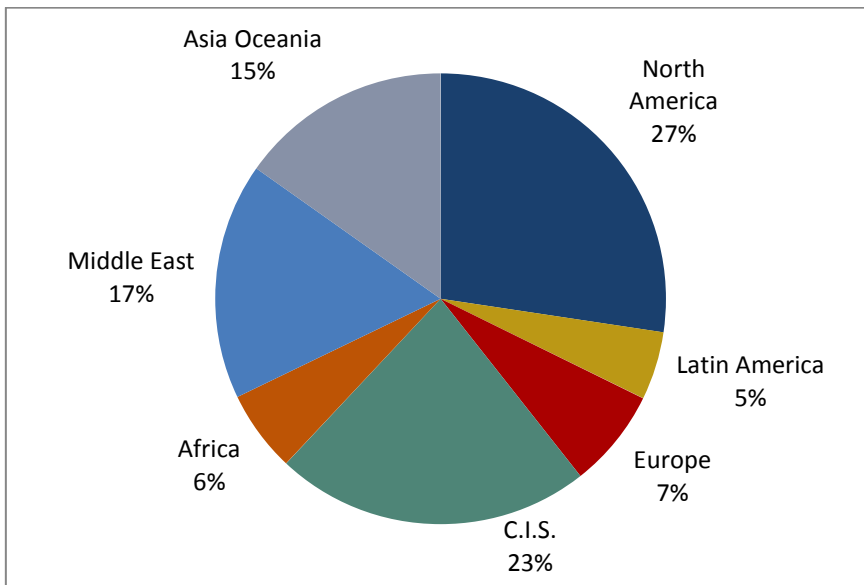
Source: CEDIGAZ First Estimates

FIGURE 4 - MARKETED GAS PRODUCTION BY REGION IN 2014



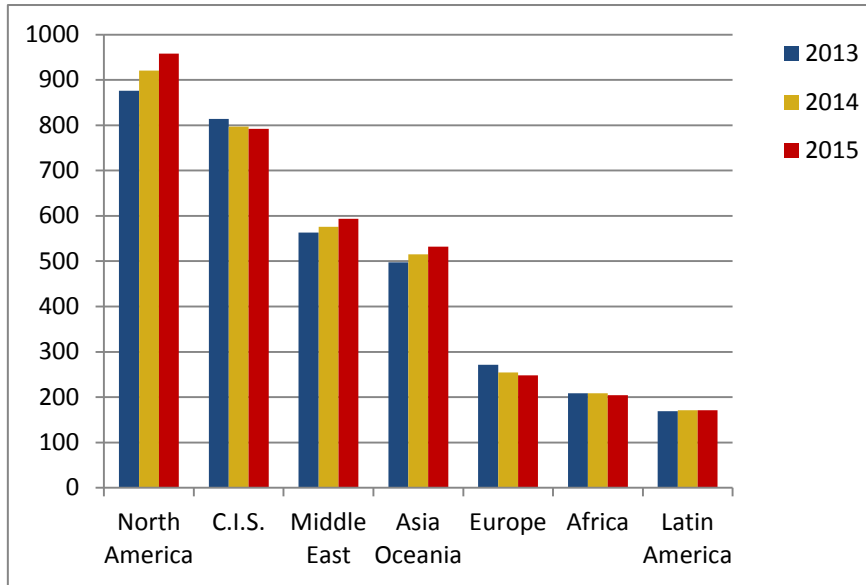
Source: CEDIGAZ First Estimates

FIGURE 5 - MARKETED GAS PRODUCTION BY REGION IN 2015



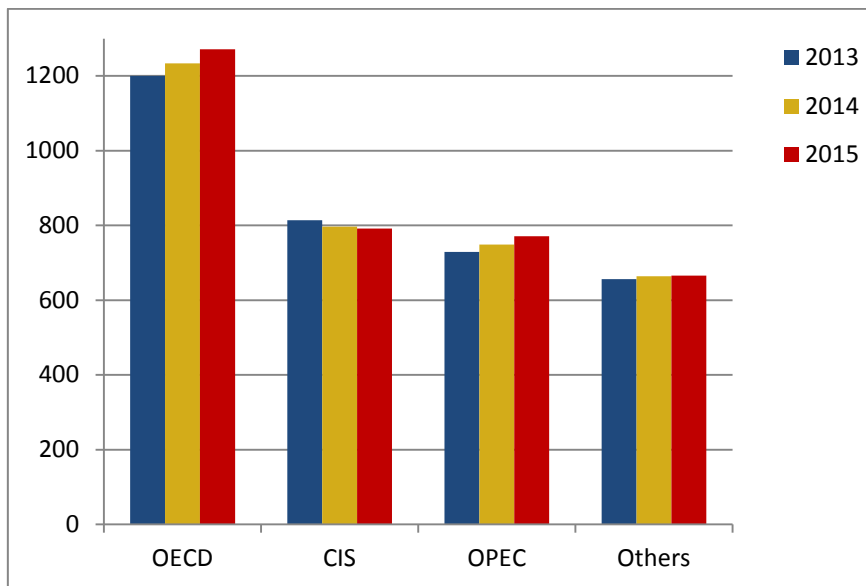
Source: CEDIGAZ First Estimates

FIGURE 6 - EVOLUTION OF MARKETED PRODUCTION BY GEOGRAPHIC ZONE (BCM)



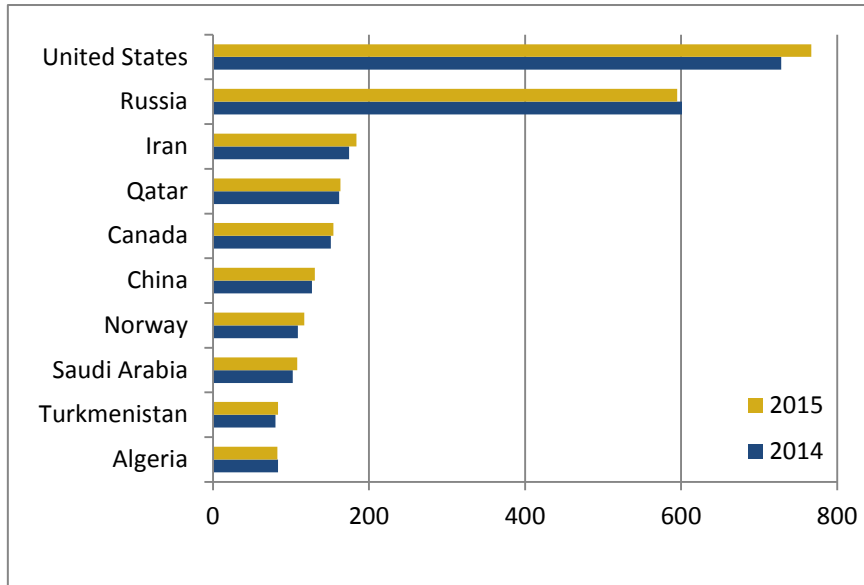
Source: CEDIGAZ First Estimates

FIGURE 7 - EVOLUTION OF MARKETED PRODUCTION BY ECONOMIC ZONE (BCM)



Source: CEDIGAZ First Estimates

FIGURE 8 - TOP-10 NATURAL GAS PRODUCERS (BCM)



Source: CEDIGAZ First Estimates

2. Buoyant expansion of international gas trade, up 2.8%

In 2015, international gas trade (net of LNG re-exports) recorded a buoyant expansion, up 2.8% to 1036 bcm, fuelled by both pipeline gas trade (+ 2.9%) and LNG flows (+ 2.8%). The strong growth in pipeline trade mainly resulted from increased deliveries of Norwegian and Russian gas exports to European markets, which reached new highs in 2015. In a context of growing supply in the Pacific Basin, 2015 saw the LNG glut deepen, dragging European and Asian spot prices down and making Europe the “market of last resort”. Thus, 2015 ended with the European gas market well supplied.

The world intra-regional trade recorded a rise of 2.7% to 592 bcm in 2015. This growth was mainly the result of intra-Asian LNG flows, which surged by 13% to 110 bcm, as supply from Australia and Papua New Guinea built up. The world inter-regional³ gas trade expanded by 3% to 444 bcm in 2015. This growth was only due to a surge in inter-regional pipeline deliveries (+ 8.7%), especially from Russia to Europe. Reversely, inter-regional LNG flows declined by 3.4% to 197 bcm.

The upturn in European gas consumption was mirrored by an increase in both net imports via LNG (+ 12.3%) and pipeline (+ 5.1%). The largest increases in total net imports in volume terms were recorded in Italy (+ 5.4 bcm) and Germany (+ 4.2 bcm). European dependence on net imports grew from 46% in 2014 to 48% in 2015.

Asia-Oceania showed an opposite trend. As natural gas consumption flattened while production continued to ramp-up, total net imports slumped 11%. Imports in some main Asian consumers (Japan, South Korea) decreased sharply amid lower consumption in the power sector. Accordingly, the dependence of Asia-Oceania on extra-regional imports decreased from 24.5% to 22% year on year.

As a consequence of these developments, Europe bolstered its standing as the leading natural gas trading zone. The share of Europe in international natural gas imports progressed from 42% in 2014 to 44% in 2015, while that of Asia-Oceania, which ranked second, slipped one point to 28%, followed by North America (13%).

On the export side, the CIS kept its position as the leading exporting region, but its share of total international exports dwindled from 27% to 26%, as the rise in Russian gas exports to Europe was offset by a contraction in intra-regional deliveries (Russia to Ukraine). In total, natural gas exports from the CIS were down 1.4% to 264 bcm.

On the other hand, total exports in Europe were on the rise, boosted by Norway and the UK. The share of Europe in international exports inched up from 20% to 21% yearly, followed by the Middle East (15%), Asia-Oceania (14%) and North America (12%).

World gas trade now accounts for 30% of global marketed production, against 29% in 2014, as a larger amount of the gas produced was exported. LNG kept a 31% share of total trade.

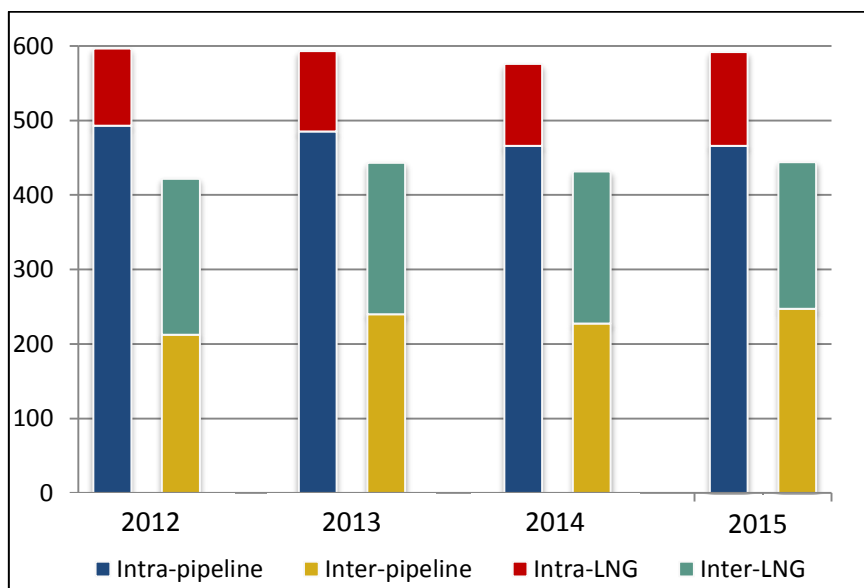
³ Only exchanges between the seven regional markets defined by CEDIGAZ are calculated.

TABLE 2 - EVOLUTION OF INTERNATIONAL GAS TRADE IN 2015 (BCM)

	2012	2013	2014	2015	2014-15 (%)	2012-15 (%/y)
Inter-regional trade	422	443	432	444	3.0%	1.7%
Pipeline	213	240	228	247	8.7%	5.1%
LNG	209	203	204	197	-3.4%	-1.9%
Intra-regional trade	597	593	576	592	2.7%	-0.3%
Pipeline	493	485	466	466	0.0%	-1.9%
LNG	104	108	110	126	14.1%	6.6%
International trade	1018	1036	1008	1036	2.8%	0.6%
Pipeline	705	725	694	713	2.9%	0.4%
LNG	313	311	314	323	2.8%	1.1%

Source: CEDIGAZ First Estimates

FIGURE 9 - RECENT TRADE IN INTERNATIONAL GAS TRADE (BCM)



Source: CEDIGAZ First Estimates

TABLE 3 - NATURAL GAS TRADE IN THE WORLD IN 2015 – BREAKDOWN BY IMPORTING COUNTRY
(BCM)

	2014	2015	Annual Change (%)
Europe	424.8	453.1	6.7%
<i>of which:</i>			
Austria	7.8	6.0	-22.6%
Belgium	28.5	34.1	19.3%
Czech Republic	8.0	8.2	3.1%
France	44.2	44.5	0.7%
Germany	92.6	103.0	11.3%
Greece	2.8	3.1	9.8%
Hungary	7.1	5.5	-22.4%
Ireland	4.5	4.6	1.6%
Italy	55.0	60.4	9.8%
Netherlands	15.9	25.0	57.2%
Poland	12.0	10.9	-9.0%
Portugal	4.2	5.0	17.6%
Romania	0.5	0.2	-66.2%
Slovakia	4.1	4.0	-3.5%
Spain	28.8	28.7	-0.3%
Turkey	48.1	47.0	-2.3%
United Kingdom	42.6	44.1	3.5%
Asia Oceania	295.1	293.0	-0.7%
<i>of which:</i>			
China	57.7	59.6	3.5%
India	18.5	18.7	0.7%
Japan	117.7	113.1	-3.9%
Malaysia	4.6	3.1	-33.6%
Singapore	12.4	12.2	-1.9%
South Korea	49.4	44.4	-10.2%
Taiwan	18.0	19.4	7.9%
Thailand	10.5	13.5	28.5%
North America	130.3	136.0	4.4%
<i>of which:</i>			
Canada	22.4	20.0	-10.5%
Mexico	28.9	36.4	25.8%
United States	76.2	76.7	0.7%
C.I.S.	75.0	62.4	-16.9%
<i>of which:</i>			
Belarus	18.4	17.3	-6.1%
Russia	25.0	16.1	-35.4%
Ukraine	19.2	16.5	-14.0%

Source: CEDIGAZ First Estimates

TABLE 3 - NATURAL GAS TRADE IN THE WORLD IN 2015 – BREAKDOWN BY IMPORTING COUNTRY
(BCM)

	2014	2015	Annual Change (%)
Middle East	41.4	45.3	9.3%
<i>of which:</i>			
Iran	9.9	9.9	0.0%
Jordan	0.3	2.2	635.4%
Kuwait	3.3	4.0	20.0%
UAE	25.8	27.1	5.0%
Latin America	33.2	34.7	4.7%
<i>of which:</i>			
Argentina	11.2	10.7	-5.0%
Brazil	17.4	20.0	14.5%
Chile	3.5	3.6	3.2%
Venezuela	1.0	0.5	-52.6%
Africa	7.8	11.7	49.6%
<i>of which:</i>			
Egypt		3.8	
South Africa	3.8	3.8	0.0%
Tunisia	2.9	3.0	2.8%
World	1007.5	1036.2	2.8%

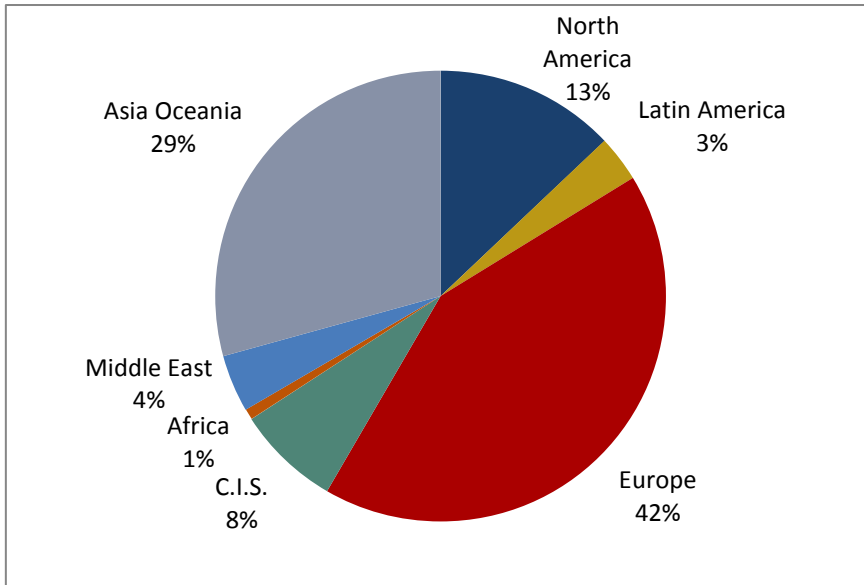
Source: CEDIGAZ First Estimates

TABLE 4 - NATURAL GAS TRADE IN THE WORLD IN 2015 – BREAKDOWN BY EXPORTING COUNTRY
(BCM)

	2014	2015	Annual Change (%)
C.I.S.	267.7	264.0	-1.4%
<i>of which:</i>			
Russia	193.4	197.1	1.9%
Turkmenistan	45.9	42.3	-7.9%
Uzbekistan	8.3	4.8	-42.4%
Europe	205.9	220.6	7.1%
<i>of which:</i>			
Netherlands	51.0	43.4	-15.0%
Norway	103.0	112.2	9.0%
United Kingdom	10.6	14.1	33.6%
Middle East	163.5	158.7	-3.0%
<i>of which:</i>			
Oman	10.3	9.8	-4.3%
Qatar	121.1	124.8	3.1%
UAE	13.5	13.2	-2.3%
Asia Oceania	128.1	143.7	12.2%
<i>of which :</i>			
Australia	31.1	38.5	23.8%
Indonesia	31.7	30.3	-4.4%
Malaysia	34.9	35.0	0.4%
Myanmar	11.7	13.9	18.9%
North America	117.3	124.0	5.7%
<i>of which:</i>			
Canada	74.5	74.3	-0.3%
United States	42.7	49.7	16.3%
Africa	83.9	85.5	1.9%
<i>of which:</i>			
Algeria	42.7	44.1	3.3%
Nigeria	24.9	25.4	2.0%
Latin America	41.1	39.7	-3.5%
<i>of which:</i>			
Bolivia	17.8	18.1	1.4%
Trinidad & Tobago	17.0	16.2	-4.6%
World	1007.5	1036.2	2.8%

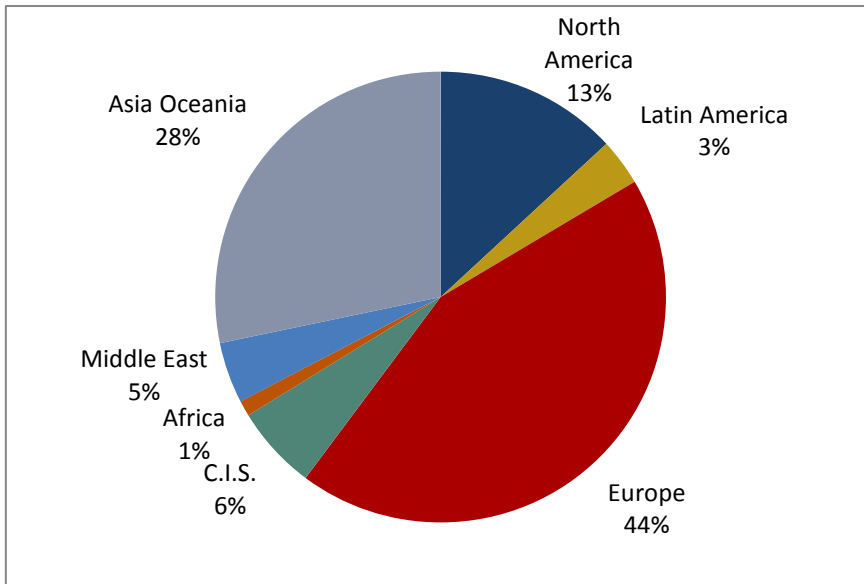
Source: CEDIGAZ First Estimates

FIGURE 10 - INTERNATIONAL IMPORTS BY GEOGRAPHIC ZONE IN 2014



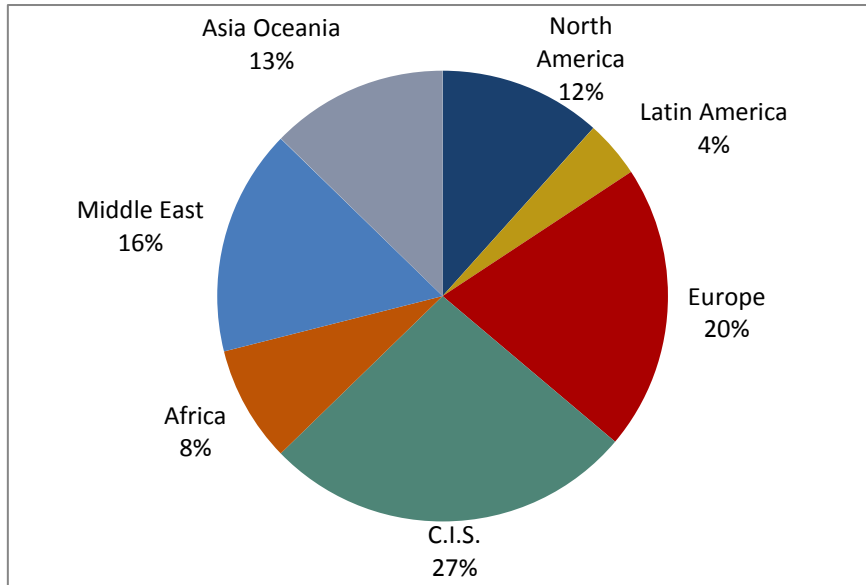
Source: CEDIGAZ First Estimates

FIGURE 11 - INTERNATIONAL IMPORTS BY GEOGRAPHIC ZONE IN 2015



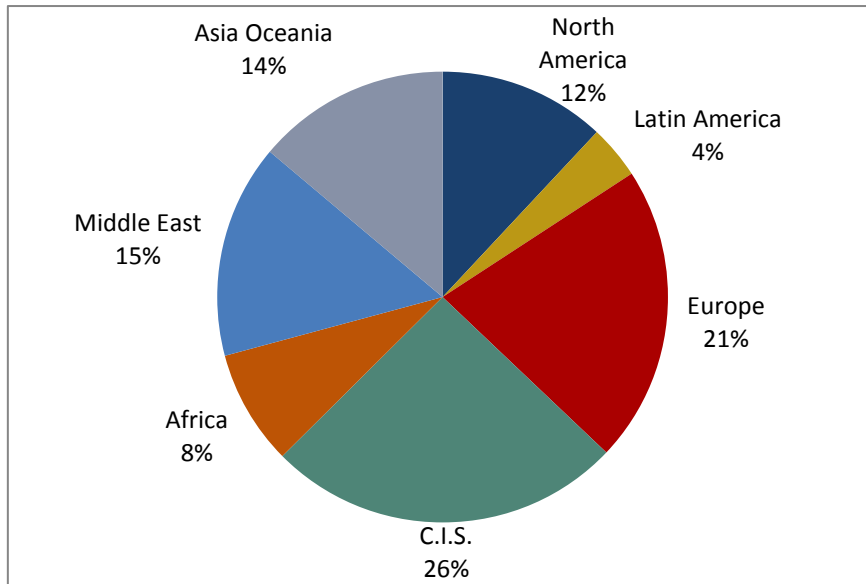
Source: CEDIGAZ First Estimates

FIGURE 12 - INTERNATIONAL EXPORTS BY GEOGRAPHIC ZONE IN 2014



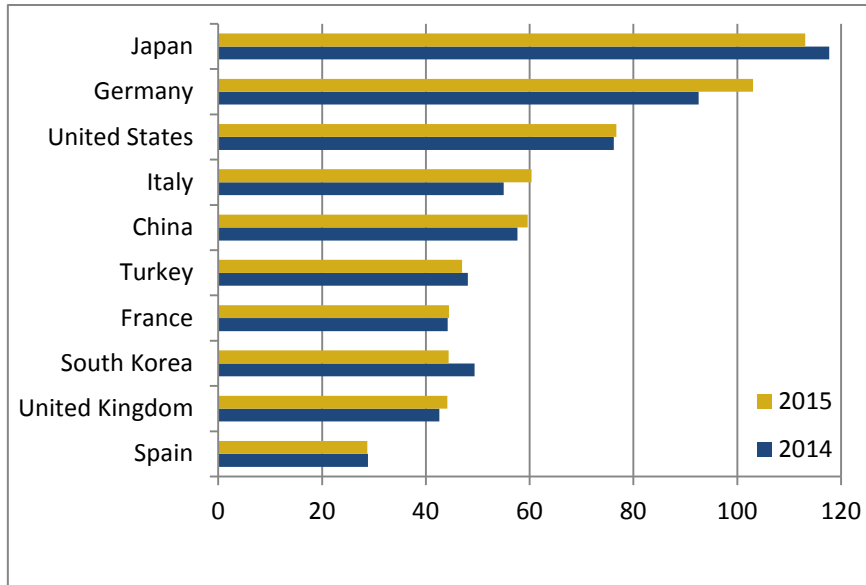
Source: CEDIGAZ First Estimates

FIGURE 13 - INTERNATIONAL EXPORTS BY GEOGRAPHIC ZONE IN 2015



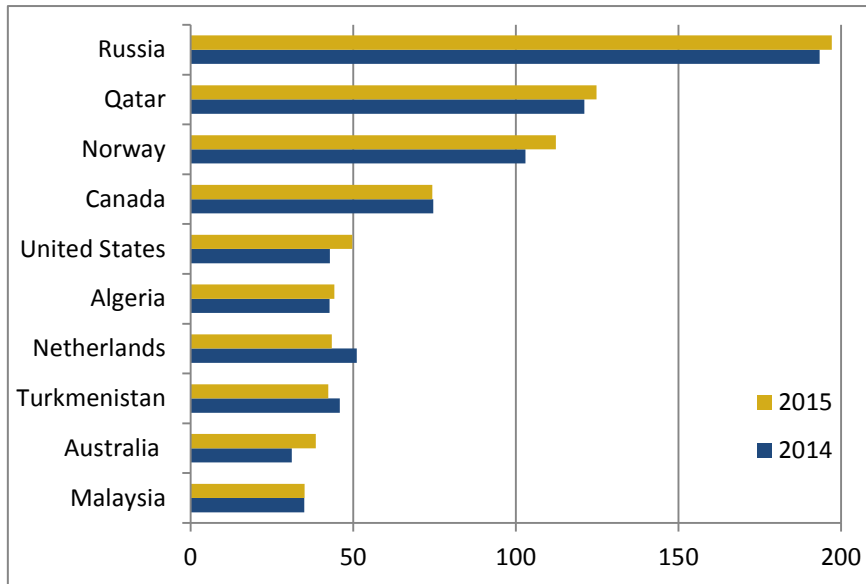
Source: CEDIGAZ First Estimates

FIGURE 14 - TOP-10 NATURAL GAS IMPORTERS (BCM)



Source: CEDIGAZ First Estimates

FIGURE 15 - TOP-10 NATURAL GAS EXPORTERS (BCM)



Source: CEDIGAZ First Estimates

2.1 After dropping in 2014, international pipeline trade rose back in 2015

After falling by 4.4% in 2014, international natural gas pipeline trade rose 2.9% to 713 bcm in 2015, according to CEDIGAZ first estimates. The strong growth in inter-regional trade (+ 8.7%), dominated by exports from Russia to Europe, was the only driver of this expansion, while intra-regional trade remained stable. This latter was affected by supplies cut from Russia to the Ukraine for the second consecutive year.

In Europe, a rebound in gas consumption combined with falling indigenous production resulted in net gas imports via pipelines rising 5.1% to 188 bcm in 2015. Total pipeline gas imports jumped 6% to 403 bcm, while exports increased more strongly by 6.8% to 215 bcm (including 9.2 bcm of extra-regional sales dedicated to Ukraine). Total pipeline gas imports increased particularly strongly to the Netherlands (+ 56%), and to a lesser extent, Germany (+ 11%) and Italy (+ 8%). Europe strengthened its leading position as the main regional import zone by pipeline, accounting for 56.5% of international flows (55% in 2014), far ahead of North America (17%).

According to CEDIGAZ estimates, Russia's natural gas exports to Europe (including Turkey, the Baltic States and Central Europe) jumped by 8.7% to 151.8 bcm in 2015, a record high annual total. Exports increased significantly in particular to Germany (+ 17%), France (+ 37%) and Italy (+ 13%), while Turkey reduced purchases by around 1.5%. More Russian gas came to Europe in the last quarter as buyers minimized their oil-indexed purchases in the first months of the year due to the time lag in the effect of falling oil prices. The transit of Russian gas through Ukraine to the European Union and Moldova in 2015 increased compared with 2014 by 7.9% to 63 bcm. Russian gas flows into Northwest Europe through the Brotherhood pipeline via Ukraine rose strongly by 20% in 2015 despite ongoing tensions between Russia and Ukraine. Flows from Russia to northeast Germany through the Nord Stream progressed by 10%, while deliveries via the Yamal pipeline through Poland were largely unchanged year on year as the pipeline is regularly running at full capacity.

Norwegian gas supplies to Europe also reached an annual record in 2015 as exports rose 8.4% (+ 8 bcm) to reach 106 bcm, according to Cedigaz estimates. Germany, France and the Netherlands all posted record high inflows from Norway, with respective growths of 11%, 11% and 24%, taking imports to 31 bcm, 19 bcm and 8 bcm. Exports' hike was the strongest to the Netherlands as the restrictions on Groningen field's output led to higher H-cal to L-cal conversion in the country. Exports from the Norwegian Continental Shelf to the UK also increased strongly, up 10.8% to 27 bcm, but remained below the 2013 annual total of 28 bcm. Only Belgium recorded a decrease in Norwegian pipeline gas receipts (- 3.8%).

In the Netherlands, the constraints on Groningen output led to net exports in 2015 being more than half their level the previous year. Total pipeline gas exports diminished by 15% to 43 bcm, according to Cedigaz estimates. They fell particularly strongly to the UK (- 3.3 bcm) and Germany (- 2.9 bcm). The country's ongoing interventionist policy around Groningen production levels led to more imports from Norway to make up for the shortfall. The third quarter marked an historic trade balance shift, as the country experienced net imports for the first time, but this situation turned around in the last quarter. The sharp fall in net exports was the result of the strong growth in Norwegian gas imports combined with declines in H-cal net exports, especially to Belgium and Italy.

In the United Kingdom, healthy production, stable imports and demand have given rise to significantly higher exports. Total pipeline gas imports were down by 2.5% to 31 bcm, whereas exports rose 34% to 14 bcm. The overall trend masks some underlying differences. Despite a small increase in overall imports, pipeline imports from the Netherlands and Belgium decreased by half compared with last year and the additional volumes were mainly sourced from Norway (up 11% on last year) and LNG (up a fifth on last year). Foreign dependence of the UK declined for the second consecutive year, from 48% to 45% annually, contrasting with the downtrend observed over the 2004-2013 period.

Pipeline flows from Africa to Europe surged by 9.5% to 32 bcm in 2015. Algeria's pipeline deliveries to Europe soared 9.6% to 24.5 bcm. Algerian pipeline gas sales to Spain and Italy increased respectively by 13.5% and 7% to 15 bcm and 7.2 bcm. The Transmed pipeline provided only 11% of Italian gas supply in 2015, compared to 27% three years before. This can be explained by the fact that in 2013, Sonatrach agreed to reduce the take-or-pay commitments of ENI until October 2014. Libya's annual gas exports to Italy via the Greenstream pipeline increased from 6.5 bcm in 2014 to 7.1 bcm in 2015, which accounts for two-thirds of the pipeline's transport ultimate capacity.

Elsewhere, Turkey's imports from Azerbaijan increased slightly to 6.2 bcm in 2015, while purchases from Iran declined from 8.9 bcm to 7.8 bcm. Turkey's imports from Azerbaijan, one of Turkey's cheapest sources, may have displaced Iranian inflows to a certain extent.

In Asia, China's imports of Central Asian gas⁴ progressed from 28.3 bcm in 2014 to 29.6 bcm in 2015, witnessing a slow growth as compared with the previous years, as China's gas demand was subdued. This volume includes almost 28 bcm of receipts from Turkmenistan, which were 30% lower than initially anticipated as Turkmengaz and CNPC had previously planned to boost China's imports of Turkmen gas to 40 bcm/y in 2015. China also imported a volume of 3.9 bcm from Myanmar, from which deliveries continue to ramp-up following the commissioning of the 12 bcm/y Myanmar-China gas pipeline in July 2013. Australia's imports from Timor Leste/Australia JPDA increased to 7.7 bcm. Myanmar's exports to Thailand rose from 8.7 bcm in 2014 to 10 bcm in 2015. Total Indonesian exports to Malaysia and Singapore are expected to have declined by 11% to 9.3 bcm.

In the Middle East, the Dolphin pipeline, which transports dry natural gas from Qatar's North Field to markets in the UAE and Oman has been running at full capacity (20 bcm/y). Since September 2015, Egypt started importing natural gas from Jordan through the Arab Gas Pipeline, while its exports through the same pipeline ceased in mid-2014 due to a lack of gas. An agreement has been signed with Jordan to take advantage of the excess capacity of gas from the national FSRU.

The intra-regional trade in North America posted a solid growth of 5.6% to 124 bcm, buoyed by US gas exports to Mexico. Indeed, continuing increases in US shale gas production reduced import requirements and supported growth in exports to Mexico. The decline in Mexican production and LNG purchases enabled the US to lift exports, particularly from the Eagle Ford Shale in South Texas.

⁴ Includes gas from Turkmenistan, Uzbekistan and Kazakhstan

The intra-CIS trade reached 52 bcm in 2015, which is 25% lower than in 2014. Russian gas sales to the neighbouring countries fell due to deliveries to Ukraine plunging by 58% to 6 bcm. It is important to precise that an additional volume of 1.3 bcm was delivered to Donetsk and Lugansk provinces, which are not administrated by the Ukrainian government. Belarus' gas purchased volumes from Russia are estimated down 6% to 17.3 bcm. Russian gas imports from Central Asia decreased significantly in 2015, due to commercial constraints. Imports from Uzbekistan have been cut by around 70%. In addition, Russia stopped importing gas from Turkmenistan at the end of 2015 because of financial issues. At the end of 2014, Russia decided to cap its imports from Turkmenistan at just 4 bcm, well down on the 10 bcm it imported in 2014.

In Latin America, Bolivian gas exports to Brazil increased slightly by 2% to 12.3 bcm in 2015, while deliveries to Argentina were mostly unchanged at 5.7 bcm. Thanks to an increase in production, Argentina managed to limit its dependence on imports. In the meantime, Argentina exported 0.04 bcm to Chile and a quite similar volume to Uruguay. Colombia's gas exports to Venezuela halved to 0.5 bcm in 2015 due to the termination of the Venezuela sale contract, which expired in June 30, 2015.

In Africa, exports from Mozambique to South Africa remained relatively stable, while Algeria's gas exports to Tunisia increased 3% to reach approximately 3 bcm. Nigeria's gas exports to Ghana via the West African Gas Pipeline (WAGP) amounted to an estimated volume of 0.6 bcm.

TABLE 5 - NATURAL GAS PIPELINE TRADE IN THE WORLD IN 2015 – BREAKDOWN BY IMPORTING COUNTRY (BCM)

	2014	2015	Annual Change (%)
Europe	380.1	402.9	6.0%
<i>of which:</i>			
Belgium	27.0	31.4	16.4%
France	37.7	38.8	2.8%
Germany	92.6	103.0	11.3%
Italy	50.8	54.8	7.9%
Netherlands	15.5	24.2	56.3%
Turkey	40.8	39.3	-3.6%
United Kingdom	31.5	30.7	-2.5%
North America	117.0	123.5	5.6%
<i>of which:</i>			
Canada	21.8	19.4	-11.0%
United States	74.6	74.3	-0.3%
C.I.S.	75.0	62.4	-16.9%
<i>of which:</i>			
Belarus	18.4	17.3	-6.1%
Russia	25.0	16.1	-35.6%
Ukraine	19.2	16.5	-14.0%
Asia Oceania	58.6	62.1	6.0%
<i>of which:</i>			
China	31.3	33.5	7.1%
Thailand	8.7	10.0	14.8%
Middle East	35.9	35.6	-0.8%
<i>of which:</i>			
Abu Dhabi	9.3	9.3	0.1%
Latin America	18.8	18.6	-1.2%
<i>of which:</i>			
Argentina	5.7	5.7	-0.3%
Brazil	12.1	12.3	2.1%
Africa	7.8	8.1	3.6%
<i>of which:</i>			
Tunisia	2.9	3.0	2.8%
South Africa	3.8	3.8	-0.1%
World	693.2	713.1	2.9%

Source: CEDIGAZ First Estimates

TABLE 6 - NATURAL GAS PIPELINE TRADE IN THE WORKD IN 2015 – BREAKDOWN BY EXPORTING COUNTRY (BCM)

	2014	2015	Annual Change (%)
C.I.S.	253.6	249.7	-1.5%
<i>of which:</i>			
Azerbaijan	8.3	8.4	1.2%
Russia	179.3	182.9	2.0%
Turkmenistan	45.9	42.3	-7.9%
Uzbekistan	8.3	4.8	-41.8%
Europe	201.0	214.7	6.8%
<i>of which:</i>			
Denmark	2.1	2.7	29.7%
Netherlands	51.0	43.4	-15.0%
Norway	98.1	106.3	8.4%
United Kingdom	10.6	14.1	33.6%
North America	117.0	123.5	5.6%
<i>of which:</i>			
Canada	74.5	74.3	-0.3%
United States	42.4	49.2	16.0%
Africa	37.0	39.5	6.9%
<i>of which:</i>			
Algeria	25.8	28.0	8.7%
Libya	6.5	7.1	9.2%
Mozambique	3.8	3.8	-0.1%
Middle East	35.5	34.6	-2.6%
<i>of which:</i>			
Iran	9.9	8.7	-11.4%
Qatar	20.1	20.1	0.1%
Asia Oceania	30.3	32.5	7.2%
<i>of which:</i>			
Indonesia	10.5	9.3	-11.1%
Myanmar	11.7	13.9	18.8%
Timor Leste/Aus. JPDA	6.3	7.7	22.2%
Latin America	18.8	18.6	-1.2%
<i>of which:</i>			
Bolivia	17.8	18.1	1.4%
Colombia	1.0	0.5	-52.6%
WORLD	693.2	713.1	2.9%

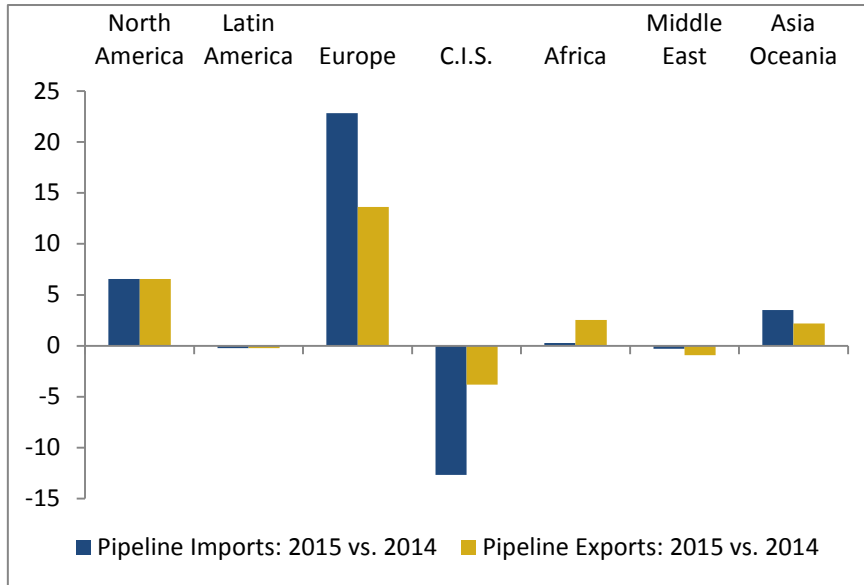
Source: CEDIGAZ First Estimates

TABLE 7 - TOTAL PIPELINE IMPORTS BY SOURCES IN EUROPE IN 2015 (BCM)

Exporter		2014	2015	Var. (%)
Europe	Denmark	2.1	2.7	28.6%
	Netherlands	51.0	43.4	-15.0%
	Norway	98.1	106.3	8.4%
	UK	10.6	14.1	33.6%
	Other	34.7	38.9	12.2%
	Total	196.5	205.4	4.5%
CIS	Russia	139.7	151.8	8.7%
	Azerbaijan	6.1	6.2	1.6%
	Total	145.7	158.0	8.4%
Africa	Algeria	22.4	24.5	9.6%
	Libya	6.5	7.1	9.4%
	Total	28.9	31.6	9.5%
Middle East	Iran	8.9	7.8	-12.0%
	Total	8.9	7.8	-12.0%
TOTAL		380.1	402.9	6.0%

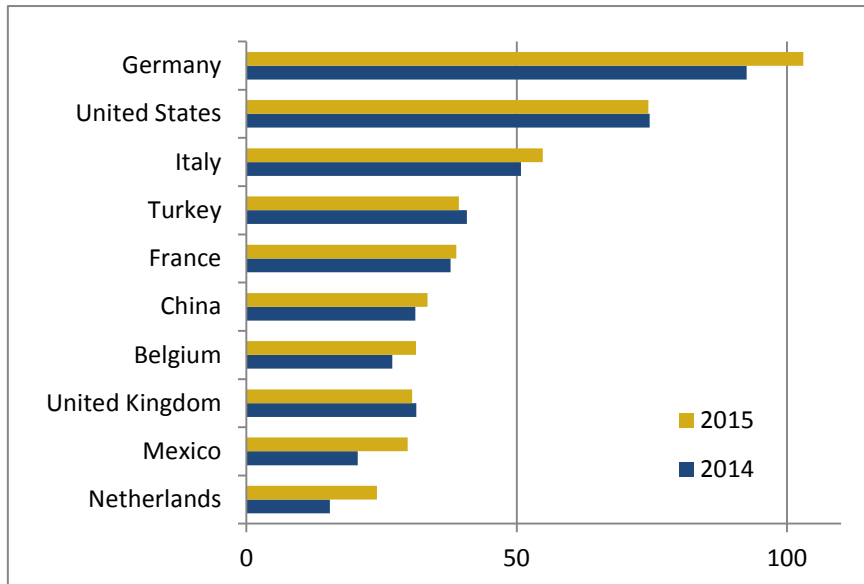
Source: CEDIGAZ First Estimates

FIGURE 16 - PIPELINE TRADE VARIATIONS (BCM), 2015 VS. 2014



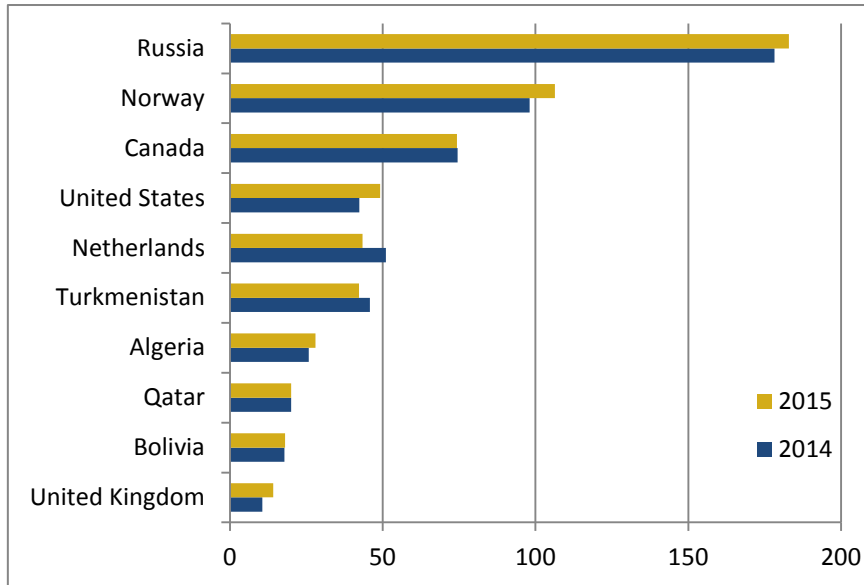
Source: CEDIGAZ First Estimates

FIGURE 17 - TOP-10 PIPELINE GAS IMPORTERS (BCM)



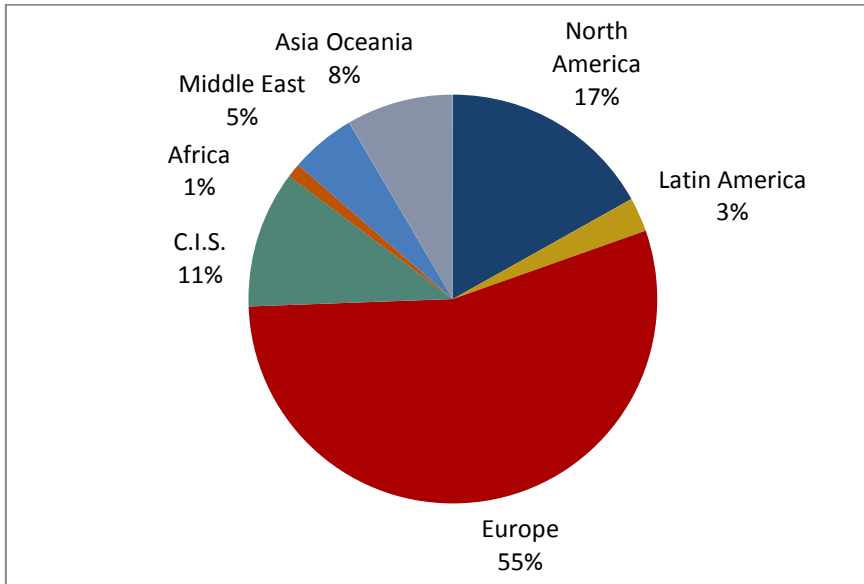
Source: CEDIGAZ First Estimates

FIGURE 18 - TOP-10 PIPELINE GAS EXPORTERS (BCM)



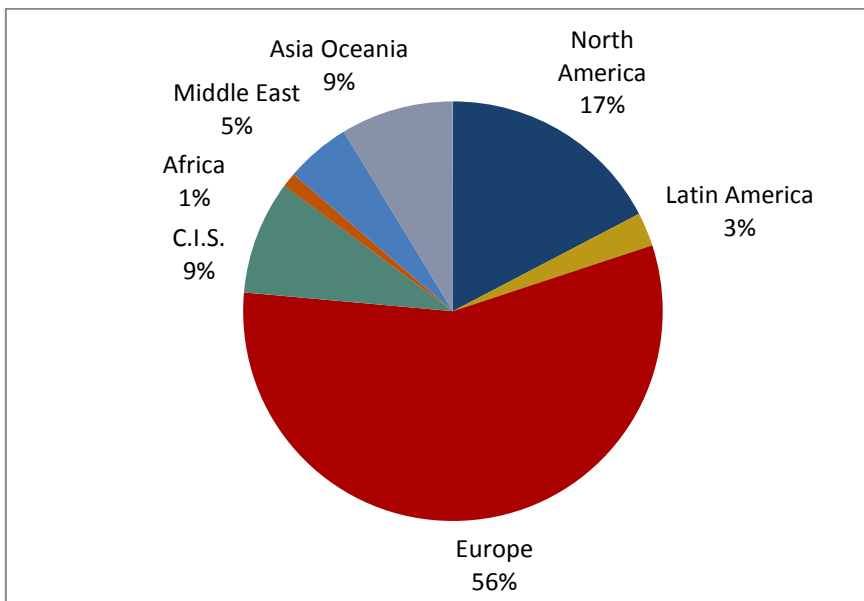
Source: CEDIGAZ First Estimates

FIGURE 19 - INTERNATIONAL PIPELINE IMPORTS BY GEOGRAPHIC ZONE IN 2014



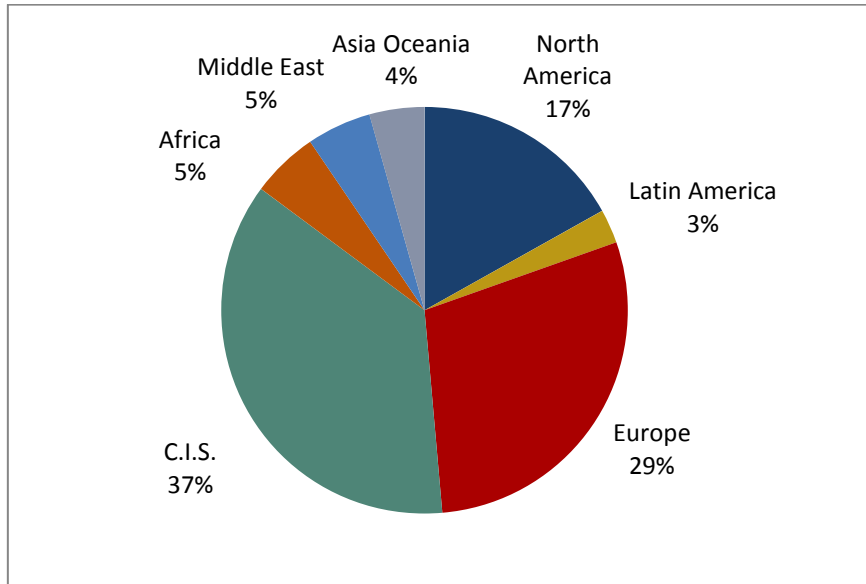
Source: CEDIGAZ First Estimates

FIGURE 20 - INTERNATIONAL PIPELINE IMPORTS BY GEOGRAPHIC ZONE IN 2015



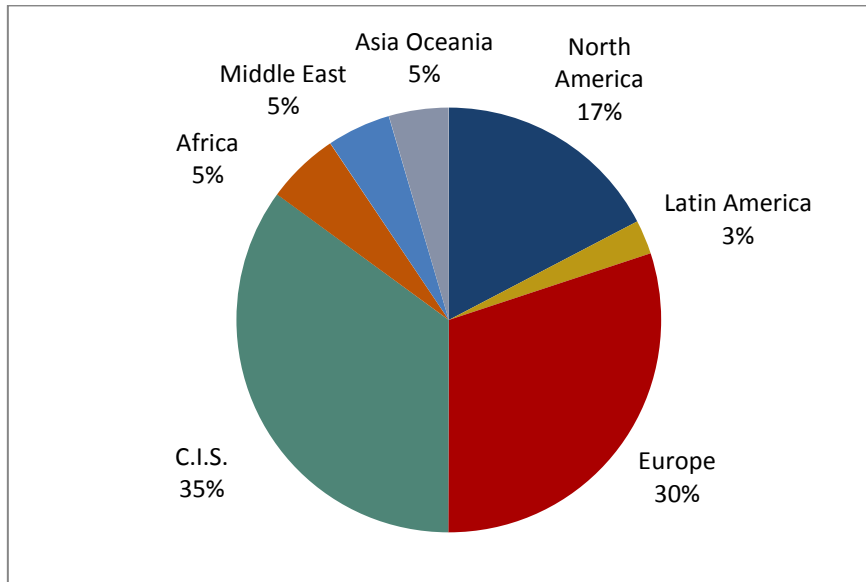
Source: CEDIGAZ First Estimates

FIGURE 21 - INTERNATIONAL PIPELINE EXPORTS BY GEOGRAPHIC ZONE IN 2014



Source: CEDIGAZ First Estimates

FIGURE 22 - INTERNATIONAL PIPELINE EXPORTS BY GEOGRAPHIC ZONE IN 2015



Source: CEDIGAZ First Estimates

2.2 Global LNG trade has entered a new era of expansion

After three successive years of little or no increase, international LNG trade (net of re-exports) regained momentum in 2015, up 2.8% to 323.05 bcm. This upturn marks the start of a surge in supply that should see growth average up to 7%/year over the next five years. Main highlights in 2015 include the accelerating supply growth, the reversal of demand trends in Asia and Europe, the growing role of the MENA countries as LNG importers and the growth of intra-regional and intra-basin trade at the expense of inter-regional flows.

- **Lower demand in Asia compensated by new emerging markets**

For the first time since 2009, Asian LNG net imports turned lower, down 2.3% to 231 bcm, mainly due to lower receipts in Japan (- 3.9%) and South Korea (- 10.2%) in a context of weak electricity consumption and slowing economic growth. Natural gas consumption in the power sector was affected by the (re)start of nuclear power plants, increased reliance on coal for cost reasons and also growing competition from renewables.

In China, net LNG imports declined for the first time ever in 2015, down 0.9% to 26.2 bcm, after eight years of double digit growth, amidst weak domestic gas demand. High inventories and low domestic demand prompted China's CNNOOC to sell some long-term LNG volumes onto the spot market.

New importers emerged on the international LNG scene and increased their role rapidly. Indeed, lower demand in Northeast Asia was partially offset by surging imports from three new emerging buyers, Pakistan, Egypt and Jordan, which added more than 7 bcm of LNG demand in 2015. In 2015, Pakistan started to import LNG thanks to a FSRU moored at Port Qasim near Karachi. The terminal, which was commissioned in March 2015, handled 17 cargoes or 1.5 bcm, including six FSRU trips to load LNG in Qatar.

Lower prices appear to have had a positive effect on India's LNG imports, which edged higher by 0.7% to 18.7 bcm in 2015.

In Singapore, LNG net imports were flat at 2.6 bcm because of the launch of the reloading activity. In 2015, three vessels were re-exported to South Korea and Japan. Compared to 2014, the origin of imports changed quite significantly as BG, which held an exclusive right to import LNG in the country, commissioned the Queensland Curtis LNG plant. In 2015, Singapore imported 0.8 bcm of LNG from Australia while imports from the Equatorial Guinean LNG plant, from which BG was the only off-taker, decreased to 0.9 bcm. BG also optimized transportation costs so that imports from Trinidad and Tobago almost vanished while imports from Qatar reached 0.7 bcm.

In Thailand, LNG imports almost doubled to reach 3.5 bcm in 2015 as long-term deliveries from Qatargas started under a 2.7 bcm/y contract. On the contrary, imports from Malaysia decreased from 2.2 bcm to 1.7 bcm. As portfolio owners optimized transportation costs through short term contracts, Malaysia received in 2015 one cargo from Nigeria and four cargoes from Australia as compared with four cargoes from Nigeria and only one cargo from Australia in 2014.

- **LNG demand in MENA skyrocketed**

The Middle East and North Africa region brought the most significant changes to the global LNG market in 2015 and emerged as a key growth driver of the LNG demand. Two out of the new importing countries in 2015, Jordan and Egypt, are located in this region. Net LNG imports in MENA soared from 5.5 bcm in 2014 to 13.2 bcm in 2015.

After having sent its last domestically produced LNG cargo in 2014, Egypt commissioned two FSRUs at Ain Sokhna on the Red Sea in 2015. Within less than a year, Egypt, which has been facing a growing gas deficit, imported about 3.6 bcm. The bulk of imports came from Qatar (1.9 bcm) while reloads from Europe, the United States and India accounted for about 0.8 bcm.

Another newcomer, Jordan, imported 2.2 bcm in 2015, mostly from Qatar (0.9 bcm) and from Nigeria (0.7 bcm).

In the meantime, imports by traditional importers also increased significantly. In 2015, Dubai increased its LNG imports by 61% to 3.4 bcm. While most of the growth was backed by higher receipts from Qatar, the number of LNG suppliers increased, from 5 countries in 2014 to 9 countries in 2015. For the first time, some shipments were delivered from Abu Dhabi, the neighbouring Emirate. In Kuwait, LNG imports surged by 20% to 4 bcm, with Qatar and Nigeria contributing for the largest part of the additional supply.

- **European net imports reverted to growth after three years of decline**

In Asia, the build-up of supply coupled with weakening demand led to increased flexible volumes, predominately Qatari, being pushed into the European market – particularly the United Kingdom. European LNG net imports surged by 12.3% to just over 50 bcm in 2015, after three years of continuous decline. But imports still remained far below the peak level of above 86 bcm/y reached in 2010-2011.

Except in France, where net imports declined 12% to 5.7 bcm, and in Greece, where they flattened, LNG net imports increased everywhere, but grew most strongly in the liquid Northwest European markets. In the Iberian Peninsula, LNG demand was boosted by higher demand for the power sector as droughts reduced the availability of hydropower. It is worth noting that the decline in re-exports from Spain was significant (- 2.6 bcm).

Poland joined the club of LNG importers in December 2015 with a commissioning cargo delivered by Qatargas to the Polskie LNG terminal.

- **In Americas, LNG imports are pulled by Brazil**

LNG net imports in Latin America grew by 12.4% year-on-year, from 14.4 bcm in 2014 to 16.1 bcm in 2015. The bulk of the growth was caused by a surge in Brazilian imports in early 2015. The country, which has three regasification vessels, imported 7.6 bcm in 2015 against 5.4 bcm in 2014. The demand for natural gas was pulled by the power sector to compensate for a fall in hydropower output due to a severe drought in the northern and north-eastern parts of the country. It is worth emphasizing that wind power output grew significantly over the same period and represented about 4% of the electricity generated in 2015 (compared with 12% for natural gas).

In 2015, Chile imported the equivalent of one more cargo compared to 2014 and received a total of 3.6 bcm of LNG.

In Argentina, where increased domestic production (+ 2.7%) reduced import needs, net LNG imports fell by 10.3 % to 4.9 bcm.

In North America, LNG net imports dropped by 6% to 12.5 bcm. Mexico was responsible for most of the decrease (- 1.7 bcm) as growing pipeline imports from the US left little space for LNG. In the United States, LNG net imports grew from 1.6 bcm in 2014 to 2.4 bcm in 2015 on the back of deliveries at the Everett terminal, Massachusetts, and Elba Island, Georgia. In Canada, LNG imports were almost flat at 0.6 bcm.

- **Supply growth was concentrated in the Pacific Basin**

LNG supply returned to growth in 2015, up 2.8%. However, this is a relatively slow annual growth rate historically for a business that has seen average growth rates of just over 8% in the 2000s. In a context of weak prices, this growth was lower than anticipated because of delays in the start-up of new projects, lower production at some operating projects, and slowing LNG and gas demand growth in the three largest LNG markets: Japan South Korea and China.

LNG supply was given impetus from the start-up of Australian projects, the ramp-up of PNG LNG which operated for the first year at full capacity, and, to a lesser extent, increased Qatari production, this latter increase compensating for the loss of Yemen production.

In Asia, the surge in LNG exports is associated with the commissioning of the Queensland Curtis LNG (QCLNG) and Gladstone LNG projects, which became the first in a new wave of LNG trains. Australia's customer base widened, with first deliveries to Singapore, India, Kuwait, Pakistan, Thailand, Dubai and Jordan.

The surge in LNG supply in the Pacific Basin (+ 11.3%) was partially offset by declines in the Atlantic Basin (- 1%) and the Middle East (- 3%).

Output from Atlantic LNG in Trinidad and Tobago declined (- 4.6%) in 2015 because of reduced gas supply from the offshore fields operated by BP and BG that feed the plant. Growing domestic demand and the failure to increase gas production appear to have been the main reasons for the

decline in Algeria's LNG exports (- 4.9%). In addition, there was no supply from Egypt due to a lack of feedgas and from Angola due to technical issues.

Despite an increase in Qatari exports, which has been favoured by lower planned maintenance, LNG supply from the Middle East posted a loss of almost 4 bcm, with respective declines of 4.4% and 3.9% in Oman and Abu Dhabi and a total disruption in Yemen LNG exports from April due to the civil war.

As a consequence of these different developments, the Pacific Basin overtook the Middle East to become the leading LNG exporting zone (Figure 26), gaining a market share of 41% of total LNG sales, followed by the Middle East with 38% and the Atlantic Basin with 21%.

- **Shifting trade flows amidst contracting regional differentials**

Despite the growth in LNG supply, the overall share of spot and short term imports remained stable at around 28% in 2015, according to GIIGNL. The narrowing of regional price differentials had an effect on arbitrage trade and re-exported volumes. The latter declined from 7 bcm in 2014 to 5.9 bcm in 2015, due to Europe (- 1.8 bcm). The larger appetite for spot and short term cargoes in the Middle East, Egypt, India and Pakistan was not sufficient to compensate for the declines in Japan and South Korea, which were well supplied through long term contracts. Atlantic to Pacific LNG flows declined significantly as the difference in Atlantic/Pacific spot prices was reduced. Atlantic volumes were squeezed out of Asia, while Australia and PNG provided additional available and proximate supply for the market. According to Cedigaz, intra-regional LNG trade in Asia picked up 13% to 110 bcm. On the other hand, Asian LNG imports from extra-regional suppliers collapsed by 12% from 142 bcm to 125 bcm year on year.

TABLE 8 - EVOLUTION OF NET LNG IMPORTS BY COUNTRY IN 2015 (BCM)

	2014	2015	Annual change (%)
Asia Oceania	236.51	230.97	-2.3%
China	26.40	26.16	-0.9%
India	18.54	18.66	0.7%
Japan	117.71	113.11	-3.9%
Malaysia	2.15	1.75	-18.6%
Pakistan		1.45	
Singapore	2.58	2.62	1.4%
South Korea	49.37	44.36	-10.2%
Taiwan	17.97	19.39	7.9%
Thailand	1.79	3.49	95.2%
Europe	44.70	50.21	12.3%
Belgium	1.57	2.67	69.6%
France	6.42	5.67	-11.8%
Greece	0.58	0.60	2.9%
Italy	4.22	5.56	31.8%
Lithuania	0.14	0.42	N/A
Netherlands	0.46	0.88	89.8%
Poland		0.12	
Portugal	1.31	1.47	11.8%
Spain	11.38	11.53	1.3%
Sweden	0.14	0.21	N/A
Turkey	7.29	7.64	4.8%
United Kingdom	11.16	13.44	20.4%
Latin America	14.36	16.14	12.4%
Argentina	5.49	4.93	-10.3%
Brazil	5.38	7.64	42.2%
Chile	3.49	3.57	2.3%
North America	13.28	12.48	-6.0%
Canada	0.56	0.61	9.9%
Dominican Republic	1.20	1.38	15.3%
Mexico	8.35	6.62	-20.8%
Puerto Rico	1.57	1.48	-5.7%
United States	1.61	2.40	49.2%
Middle East	5.50	9.66	75.4%
Dubai	2.10	3.39	61.0%
Israel	0.08	0.08	-1.7%
Jordan		2.21	
Kuwait	3.32	3.99	20.0%
Africa		3.59	
Egypt		3.59	
World	314.35	323.05	2.8%

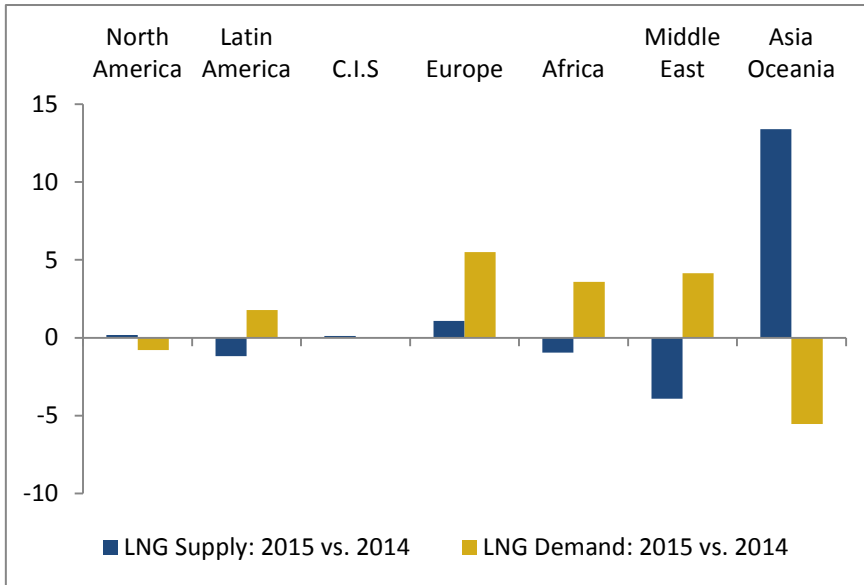
Source: CEDIGAZ First Estimates

TABLE 9 - EVOLUTION OF LNG SUPPLY BY COUNTRY IN 2015 (BCM)

	2014	2015	Annual change (%)
Middle East	127.99	124.08	-3.1%
Oman	10.27	9.82	-4.4%
Qatar	101.02	104.76	3.7%
UAE	7.91	7.60	-3.9%
Yemen	8.80	1.90	-78.4%
Asia Oceania	97.85	111.26	13.7%
Australia	31.09	38.47	23.8%
Brunei	7.82	8.61	10.1%
Indonesia	21.27	21.04	-1.1%
Malaysia	33.03	33.44	1.3%
Papua New Guinea	4.65	9.70	108.6%
Africa	46.94	45.98	-2.1%
Algeria	16.95	16.12	-4.9%
Angola	0.43		
Egypt	0.42		
Equatorial Guinea	4.79	5.02	4.6%
Nigeria	24.34	24.85	2.1%
Latin America	22.26	21.07	-5.4%
Peru	5.24	4.83	-7.8%
Trinidad and Tobago	17.02	16.24	-4.6%
C.I.S	14.12	14.24	0.8%
Russia	14.12	14.24	0.8%
Europe	4.84	5.92	22.2%
Norway	4.84	5.92	22.2%
North America	0.34	0.51	N/A
United States	0.34	0.51	N/A
WORLD	314.35	323.05	2.8%

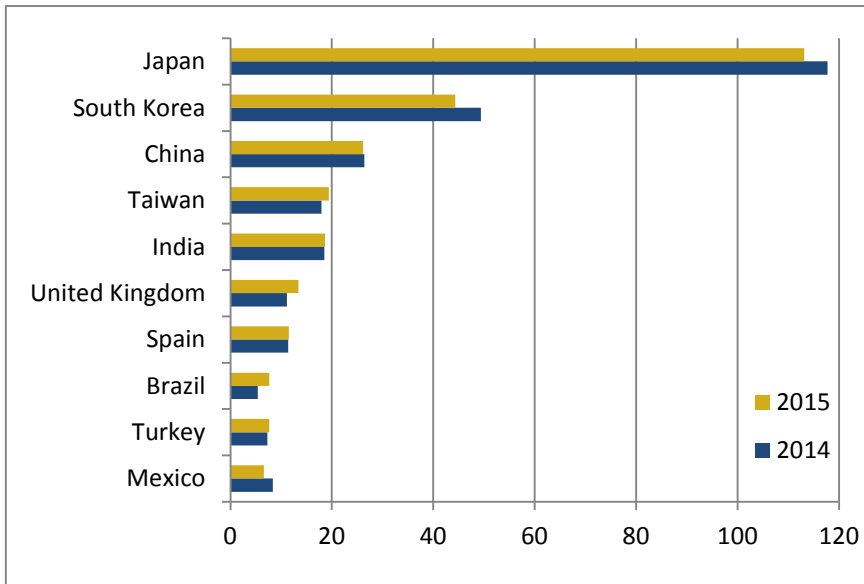
Source: CEDIGAZ First Estimates

FIGURE 23 - LNG TRADE VARIATIONS (BCM), 2015 VS. 2014



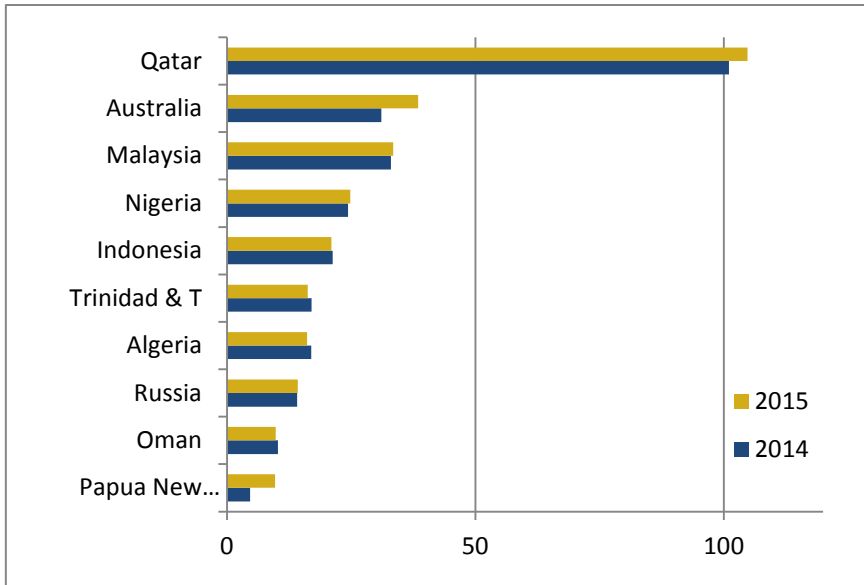
Source: CEDIGAZ First Estimates

FIGURE 24 - TOP-10 LNG IMPORTERS (BCM)



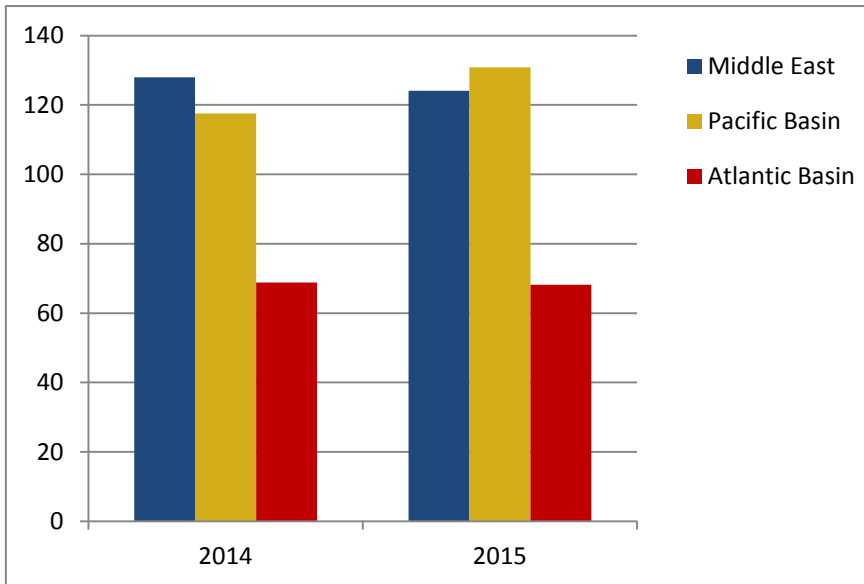
Source: CEDIGAZ First Estimates

FIGURE 25 - TOP-10 LNG EXPORTERS (BCM)



Source: CEDIGAZ First Estimates

FIGURE 26 - LNG EXPORTS BY ZONE



Source: CEDIGAZ First Estimates

2.3 The LNG infrastructures in 2015

The global liquefaction capacity increased by 19 bcm/year in 2015, reaching 417 bcm at year-end. Four trains were commissioned in 2015: Australia's Queensland Curtis LNG Train 1 (+ 5.7 bcm) in January 2015, Australia's QCLNG Train 2 (+ 5.7 bcm) in July 2015, Indonesia's Donggi-Senoro (+ 2.7 bcm) in August 2015 and Australia's Gladstone LNG Train 1 (+ 5.2 bcm) in October 2015.

The expansion of import terminal capacity again outpaced new liquefaction capacity. The total regasification capacity worldwide increased from 1015 bcm at year-end 2014 to 1056 bcm at year-end 2015, with the addition of four new onshore terminals⁵, four FSRUs⁶, the conversion of the Arun liquefaction plant into a receiving terminal (+ 4 bcm), the upgraded FSRU in Dubai (+ 5 bcm) and the expansion of Quintero terminal in Chile (+ 1.9 bcm).

TABLE 10 - LNG LIQUEFACTION CAPACITIES, AS OF END-2015

Country	Liquefaction capacity (Bcm/year)
Abu Dhabi	7
Algeria	38
Angola	7
Australia	49
Brunei	10
Egypt	17
Equatorial Guinea	5
Indonesia	35
Libya	4
Malaysia	34
Nigeria	30
Norway	6
Oman	14
Papua New Guinea	9
Peru	6
Qatar	103
Russia	13
Trinidad and Tobago	20
United States	2
Yemen	9
World	417

Source: CEDIGAZ LNG Service

⁵ Japan's Kushiro (+ 0.7 bcm) & Hachinohe (+ 2 bcm) & Hitachi (+ 0.7 bcm), Poland's Swinoujscie (+ 5 bcm)

⁶ Pakistan's Port Qasim (+ 6.7 bcm), Egypt Ain Sokhna FSRU 1 (+ 5.7 bcm) & FSRU 2 (+ 7.7 bcm), Jordan's Aqaba (+ 7.4 bcm)

TABLE 11 - LNG REGASIFICATION CAPACITIES, AS OF END-2015

Country	Regasification capacity (Bcm/year)
Argentina	9
Belgium	9
Brazil	13
Canada	12
Chile	9
China	55
Dominican Republic	3
Dubai	10
Egypt	13
France	22
Greece	5
India	33
Jordan	7
Indonesia	17
Israel	3
Italy	15
Japan	252
Kuwait	8
Lithuania	4
Malaysia	5
Mexico	23
Netherlands	12
Pakistan	7
Poland	5
Portugal	8
Puerto Rico	4
Singapore	8
South Korea	146
Spain	67
Sweden	1
Taiwan	18
Thailand	7
Turkey	12
United Kingdom	48
United States	187
World	1056

Source: CEDIGAZ LNG Service

3. The European gas supply in 2015

Total gross European natural gas supply⁷ is estimated to have increased 2.2% from 486 bcm in 2014 to 497 bcm in 2015.

On the back of falling production at the Dutch Groningen field, Europe (including Norway) recorded an increase in its dependence on external sources. European producer countries outside Norway accounted for only 26% of European gas supply, down 4 points from 2014. Reversely, Norway's market share picked up from 22% to 24%.

Russia strengthened its market share in European gas supply from 29% in 2014 to 31% in 2015.

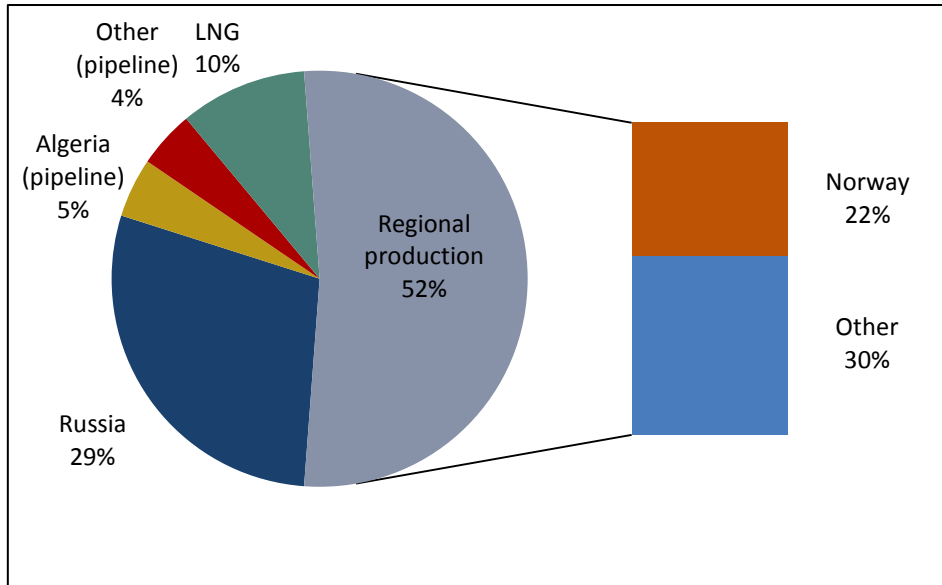
The share of Algerian pipeline gas in European gas supply remained unchanged at 5%, while Algerian LNG edged down from 3% to 2.5% year on year. Pipeline gas imports from other extra-regional sources (Azerbaijan, Libya, Iran) accounted for 4% of the total, a similar share to 2014 and 2013.

Gross LNG imports from extra-regional sources increased 7.4% to 51.6 bcm in 2015. The share of LNG in European gas supply flattened at 10%, which is 5% below the 2010 level. Among LNG suppliers, Nigeria boosted LNG deliveries to Europe by 26% to 7.4 bcm, which were mainly oriented to Spain (+ 30%). Qatar also increased LNG sales to Europe at a significant rate (+ 21%), with massive volumes dedicated to the UK in particular (+ 23%). Qatar's market share in European gas supply increased 1 percentage point to 5.6%.

Total European LNG re-exports dedicated to extra-regional markets fell strongly from 6 bcm to 4.7 bcm, resulting in total net LNG imports rising more steeply than gross imports.

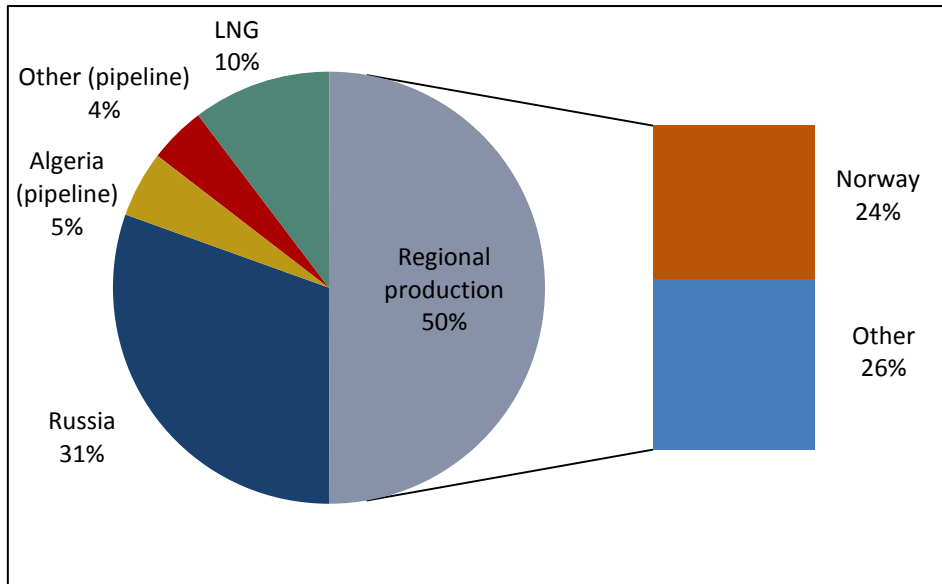
⁷ Production (Norway included) plus total imports from extra-regional sources

FIGURE 27 - EUROPEAN GAS SUPPLY IN 2014



Source: CEDIGAZ First Estimates

FIGURE 28 - EUROPEAN GAS SUPPLY IN 2015



Source: CEDIGAZ First Estimates

4. Gas prices were on a downward trend in a context of healthy supply

In 2015, the price of Brent stood at \$52/barrel, down nearly 47% compared to 2014 (\$99/barrel). The excess of supply was the main influencing factor. Oil prices have plummeted due to the US shale gas revolution and Saudi Arabia's new strategy aiming to protect its market share.

International gas prices declined sharply in direct or indirect relation to falling prices of other fossil fuels, in a market characterized by excess supply.

In the United States, the continued rise in domestic production, high stock levels and a mild weather helped push the Henry Hub price to its lowest recorded level since 1999. It fell around an average of 40% from \$4.4/MBtu in 2014 to \$2.6/MBtu in 2015, and traded in a range of \$1.5-3.3/MBtu. A relatively very warm start of the 2015-2016 winter season led to a steep decline in the Henry Hub price which fell below \$2/MBtu at the end of the year.

The NBP spot price in Europe has trended downward since February, falling below \$6/MBtu at the end of the year, the lowest levels of the past six years. The average price stood at \$6.5/MBtu in 2015, a 21% fall from 2014. Falling coal prices, down 25% in \$/t, contributed in part to this decline.

Impacted by the falling price of Brent, the average long-term oil-indexed price in Europe was close to spot price levels in the second half of the year, which means that Russian gas exported via long-term contracts has become competitive. Cedigaz estimate points to an average price of \$6.8/MBtu in 2015 (assuming a 60% indexation on the NBP, the remaining being linked to oil products), compared with \$10/MBtu in 2014. Overall, European long-term contract prices are year after year, coming closer to that prevailing on the spot markets. The 2015 thus saw oil-indexed prices, the UK coal switching point (taking into account the UK carbon floor price) and LNG contract prices converge closer to the UK NBP. This convergence was caused by market fundamentals – firm demand coupled with ample supply – and increased supply flexibility for buyers. It in turn reduced price volatility on European gas markets.

In 2015, the average price of LNG in Japan, almost entirely indexed to the price of oil, dropped around 36% from \$16/MBtu in 2014 to approximately \$10/Mbtu in 2015. The price of spot deliveries has dropped even more, by 45%, from around \$14 to \$7.5/Mbtu. The weakness of spot prices in Asia was the consequence of falling oil prices, the possibility of arbitrage between Europe and Asia, weak demand coupled with abundant supply and high levels of stocks. However, the entry of new buyers onto the market and increased spot purchases from India supported prices in the \$6-7/Mbtu range through most of 2015. Despite the LNG oversupply, the spread between the Asian spot price and oil parity narrowed to \$2-3/Mbtu in 2015's shoulder months, partly due to opportunistic buying.

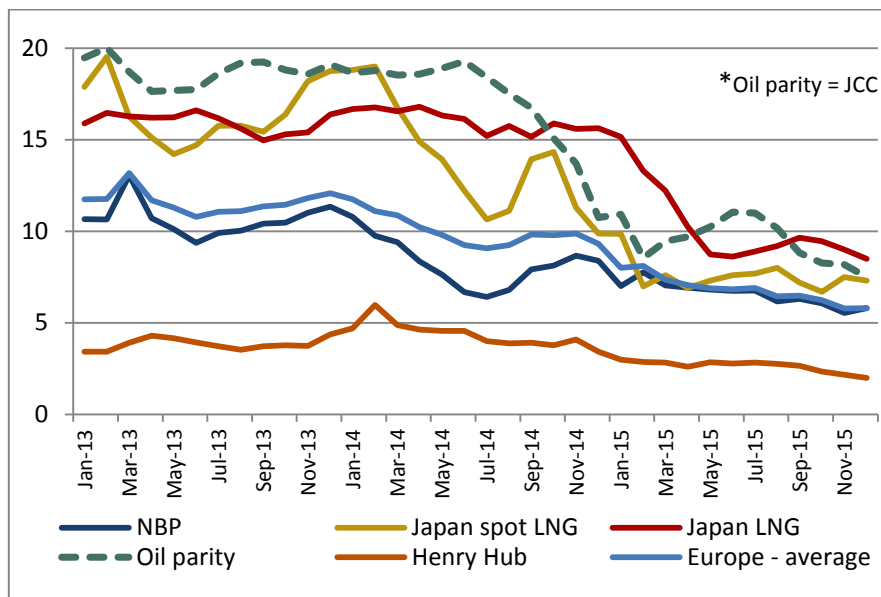
The spread between NBP and Asian spot prices decreased from \$6.5/MBtu in early October 2014 to \$1.8/Mbtu towards the end of 2015. The NBP price was even briefly higher than the Asian spot prices in February 2015.

TABLE 12 - EVOLUTION OF INTERNATIONAL PRICES (\$/MBTU)

	2013	2014	2015	2014-15
Henry Hub	3.8	4.4	2.6	-41%
NBP	10.6	8.2	6.5	-21%
Brent	18.7	17.1	9.0	-47%
Europe - Average	11.8	10.1	6.8	-33%
German Border Price	10.7	9.1	6.6	-27%
Japan - LNG	16.0	16.0	10.2	-36%

Source: CEDIGAZ, US EIA, Reuters

FIGURE 29 - EVOLUTION OF INTERNATIONAL GAS PRICES, \$/MBTU



Source: CEDIGAZ, US EIA, Reuters

5. Gas demand growth remained mixed

According to CEDIGAZ, world apparent natural gas consumption (excluding storage variations) increased moderately by 1.6% in 2015, a slightly higher growth to the previous year. This growth rate is similar to the past three-year average but is much lower than the average annual growth rate of about 2.3% in the past decade.

Like in the previous year, the North-American market provided the largest contribution to growth in volume terms (+ 37 bcm), followed by the Middle East (+ 26 bcm), where consumption rose almost 6%, under the impulsion of Iran and the UAE.

In Europe, apparent consumption trend was reversed, up 1.4% after declining steadily over 2011-2014. Apparent consumption differed strongly from actual consumption (+ 3.6%), as a significant amount of gas was withdrawn from underground storages in 2015 (+ 3.5 bcm), contrasting with net injection volumes of 6.3 bcm in 2014.

In Asia-Oceania, consumption growth turned slightly negative, according to Cedigaz first estimates, after slowing markedly in 2014. This result marked an historic brake on the expansion of the Asian market after three decades of exponential growth.

Consumption progressed at a moderate rate in Latin America (+ 1.9%), the slump in Trinidad & Tobago, due to gas shortfall being alleviated by increasing consumption in Brazil (+ 6.8%) and Venezuela (+ 7.7%).

In Africa, consumption was sluggish as it remained constrained by supply, especially in Egypt. Natural gas developments are also affected by security problems (Libya, Nigeria). However, consumption continued to expand in the power generation sector.

Like in 2014, natural gas demand in the CIS was depressed against the background of a poor political and economic climate as well as a mild weather. Regional apparent consumption was down 2.3% to 590 bcm. The three main consuming countries (Russia, Ukraine, Belarus) registered negative trends.

In light of these contrasted developments, North America continued to bolster its standing as the leading regional consuming market, gaining a 28% market share. Asia-Oceania remained the second main consuming zone, but its share of global consumption declined from 20% to 19% annually, followed by the CIS (17%), Europe (14%), the Middle East (13%), Latin America (5%) and Africa (4%).

After including underground storage variations, global actual consumption totalled a volume of 3472 bcm in 2015, a 1.6% increase from 2014. In OECD markets, it advanced by 2.3% to 1620 bcm, on the back of growing consumption in North America (+ 3%) and Europe (+ 3.6%), whereas consumption in Asia-Oceania was sluggish. Consumption in OECD contributed for 47% of global consumption, versus 46% in 2014. Actual consumption in the CIS is expected to have declined by around 3% to 577 bcm. In OPEC, consumption surged 3.8% to 558 bcm, a higher growth rate than for other emerging markets (+ 2.2%).

- **Consumption growth in Asia stopped in 2015**

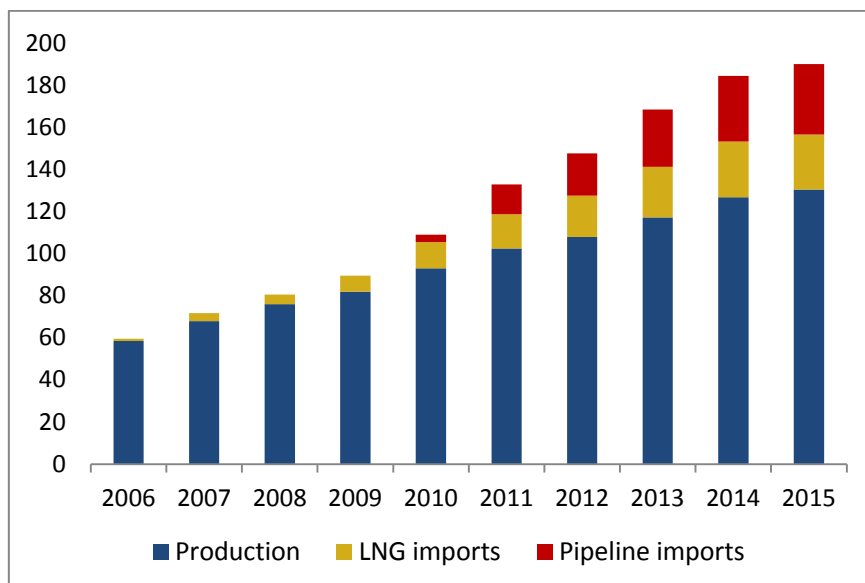
Actual natural gas consumption growth in Asia-Oceania marked a historic halt in 2015, as consumption was rather unchanged compared with the previous year.

Several factors, already present in 2014, had an adverse effect on Asian natural gas consumption in 2015:

- Mild temperatures,
- The slowdown in economic growth,
- The expansion of power capacity through nuclear and renewable sources,
- The competition from coal in most of countries (including industrialized markets) and oil (China).

After recording a 9% growth in 2014 - already lower compared with the previous years - natural gas consumption in China only increased by 3.1%, according to Cedigaz provisional estimates, which is below annual GDP growth (+ 6.9%). Several factors were at play in 2015: the reduced competitiveness of natural gas when compared with coal (power generation) and 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. The country's dependence on imports remained stable at 31%, after an exponential growth recorded since the beginning of imports in 2006 (Figure 30).

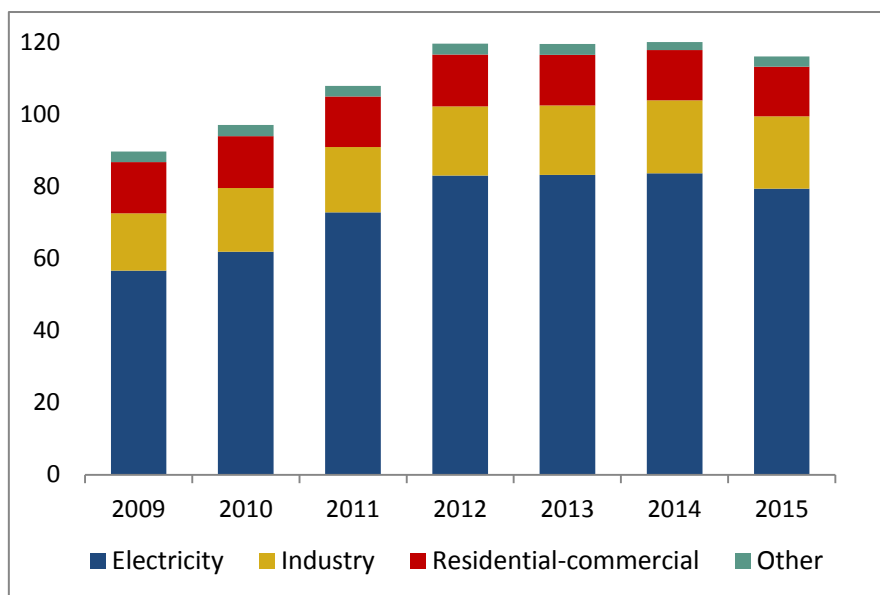
FIGURE 30 - NATURAL GAS SUPPLY IN CHINA (BCM)



Source: CEDIGAZ First Estimates

Actual natural gas consumption in Japan shrank by 3.7% to 116 bcm, only due to the power generation sector, in which gas use declined from 83.6 bcm in 2014 to 79.4 bcm in 2015 (Figure 31). In the other sectors (industry, buildings), consumption remained relatively stable.

FIGURE 31 - EVOLUTION OF NATURAL GAS CONSUMPTION IN JAPAN (BCM)



Source: CEDIGAZ, IEEJ

In South Korea, natural gas consumption dipped 8% to 44.8 bcm in 2015. Korea Gas, which imported 93% of the country's total LNG imports, reported that its sales for the year were 14% lower in the power sector and 7% lower in the industrial, domestic and commercial sectors.

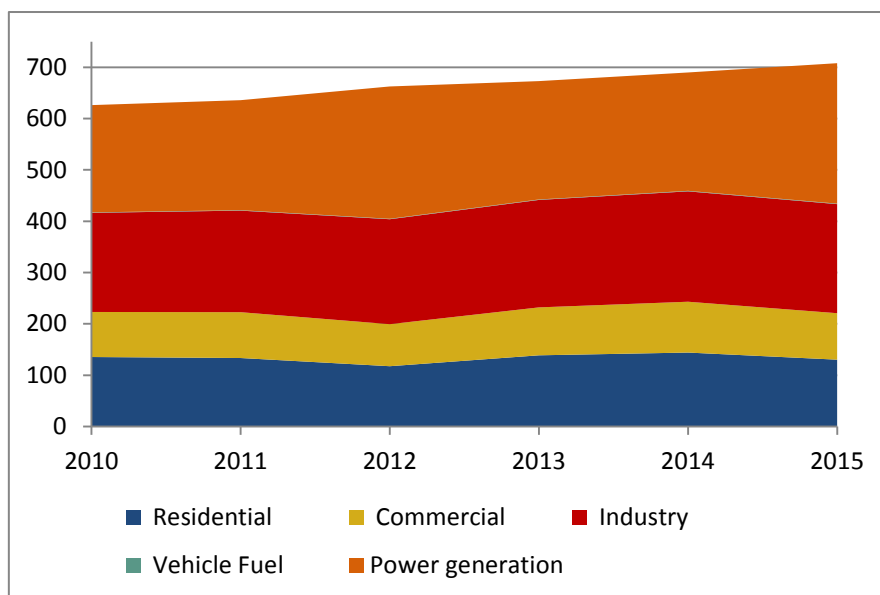
In Taiwan, natural gas consumption picked up by 7.7% to almost 20 bcm, as Taipower, which accounts for around 70% of the country's natural gas consumption, increased output from its gas-fired power plants to compensate for lower output from coal-fired and nuclear plants.

- **In North America, US gas consumption was propelled by the power sector**

Apparent US gas consumption soared by 4.2%, while actual consumption (including net storage injections) recorded an increase of 3% to reach 778 bcm in 2015. This growth stemmed from the power generation sector (Figure 32), as low natural gas prices supported the continuous trend of substitution of coal by gas. Industrial sector consumption of natural gas remained relatively flat in 2015, while natural gas consumption in the residential and commercial sectors recorded a sharp drop, mainly due to milder winter temperatures (10% decrease in degree-days in 2015).

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).

FIGURE 32 - US GAS DELIVERIES TO CONSUMERS IN 2015 (BCM)



Source: EIA

- **Depressed CIS consumption for the third consecutive year**

Actual gas consumption in the CIS posted a notable decline for the fourth consecutive year, tentatively estimated at 3%, against the background of the Ukraine conflict, a poor economic climate and a warm weather. The region recorded negative results in the two main consuming countries, Russia and Ukraine, which account for respectively 71% and 5% of the regional total.

After falling by 15% in 2014, actual natural gas consumption in Ukraine plunged by 25% in 2015, reflecting energy saving measures implemented by the national energy policy.

Actual Russian gas consumption is provisionally estimated to have decreased by 3.3% to 413 bcm⁸ in 2015, against the background of the economic crisis, as GDP contracted by 3.7%. Gazprom is increasingly losing domestic market share to the independents, who offer gas to Russian customers at lower prices.

- **European gas consumption increased for the first time since 2010**

After four consecutive years of decline, actual natural gas consumption in Europe⁹ rebounded by 3.6% to 484 bcm in 2015. In the EU28, it grew strongly by 4.5% to 427 bcm in 2015.

The weather contributed for most of the increase as temperatures in 2015 were closer to the average, whereas 2014 experienced record warm weather. As the first quarter was characterized by

⁸ Cubic metres of natural gas in the CIS have been converted to be taken in international standard conditions.

⁹ OECD Europe and Central Europe

cold weather, natural gas demand for heating increased in several countries, such as in Germany, where half of new-build residential construction was fitted with gas heating appliances. However, by the end of 2015, demand was increasingly under pressure on the back of the mildest winters since records began.

At the national level, the extent and the role of contributory factors differed. Countries such as France and the Czech Republic, for instance, benefited from the economic recovery, which is mirrored by an increase in industrial gas use, while other countries continued to witness declines in this sector. In Germany, industrial gas demand has also remained robust although economic growth is largely offset by increased energy efficiency.

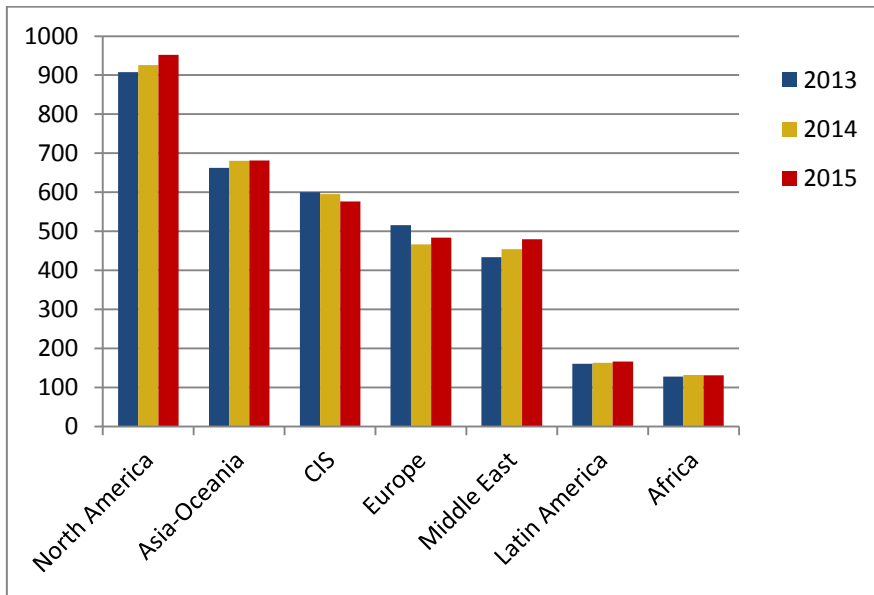
The evolution of gas consumption in the power generation sector also varied among countries. In Germany and the Netherlands, natural gas continued to be displaced by coal and renewables.

However, 2015 was notable in the United Kingdom for the renewed competitiveness of gas compared to coal. This is partly due to the increase in the “Carbon Tax Support”, which has been fixed since April 2015 at €25/tCO₂. Accordingly, coal’s share of electricity production fell to 21% in 2015, compared to an average of more than 30% since 2000. The share of gas stabilized at 29%, ending the decline observed between 2008 (46%) and 2013 (27%), due in large part to the rise of renewable energies (22%, up from 4% in 2008).

There was also resurgence in gas consumption for power generation in Italy and France. In Italy, gas demand in the power sector increased on demand for cooling and also made up for the shortfall of hydro levels. In France, gas use offset some nuclear unavailability.

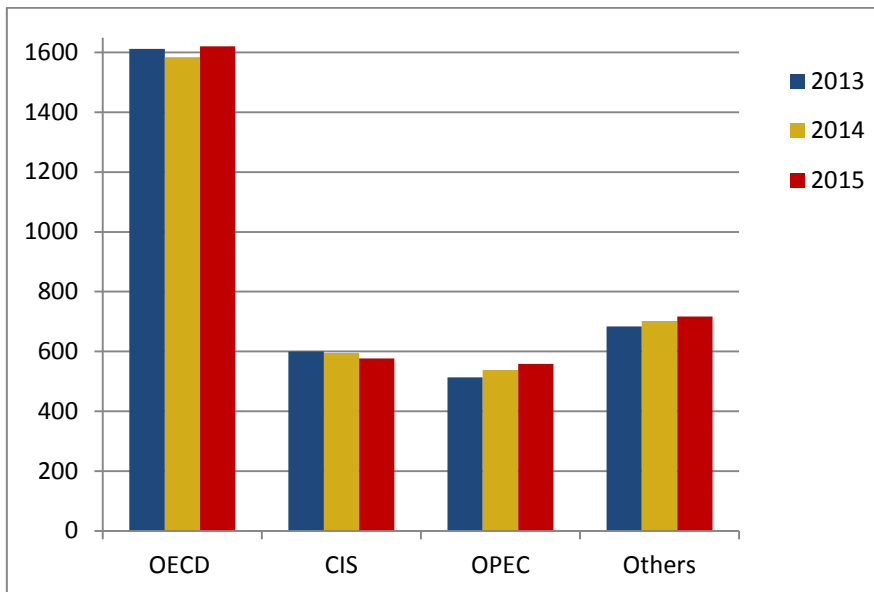
Outside the EU-28, Turkey’s gas consumption fell 2% in 2015. This downturn is partly attributable to gas-fired generation falling, as rising renewables output displaced gas from the merit order. The power sector accounted for 31% of total gas demand in 2015, compared with 35% in 2014, when the weather was drier.

FIGURE 33 - EVOLUTION OF ACTUAL CONSUMPTION BY GEOGRAPHIC ZONE (BCM)



Source: CEDIGAZ First Estimates

FIGURE 34 - EVOLUTION OF ACTUAL CONSUMPTION BY ECONOMIC ZONE (BCM)



Source: CEDIGAZ First Estimates

TABLE 13 - EVOLUTION OF EUROPEAN ACTUAL GAS CONSUMPTION IN 2015 (BCM)

	2014	2015	Annual growth (%)
Germany	81.3	85.4	5.0%
United Kingdom	66.7	67.3	1.0%
Italy	61.0	66.5	9.1%
France	38.6	41.6	7.8%
Netherlands	34.5	34.2	-0.8%
Spain	27.4	28.6	4.4%
Belgium	16.4	17.9	9.5%
Poland	14.9	15.3	2.8%
Romania	11.8	11.3	-4.6%
Czech. Rep.	8.2	8.6	4.8%
Austria	7.7	8.2	6.1%
Hungary	7.3	7.9	7.4%
Other EU28	33.0	34.2	3.5%
Turkey	47.6	46.4	-2.4%
Others	11.2	10.8	-3.9%
TOTAL EU28	408.6	426.8	4.5%
TOTAL EUROPE	467.4	484.1	3.6%

Source: CEDIGAZ First Estimates

TABLE 14 - APPARENT GAS CONSUMPTION* IN 2015 (BCM)

	2014	2015	Annual Change (%)
North America	933.4	970.0	3.9%
<i>of which:</i>			
Canada	99.0	99.9	0.9%
United States	761.6	793.8	4.2%
Asia Oceania	682.2	681.4	-0.1%
<i>of which:</i>			
Australia	28.9	29.7	2.7%
Bangladesh	23.8	25.8	8.4%
China & Hong Kong	184.5	190.1	3.1%
India	51.8	50.8	-1.9%
Indonesia	41.7	40.6	-2.7%
Japan	120.7	116.1	-3.8%
Malaysia	35.2	32.6	-7.5%
Pakistan	39.1	42.7	9.2%
South Korea	49.7	44.6	-10.3%
Taiwan	18.3	19.7	7.7%
Thailand	52.6	53.3	1.3%
C.I.S.	604.2	590.4	-2.3%
<i>of which:</i>			
Belarus	18.5	17.3	-6.1%
Russia	432.6	413.8	-4.3%
Ukraine	38.7	35.5	-8.3%
Europe	473.7	480.6	1.4%
<i>of which:</i>			
Austria	9.0	7.3	-19.6%
Belgium	16.6	17.8	7.5%
Czech Republic	8.2	8.4	3.1%
France	39.7	41.2	3.7%
Germany	81.6	85.2	4.4%
Hungary	8.8	6.7	-23.9%
Italy	61.8	66.8	8.1%
Netherlands	34.5	35.2	2.1%
Poland	14.9	15.1	1.1%
Romania	11.0	10.7	-3.0%
Spain	28.3	27.8	-1.9%
Turkey	48.0	46.7	-2.5%
United Kingdom	66.9	67.0	0.1%

* Apparent consumption = Marketed production + Imports - Exports

Source: CEDIGAZ First Estimates

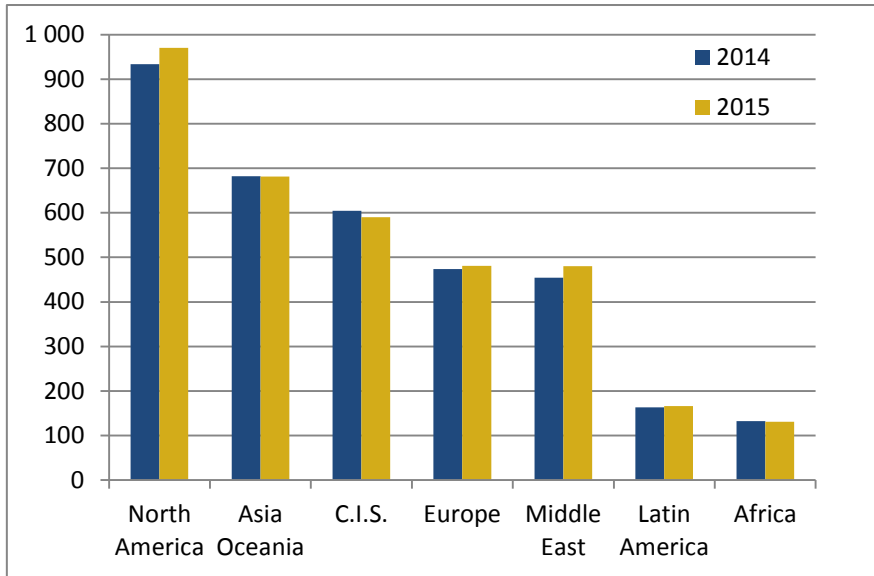
TABLE 14 - APPARENT GAS CONSUMPTION* IN 2015 (BCM)

	2014	2015	Annual Change (%)
Middle East	454.0	480.0	5.7%
<i>of which:</i>			
Bahrain	16.0	16.6	3.7%
Iran	174.6	184.9	5.9%
Oman	20.4	22.0	7.5%
Qatar	40.5	38.4	-5.2%
Saudi Arabia	102.4	107.9	5.4%
UAE	66.5	72.7	9.2%
Latin America	163.2	166.4	1.9%
<i>of which:</i>			
Argentina	46.7	47.1	0.8%
Brazil	37.8	40.4	6.8%
Chile	4.4	4.5	2.5%
Colombia	11.7	11.7	-0.7%
Peru	7.7	7.7	0.0%
Trinidad & Tobago	23.0	21.5	-6.7%
Venezuela	26.5	28.6	7.7%
Africa	132.6	130.7	-1.4%
<i>of which:</i>			
Algeria	40.6	38.4	-5.4%
Egypt	48.1	48.2	0.3%
Libya	5.9	4.3	-27.0%
Nigeria	18.9	20.9	10.4%
South Africa	4.8	4.7	0.0%
Tunisia	4.6	4.6	-0.4%
World	3443.3	3499.4	1.6%

* Apparent consumption = Marketed production + Imports - Exports

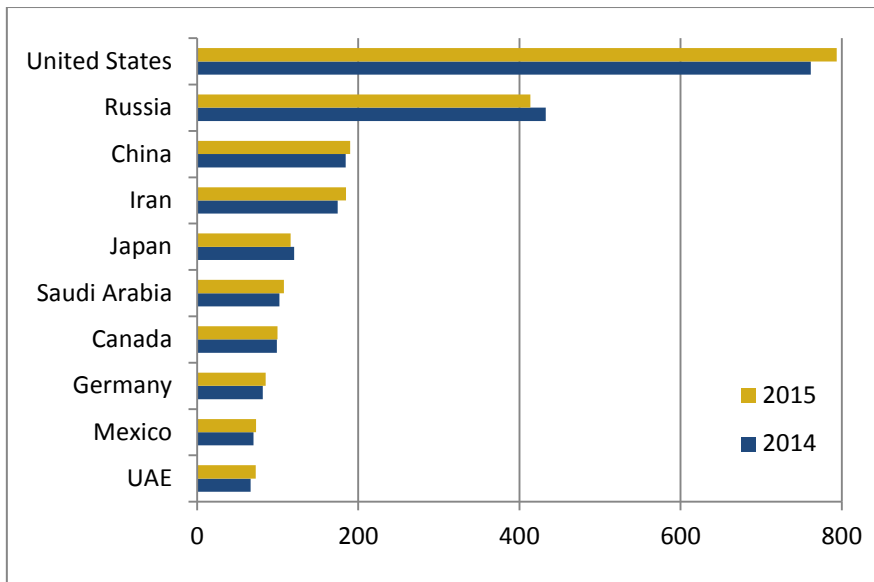
Source: CEDIGAZ First Estimates

FIGURE 35 - EVOLUTION OF APPARENT CONSUMPTION BY GEOGRAPHIC ZONE (BCM)



Source: CEDIGAZ First Estimates

FIGURE 36 - TOP-10 NATURAL GAS CONSUMERS (BCM)



Source: CEDIGAZ First Estimates

TABLE 15 - WORLD NATURAL GAS BALANCE IN 2014 (BCM)

	Marketed production	Exports	Imports	Consumption
North America	920	117	130	933
Asia-Oceania	515	128	295	682
C.I.S*	797	268	75	604
Europe	255	206	425	474
Middle-East	576	164	41	454
Latin America	171	41	33	163
Africa	209	84	8	133
World	3443	1008	1008	3443

*Intra-CIS trade is included

Apparent consumption = marketed production + Imports – Exports

Figures differ from actual consumption which takes stock changes into account.

Source: CEDIGAZ First Estimates

TABLE 16 - WORLD NATURAL GAS BALANCE IN 2015 (BCM)

	Marketed production	Exports	Imports	Consumption
North America	958	124	136	970
Asia-Oceania	532	144	293	681
C.I.S*	792	264	62	590
Europe	248	221	453	481
Middle-East	593	159	45	480
Latin America	171	40	35	166
Africa	205	86	12	131
World	3499	1036	1036	3499

*Intra-CIS trade is included

Apparent consumption = marketed production + Imports – Exports

Figures differ from actual consumption which takes stock changes into account.

Source: CEDIGAZ First Estimates