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Natural Gas information: Overview



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2017

The following analysis is an overview from the publication *Natural Gas Information 2017*.

Please note that we strongly advise users to read definitions, detailed methodology and country specific notes which can be found online under *References* at www.iea.org/statistics/topics/natural_gas/

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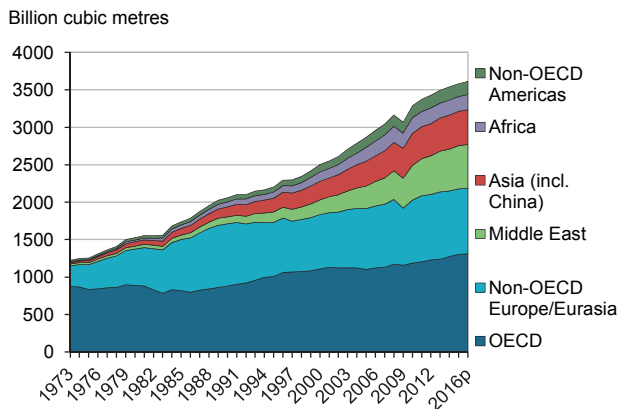
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NATURAL GAS OVERVIEW

Production

In 2016¹, 3 613 Billion cubic metres (Bcm) of natural gas were produced globally, a 0.8% increase compared to 2015. Natural gas production has risen every year since the economic crisis of 2009; however the increase in 2016 (+29.1 Bcm) is the smallest in this period.

Figure 1. World natural gas production by region



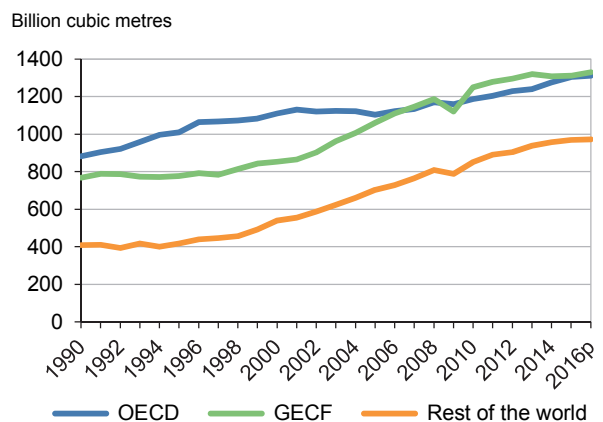
Out of the additional 29.1 Bcm produced in 2016, 23.1 Bcm were produced in countries that do not belong to the OECD or non-OECD Europe/Eurasia, highlighting the importance of new producers in the market. The share of these countries in the global production more than doubled since 1990, rising from 16.8% to 39.5%. However, the trend in production varies across different countries in the OECD and non-OECD Europe/Eurasia.

In the OECD, overall, natural gas production rose by 0.4% (from 1 304 Bcm to 1 310 Bcm). This growth was driven by Australia (+21.0 Bcm) which offset

the fall in the United States (-17.3 Bcm) and OECD Europe (-3.1 Bcm).

In non-OECD Europe/Eurasia, the growth in Russia (+5.9 Bcm) and Uzbekistan (+1.1 Bcm) offset the falls in Turkmenistan (-3.9 Bcm), Romania (-1.2 Bcm) and Kazakhstan (-0.9 Bcm). In 2016, this entire region produced 874 Bcm, the same volume as in 2015. This stabilization, with growth elsewhere, resulted in a decrease of 0.2 percentage points in the region's share of the global supply (24.2% in 2016).

Figure 2. World natural gas production by organisation



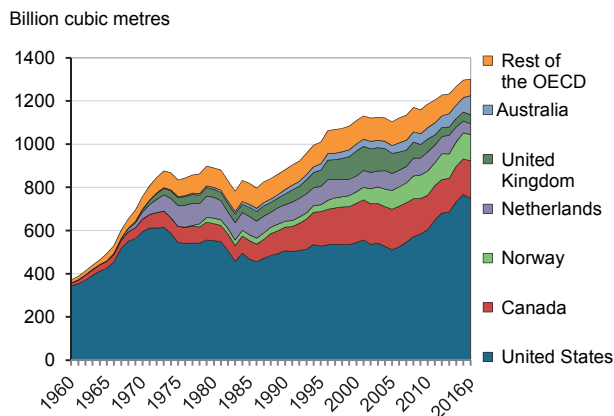
The production in the members of the Gas Exporting Countries Forum (GECF)² increased by 1.5%. Most of the additional volumes were produced in Algeria (+10.0%), the Russian Federation (+0.9%) and Iran (+3.0%), which increased their production by 8.4 Bcm, 5.9 Bcm and 5.5 Bcm. Overall GECF produced 1 330 Bcm (36.8% of global supply), slightly above the OECD (36.3%).

1. All energy data for 2016 are provisional.

2. GECF member countries are: Algeria, Bolivia, Egypt, Equatorial Guinea, Iran, Libya, Nigeria, Qatar, Russia, Trinidad and Tobago, United Arab Emirates and Venezuela.

In other non-OECD countries outside the GECF, production increased by 0.4%, up to 973 Bcm. Saudi Arabia, the People's Republic of China, Indonesia, Argentina, Malaysia and Peru experienced the biggest increases. The share of global production of these countries has grown from 19.8% in 1990 to 26.9%.

Figure 3. Natural gas production in the OECD



Analysis of individual countries' production shows a range of factors implying changes in 2016. Within the OECD:

- Australia continued the growth shown last year. In 2016, more LNG projects were commissioned and this new export capacity enhanced production, which increased by 21.0 Bcm in 2016. Australia was the 10th largest natural gas producer in the world in 2016.
- After the sustained growth of the last few years in the United States (production increased by 47.8 Bcm and 33.1 Bcm in 2014 and 2015 respectively) natural gas production fell in 2016 (-17.3 Bcm). This is the first annual decrease since the beginning of the shale gas revolution.
- In the United Kingdom and Norway, production remained almost stable in 2016 with a small increase of +0.2 Bcm in both countries.
- In the Netherlands, the cap in gas production established by the government at the major Groningen gas field in response to the risk of earth quakes continued in 2016, resulting in a new decrease in their L-gas production (-4.1 Bcm).
- The gas output in Mexico continued falling due to the decline in associated gas from legacy oil and gas fields (-4.9 Bcm).
- In Ireland, where almost all the gas consumed used to be imported from the UK, the production jumped

to 3.0 Bcm (almost 60% of the natural gas consumed in the country) after natural gas extraction from the Corrib Gas field began at the end of 2015 and continued through 2016.

Among non-OECD countries:

- Algeria led the increase outside the OECD, supplying to the market 8.4 Bcm more than in 2015. In 2016 it produced 92.4 Bcm, the highest in its history, and became the eighth largest producer.
- In Iran production has grown every year in the last two decades. Since 2006, it grew at an average rate of 5.7% per year. In 2016, the increase rate was smaller (3.0%). This country is the world's third largest natural gas producer since 2014.
- China, which surpassed Norway as the sixth largest producer in 2013, continues to increase its production but at a slowest rate than in the early 2000s. For the last 10 years, production has grown at an average rate of 8.9% per year but in 2015 and 2016 the increases were smaller, of 3.4% and 1.7% respectively.
- Qatar, the fifth largest producer of natural gas, showed a small increase of 0.8% in 2016 (+1.3 Bcm).
- Turkmenistan's production decreased for the first time since 2009 by 4.7% (-3.9 Bcm).
- Nigeria's production also fell in 2016 (-5.7% and -2.5 Bcm).

The top five natural gas-producing countries (United States, Russia, Iran, Canada and Qatar) together represented 53.2% of the world's production

Imports

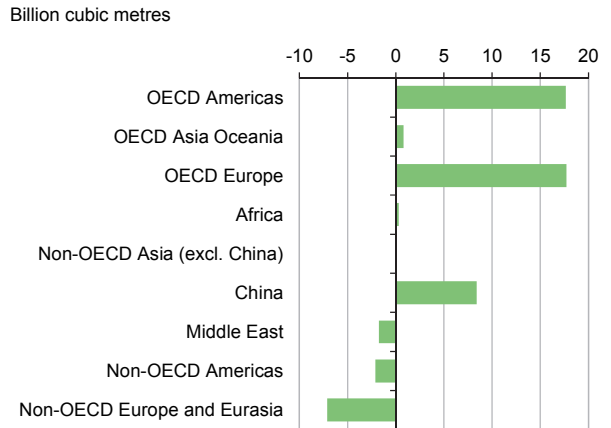
Imports by pipeline to OECD Europe rose by 17.7 Bcm in 2016, consolidating the region's position as the world's largest importer. OECD Europe represented over 50% of the pipeline trade in the World. This increase was mostly due to increases in imports in two of the main producers in the area: the UK (+21.5% to balance the increase in demand) and the Netherlands (+13.3%, mainly due to the decrease in production). In addition, pipeline imports to Italy, the third largest consumer in the region after Germany and the UK, also increased (+6.1%) to meet the growing demand. The additional pipeline imports into Europe were sourced mainly with Algerian and Russian gas (+11.1 Bcm and +20.3 Bcm).

With the growth in consumption and production in most of the European countries declining or remaining stable, the region became more dependent on imports from countries outside the OECD. In 2016 for the first time, countries in OECD Europe produced less than 50% of the gas they consumed.

OECD Americas also increased their pipeline imports for second year in a row (+17.6 Bcm). This was largely due to the decline in Mexican production and a small increase in demand, resulting in a need to import by pipeline from the United States (+28.1%). Pipeline imports to the United States from Canada also increased (+10.9%). Compared to the situation in OECD Europe, the increase in pipeline trade in OECD Americas is purely between members of the OECD. In addition, Chile exported by pipeline re-gasified LNG to Argentina for the first time in 2016, after the works to enable reverse flows in the interconnector were finished.

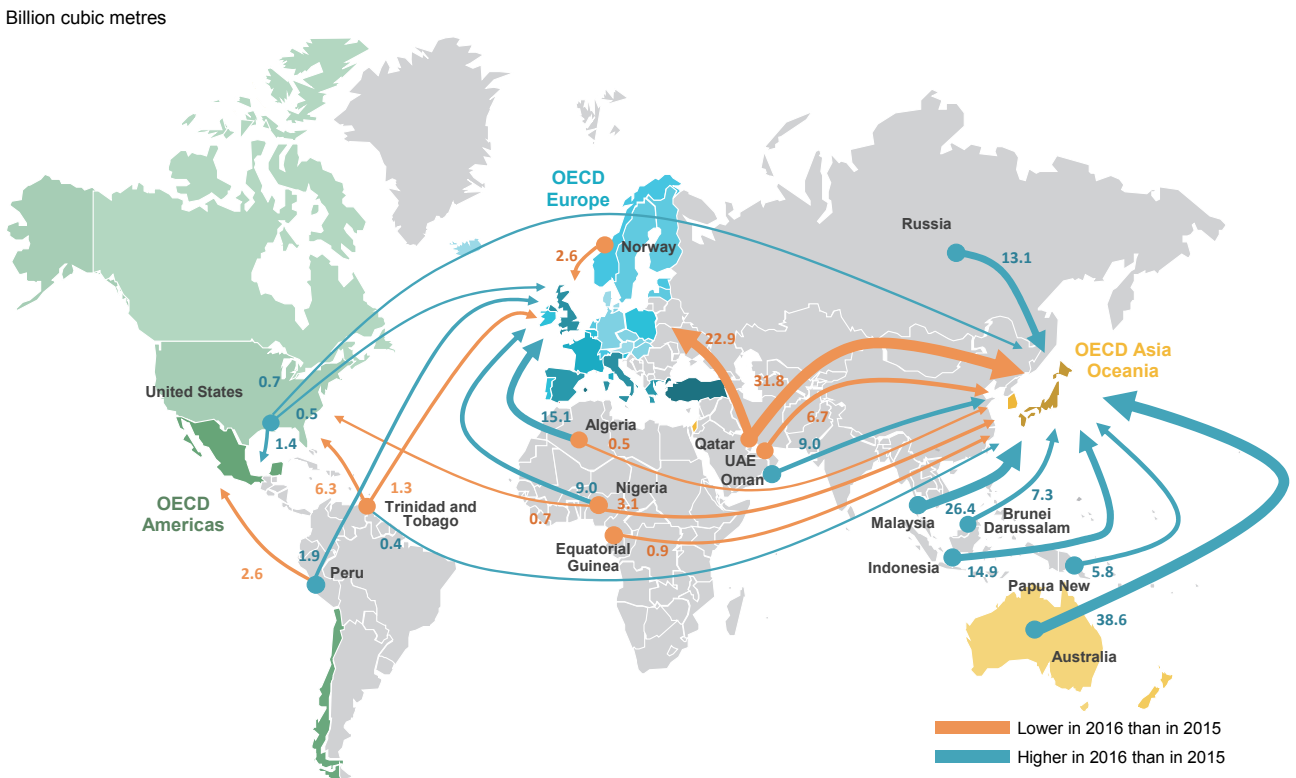
Outside the OECD there are different trends across the regions. While in Africa and non-OECD Asia (excluding

Figure 4. Change in natural gas imports by pipeline, 2015-2016



China) imports by pipeline remained stable, in non-OECD Europe/Eurasia they fell by 7.1 Bcm, especially in Ukraine where due to the severe economic recession, it fell by 33.7%. Pipeline imports decreased slightly in the Middle East driven by the 19.8% fall in

Figure 5. Map of LNG movements in the OECD^{1,2}



1. The trade volumes smaller than 400 mcm are not represented in this map.

2. This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Iran where production grew more than consumption, decreasing its dependency on imports. Similarly, in non-OECD Americas the decrease in Brazil (-20.2%) drove the decline in the region. Finally, the largest growth for the pipeline imports of a single country was in the People's Republic of China, where an estimated additional 8.3 Bcm were imported in 2016 (+25%) to supply its increasing demand.

Within the OECD, LNG imports remained fairly constant in 2016. There were small decreases in OECD Americas (-1.4 Bcm) and OECD Europe (-0.5 Bcm), and an increase in OECD Asia Oceania (+2.8 Bcm) after the substantial fall in 2015. Mexico and the UK, which saw big increases in pipeline imports, drove the decline of LNG imports in the OECD Americas and OECD Europe respectively. On the other hand, both Japan and Korea increased their imports by almost 2% receiving from Australia 10.2 Bcm more than in 2015.

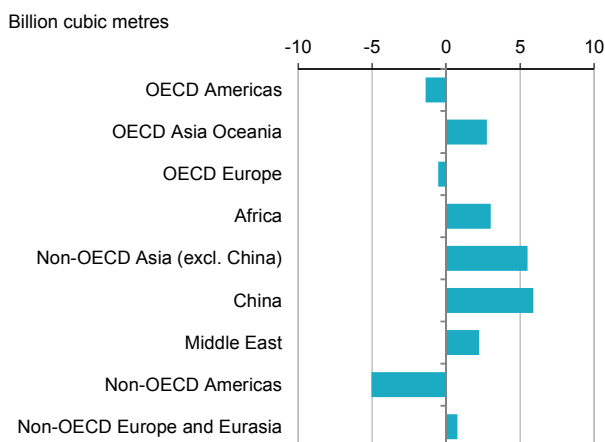
Despite the decrease in imports from Qatar (-7.1 Bcm), it is still the main supplier of LNG for the OECD, with a 24.1% of the total share. However, Qatar is no longer the main supplier of OECD Asia Oceania after being surpassed by Australia, the second largest source of LNG for the total OECD. Australia also supplied, for the first time, to OECD Americas (Mexico), showing its increasing relevance in the global LNG market. In addition, many other new routes appeared in the LNG trade in 2016. In particular, the United States, which became a net exporter of LNG in 2016, supplied a total of 5.3 Bcm to more than 13 different destinations.

In 2016, non-OECD countries continued importing more LNG than previous years and they accounted for one third of the global LNG imports. Since 2006, when OECD countries represented 90.3% of the total market, non-OECD LNG imports increased at an average rate of 18.3% per year. This growth was mainly pushed by Asia, in particular by China and India. In 2016, these two countries imported 5.9 Bcm and 4.8 Bcm of LNG more than in 2015 and they were the third and fourth largest LNG importers of the world respectively (the People's Republic of China was 9th and India 7th in 2010).

LNG imports also increased in Africa and the Middle East, mainly in Egypt (+3 Bcm), Jordan (+1.2 Bcm) and the United Arab Emirates (+0.5 Bcm). In contrast to OECD countries, imports from Qatar to non-OECD countries increased by an estimated 8.1 Bcm in 2016.

In non-OECD Americas, LNG imports fell in Brazil and Argentina (-4.2 Bcm and -0.9 Bcm respectively) driving the imports of the region down by 37.1%.

Figure 6. Change in LNG imports, 2015 - 2016

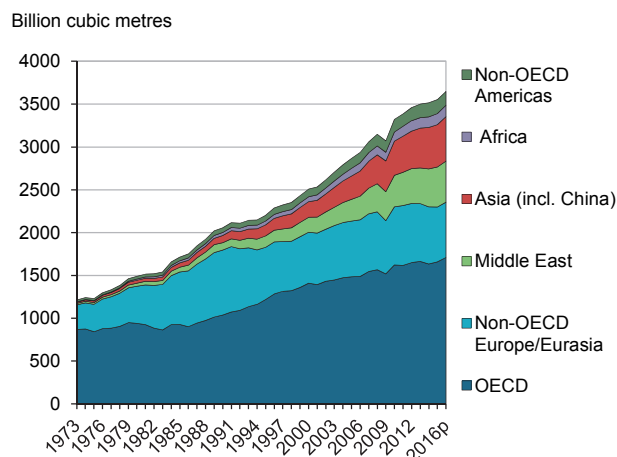


Demand

In 2016, global demand for natural gas increased by 2.7% compared to 2015, rising up to 3 648 Billion cubic metres.

In 2016, OECD natural gas demand was 3.1% higher than in the previous year. In OECD Europe, where consumption rose by 6.4%, the increase was concentrated in the largest consumers of the region: the UK (+9.6 Bcm), France (+5.1 Bcm), Germany (+4.8 Bcm), and Italy (+3.4 Bcm). Despite the lack of published disaggregated annual demand data, the main factor for this increase in Europe was gas-fired power generation, especially in the UK, where the Carbon Price Floor contributed to the coal-to-gas switch, and in France to compensate the drop in nuclear power generation. On the other hand, Turkish natural gas demand decreased by 3.3% (-1.6 Bcm) in 2016 following a decrease in 2015 as a consequence of the national policies to decrease Turkish dependency on imports.

An increase was also registered in OECD Americas, 1.1% in the entire region, mainly driven by the growth in the United States (+ 11.6 Bcm), where power generated from natural gas also increased (+3.4% electricity generated from natural gas, based on annual electricity data). In OECD Asia Oceania natural gas demand raised again (+10.5 Bcm) after the decrease in 2015.

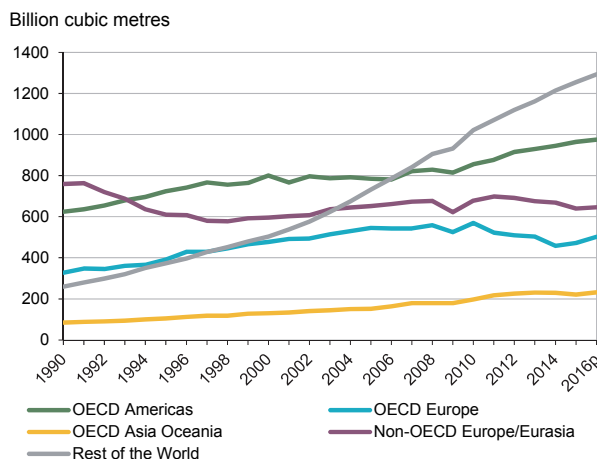
Figure 7. World natural gas demand by region

In non-OECD countries, natural gas demand increased as well (+2.3%). Non-OECD countries consumed more than the OECD since 2008, but 2016 is the second year when the growth rate is smaller outside than inside the OECD, closing the gap between the two regions.

Different trends characterized the demand growth since 1990 across regions: OECD Americas, OECD Europe, OECD Asia/Oceania, non-OECD Europe/Eurasia and the rest of the World (special case for China):

- In OECD Americas consumption grew steadily between 1990 and 2000 when it stabilized around 800 Bcm for 10 years. In 2010 demand growth resumed until 2016, when it hit the record of 975 Bcm.
- In OECD Europe, the increase was sustained until the year 2005, when it stabilized between 540 Bcm and 560 Bcm until 2008. Then, it fell reaching 458 Bcm in 2014. Despite growth in the last three years, it is still far from the levels previous to the economic crisis in 2009. Currently, demand levels are similar to 2002. In addition to economic drivers, improvements in energy efficiency in major gas consuming sectors, such as space heating also contributed to slower demand growth.
- In OECD Asia/Oceania, demand also increased steadily until 2007 when it remained almost constant for three years before growing again in 2010 (driven by demand growth in Korea) and 2011 (driven by the decrease in nuclear power generation after the Fukushima accident in Japan). Since then, it oscillated around 225 Bcm.
- In non-OECD Europe/Eurasia, the natural gas consumption remained fairly constant after 1994.

- Finally, in the rest of the World, natural gas consumption showed a strong average growth rate of 6.1% per year in the last 20 years. This trend has been even stronger in China, where the average increase rate was of 12.8% per year in the same period.

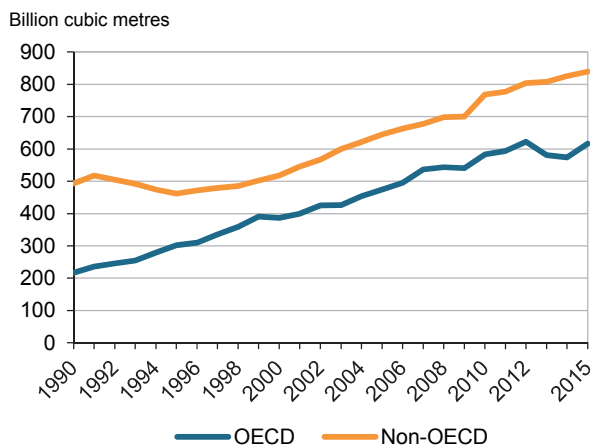
Figure 8. World natural gas demand by selected regions

At a country level, significant increases in natural gas demand were registered in 2016 for the People's Republic of China (+8.0% reaching 207 Bcm) and Russia (+2.5% and +11.0 Bcm). Additional noteworthy increases were also observed in Iran (+4.2 Bcm), India (+4.0 Bcm), the United Arab Emirates (+3.3 Bcm) and Egypt (+3.3 Bcm).

On the other hand, natural gas demand decreased in Brazil (-5.7 Bcm), Kazakhstan (-2.4 Bcm), Ukraine (-1.7 Bcm) and Uzbekistan (-0.9 Bcm).

Detailed demand data by sector, available to 2015, show non-OECD demand increasing, mainly in the largest natural gas-consuming sector, the heat and power generation (+1.6%, equivalent to 13.1 Bcm). This was the case in the People's Republic of China (+23.8%), Iran (+16.4%) and Saudi Arabia (+21.8%). This growth offset the decrease in the Russian Federation (-8.9%) driven by the shorter heating season in 2015. In addition, natural gas is becoming more relevant in the heat and power generation sector and it is replacing coal and oil in some countries.

In the OECD, natural gas demand for power generation increased more significantly than in non-OECD countries in 2015 (+7.3%). Mainly pushed by low prices that allowed natural gas to compete with coal fired generation in the United States, it increased by 16.6% (+41.4 Bcm). This growth was much slower in Europe (+1.6% and 2.1 Bcm). In OECD Asia/Oceania, it

Figure 9. Natural gas use for power generation

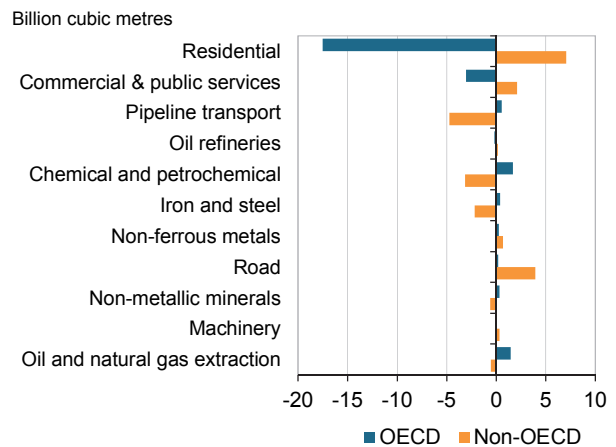
decreased, in particular in Japan (-6.8%), where the gas-fired power generation fell in 2015 for the first time since the Fukushima accident in 2011.

Other major natural gas consuming sectors showed different behaviours in 2015 in the OECD and non-OECD countries.

In 2015 the industry sector showed a decrease in natural gas consumption in both OECD and non-OECD countries. This decrease was mainly driven by the chemical sector in the OECD. In the residential and commercial sectors demand figures showed opposite trends in the OECD, where it declined, and in non-OECD, where it grew. Consumption in the oil and gas extraction increased globally and it fell significantly only in Egypt and Thailand, where natural gas production decreased compared to 2014. Regarding road transport, the increase is mainly outside the OECD, with China and Iran leading it (they represent 39.5% and 15% of the global natural gas consumption for road transport respectively).

The trends also differ among OECD regions. Whereas in OECD America the consumption in the residential sector decreased substantially (-1.3 Bcm in Canada and -13.1 Bcm in United States), it increased in OECD Europe, mainly driven by the largest countries like Germany (+1.7 Bcm), Italy (+2.2 Bcm), Turkey (+1.7 Bcm) and the UK (+1.3 Bcm). A similar trend is observed in the commercial sector where OECD Europe registered an increase of 3.2 Bcm and in OECD Americas it fell by 8.3 Bcm.

The chemical and petrochemical sector saw an overall decrease in natural gas consumption, however the trend is very different for the energy use (-5.4 Bcm) and the non-energy use (+0.9 Bcm). In the United States, the biggest consumer of natural gas for the chemical and

Figure 10. Change in natural gas demand in selected sectors, ranked by magnitude, 2014-2015

petrochemical sectors, natural gas burned to support its activity decreased (-2.5 Bcm) while the natural gas used as a feedstock in this sector increased (+0.8 Bcm). Similarly, in Russia and India, the energy use consumption of natural gas in the chemical and petrochemical sectors remained constant but the non-energy use increased by 1.7 Bcm and 1.8 Bcm respectively. On the contrary, in China energy use fell by 3.3 Bcm and non-energy use by 2.5 Bcm, resulting in the biggest decrease at a country level.

Prices

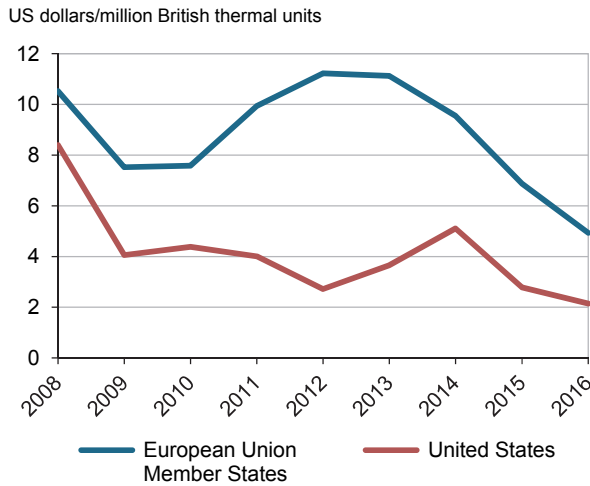
In 2016, natural gas import prices by pipeline fell by 28.2% for European Union members, while in the United States they fell by 23.0%. As such, the gap between these two prices continued closing in 2016, showing a stronger convergence than in the previous year. However, the price for the American market remained much lower than the European one, at 2.14 US dollars/MBtu vs. 4.93 US dollars/MBtu.

LNG import prices showed a similar pattern, with a general decrease observed in all regions, notably in the US (-44.7%). After converging in 2014, LNG prices in Europe and the US remained in line in 2016 again whilst in Japan and Korea the gap between their LNG import prices and those for the US and Europe continued to narrow. This convergence is partially driven by the increase in global liquefaction capacity, especially in Australia.

The LNG price for the American market was below that of the European one but much higher than the pipeline import price, at 3.99 US dollars/MBtu. The price in

Europe was of 4.78 US dollars/MBtu, slightly lower than the price of pipeline imports, showing the competitiveness of LNG as a source of imports for Europe. In Japan and Korea, the two largest LNG importers, the weighted average price was higher, 7.04 US dollars/MBtu.

Figure 11. Natural gas import prices by pipeline



The LNG market continued its globalization in 2016, with 18 countries with liquefaction capacity operating and 40 countries with regasification capacity. Colombia, Jamaica, Finland and Poland commissioned their first re-gasification LNG terminal.

Figure 12. LNG import prices

