



# Current Trends and Developments in the International Gas Markets

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## Abbreviations and Units of Measurement

bbls	Barrels
bcm	Billion cubic metres
bcma	Billion cubic metres per annum
bcf	Billion cubic feet
IOC	International Oil Company
mmbtu	Million British thermal units
mmcm	Millions of cubic metres
mtpa	Millions of tonnes per annum
tcm	Trillion cubic metres

## Introduction

International market dynamics and geopolitical shifts are normally difficult to internalize in the shorter term. Access to energy resources has always been a major factor in determining a country's or a region's economic prosperity and growth. The international energy markets in the last decade are characterized by price swings with major effects in real economy. Vast and fast-paced changes caused by technological breakthroughs such as hydraulic fracturing and horizontal drilling, geopolitical tensions in the Middle East and Eastern Europe, the 2008 financial crisis and natural disasters such as the Fukushima accident are shaping the energy sector and consequently the world economy of the 21<sup>st</sup> century.

This paper aims at providing a brief overview of the recent developments in the international gas markets from a European perspective. In the first part, are presented the main trends in the liquefied natural gas (LNG) market and the main effects of the shale gas revolution. The second part is about the European gas market where an analysis of the current situation is given along with Russia's production and exportation strategy. Then, attention is paid to what can be conceived as game changing events which can entirely shift the current dynamics and the challenges ahead.

## LNG Trade and the Shale Gas Revolution

The international gas markets have suffered radical changes in the last two decades. Since the year 2000 the LNG industry has boomed due to the growing energy demand in the Asia Pacific basin. The strong need for long term security of supply at the same time with the fact that the Asian LNG price formula is based on Japan’s crude oil imports has been the culprit to the development of LNG reaching at a level of 33% of total gas exportation in 2012.<sup>1</sup>

Moreover, the change towards a supply driven market model in the Atlantic basin where producers developed new pipeline or LNG capacities without supply contracts lead to a rapidly growing regional market with spot trading and arbitrage dynamics. Traditionally, the LNG market was based on long term contracts between producers and market players following on a demand driven business model.

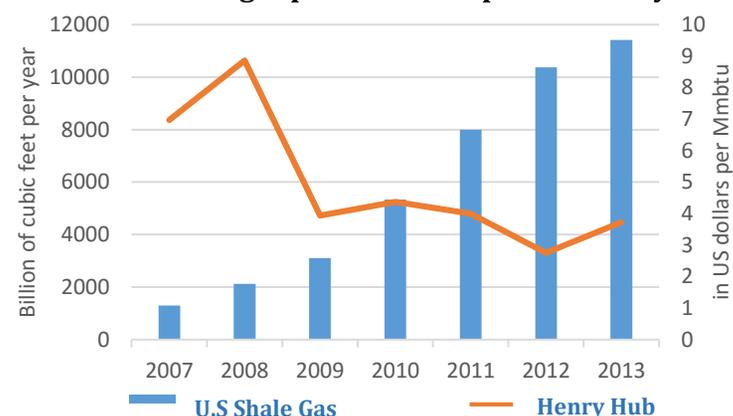
An unprecedented natural disaster which lead to the nuclear catastrophe in Fukushima in 2011 affected substantially the course of international LNG trade. All over the world ongoing nuclear projects were either halted either completely cancelled. Japan’s decision to phase out from nuclear power generation skyrocketed Asian gas spot prices to an average of \$18/mmbtu at a time when NBP and East Asia Index seemed to converge at \$10/mmbtu.<sup>2</sup>

On the other side of the Pacific, in the US, since 2008 a technological breakthrough along with the fact that the oil prices had surpassed the \$100/bbls threshold constituted to what was later called the “shale gas revolution”, a game changer to the

international gas markets with a cross sectorial impact. Since then the US have been transformed to the biggest gas producer amounting 20% of global gas production in the world surpassing Russia (18%). Shale gas accounts for more than 40% of the U.S gas production in total and 9% of the global gas production.<sup>3</sup>

Nevertheless, it is important to define why did this revolution took place in the U.S and not somewhere else where tremendous reserves of shale gas are also in place such as in China, Europe, or Argentina. It was a hand of small independent companies which for years put effort and money to develop the technology which completed the function of the unique ownership regime, a well-developed transportation infrastructure in place, market-based pricing and favorable regulation.

**Chart 1. U.S shale gas production impact on Henry Hub**



Source: EIA, elaborated by the author

<sup>1</sup> See GIIGNL “The LNG Industry in 2012” [http://www.giignl.org/sites/default/files/publication/giignl\\_the\\_lng\\_industry\\_2012.pdf](http://www.giignl.org/sites/default/files/publication/giignl_the_lng_industry_2012.pdf)

<sup>2</sup> Rogers “The potential Impact of North American LNG Exports”, OIES (2012)

<sup>3</sup> BP statistical review 2013

The first result of this phenomenon was that Henry Hub prices collapsed and stabilized at around \$4/mmbtu since 2009<sup>4</sup> which was one third of the average European spot price and one fifth of the average Asian LNG spot price. The American electricity mix was affected directly since the share of electricity production from gas has risen by 10% reaching a total of 30% substituting coal fire generation.

Going back to years 2000 – 2008, were US gas production was in decline and HH prices fluctuated at an average of \$6/mmbtu, with the latest spike recorded in May 2008 at \$12.69/mmbtu, foreshadowed that LNG was to become the first source of energy import<sup>5</sup>. Heavy investments in regasification terminals took place reaching a capacity of 430 bcm in 2012 while the imports accounted only for 19 bcm in the winter of the same year<sup>6</sup>.

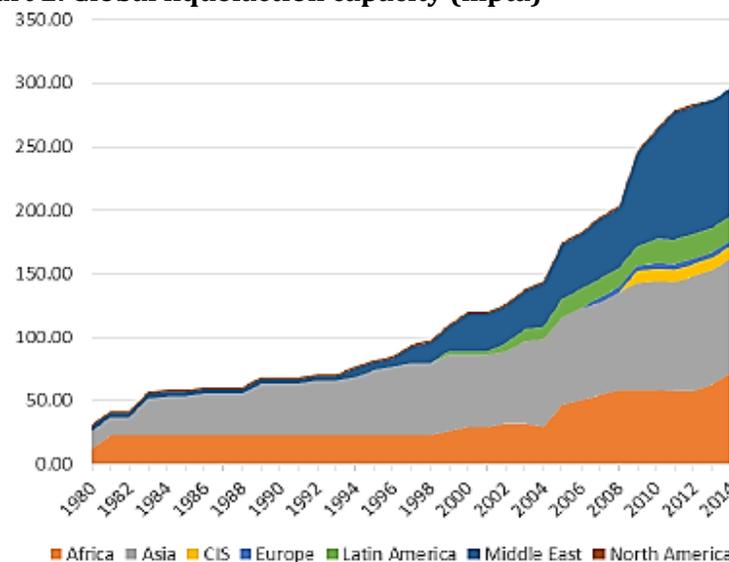
On the supply side LNG projects that were developed around the world to respond to US demand shifted towards the Asian markets as a function of Asian high prices and no demand signals from the North American market due to shale gas development.

Regasification terminals are turning into liquefaction terminals and US is about to become a net exporter reaching 200 bcm by 2040. The EIA projects in the Annual Energy Outlook 2015 reference case that LNG exports will reach 7 bcf/d (billion cubic feet per day) by 2022<sup>7</sup>. So far five LNG facilities have taken FERC approval.

<sup>4</sup> See EIA, <http://www.eia.gov/dnav/ng/hist/rngwhhdm.htm>

<sup>5</sup> “Accordingly, in 2003 the US Energy Information Administration forecast that by 2015, LNG would become the largest source of gas imported into the US, rising to 39% in 2010 from 5% of imports in 2002” <http://www.ogi.com/articles/print/volume-107/issue-10/transportation/us-lng-imports-in-2008-signal-unexpected-role-for-gas-markets.html>

**Chart 2. Global liquefaction capacity (mpta)**



Source: Enerdata World Energy Database

Pacific Asia and the North America, two markets which are characterized by completely different dominant pricing regimes have been the major drivers of the radical changes in the international gas flows.

<sup>6</sup> “With a LNG regasification capacity of more than 5,500 bcf of LNG and an import of only 390 bcf in 2008, the US is left with a large number of underutilized LNG regasification terminals.”

<http://coloradoenergynews.com/wp-content/uploads/2008/12/from-lng-importers-to-re-exporters-of-lng.pdf> also EIA

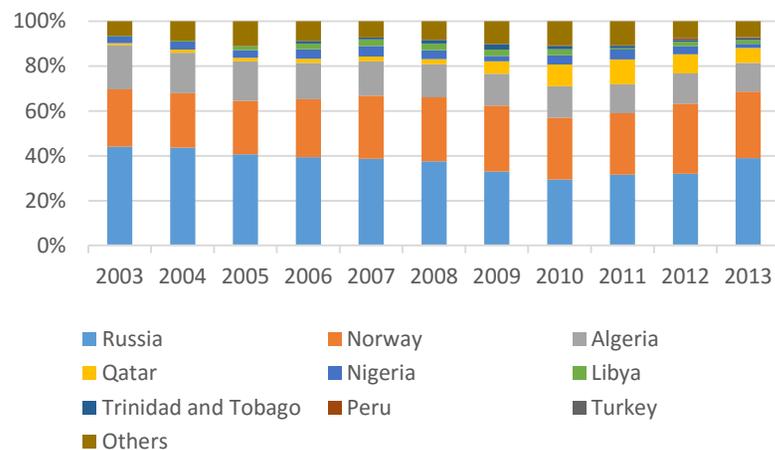
<http://www.eia.gov/dnav/ng/hist/n9103us2m.htm>

<sup>7</sup> See EIA Annual Energy Outlook 2015.

## The European Gas Market

In Europe, during the 1970s and the 1980s gas replaced oil products in industrial, commercial and residential uses, however, today natural gas in power generation seems to be no longer competent due to abundant volumes of coal coming from the other side of the Atlantic and due to renewable energy sources (RES) penetration backed from EU's policies<sup>8</sup>. Europe is characterized by depleting indigenous conventional gas resources and growing import dependency with imports from Russia counting for as much as 40% in 2013<sup>9</sup>.

**Chart 3. EU 28 natural gas imports by country of origin (%)**



Source: Eurostat, elaborated by the author

<sup>8</sup> EU 2020 Climate and Energy Package

<sup>9</sup> The highest energy dependency rates in 2013 were recorded for crude oil (88.4 %) and for natural gas (65.3 %). See Eurostat: [http://ec.europa.eu/eurostat/statisticsexplained/index.php/Energy\\_production\\_and\\_imports#Further\\_Eurostat\\_information](http://ec.europa.eu/eurostat/statisticsexplained/index.php/Energy_production_and_imports#Further_Eurostat_information)

<sup>10</sup> Oxford Institute for Energy Studies, Katja Mafimava, "The EU Third Package for Gas and the Gas target Model"

Only 20% of gas imports is based on gas spot prices at an average of \$10mmbtu while 80% remains on long term oil linked contracts, however, the market trend driven by EU's policy<sup>10</sup> is towards more short term gas hub priced contracts. It is worth to be mentioned the EU's energy dependency on imports has an expensive price, only France had a cost of 69bn Euros in 2012 from the fact the country imports 99% of the oil and 98% of the national gas consumption<sup>11</sup>. EU's natural gas demand dropped 11% on year in 2014 to 409 bcm due to an exceptionally warm winter coupled with low coal and carbon dioxide prices.

### EU energy policy

The three pillars upon which the EU energy policy is built are transition to a carbon neutral energy sector, a well-functioning integrated energy market and security of supply. The 20-20-20 by 2020 policy set the first step toward EU's energy transition road while the Third Energy Package further opened up the gas and electricity markets. So far, the EU is on track to achieve the targets set, however, that does not imply that the policy was successful as the economic recession and the deindustrialization of the continent played a major role in the reductions of the GHG emissions.

The financial crisis of 2008 and the followed economic recession coupled with policies promoting power generation from renewable energy sources has had tremendous effects on European utilities. The grid priority given to RES by the EU regulators and the resurgence of coal from the US lead to the

<http://www.oxfordenergy.org/wpcms/wp-content/uploads/2013/04/NG-75.pdf>

<sup>11</sup> Ministère de l'Ecologie et du Développement Durable, La facture énergétique

[http://www.developpementdurable.gouv.fr/IMG/pdf/08\\_Les\\_importations\\_exportations\\_facture\\_energetique.pdf](http://www.developpementdurable.gouv.fr/IMG/pdf/08_Les_importations_exportations_facture_energetique.pdf)

demand for natural gas to decline in an already over flooded gas market due to the LNG boom at the beginning of the decade. At the same time the market liberalization and competition which had started in late 80s started to have effect mostly in North Western Europe. The utilities found themselves over flooded with gas flowing under long term contracts (LTCs) and take or pay clauses with suppliers, causing severe economic impacts on their balance sheets since major investments had taken place in gas power generation facilities.

The current situation of the European gas market along with EU energy policy does not seem to favor Russia from any side. The Energy Union's strategy clearly aims at strengthening the diversification of supply sources including plans for a new LNG strategy while emphasis is given to the South Eastern Corridor and a strategic alliance with Turkey<sup>12</sup>. Turkey undoubtedly is the country with the best perspectives of becoming a hub for natural gas in South Eastern Europe and plays a critical role in unlocking the reserves of the Caspian and Middle East to the European market.

The final investment decision (FID) taken on the summer of 2013 by the BP lead Shah Deniz consortium for the realization of the Trans Adriatic Pipeline (TAP) opens the door of the South Eastern Corridor for Caspian gas to flow directly to the European market.

However, it remains uncertain to what extent TAP satisfies EU's wish to diversify from Russia since it is of only 18 bcma maximum capacity. There is always the question though how reliable are the new suppliers going to be taking into consideration the conflicts

that are taking place in the region and Turkey's recent involvement. Another element to be considered is that Turkey's primary concern is the satisfaction of its own domestic gas demand<sup>13</sup>.

### Russia's export strategy

Russian export strategy has been traditionally oriented towards satisfying European demand only through pipeline gas and be the region's dominant supplier. As it concerns the pricing strategy, from 1990 – 2002 Russia's policy was volume maximization and price damping. The strategy changed from 2002 to 2008 towards price maximization and volume growth while during the years of the financial crisis, 2008 and onwards, Gazprom has proceeded with small price adjustments acceptable from the consumers and stagnating gas flows.

Today, the European market is not Russia's only target as Gazprom tries to find new markets. The strong support that Novatek's LNG project in the Yamal peninsula is receiving from the Russian government highlights the shape that the Russian export policy has been taking<sup>14</sup>. Exploiting the Arctic reserves and opening the North Route for Russian LNG cargoes to reach Asian markets is very high on Russian government's agenda, however, Gazprom's and Rosneft's LNG plans have been suffering delays while the current low oil prices coupled with the continues fall of the Ruble call for a re-evaluation of the project economics.

Amid tensions in Ukraine and sanctions imposed to the Russian state for the annexation of Crimea a final purchase and sales agreement was signed by Gazprom and China National Petroleum

<sup>12</sup> See European Commission Communication on the Energy Union [http://ec.europa.eu/priorities/energy-union/index\\_en.htm](http://ec.europa.eu/priorities/energy-union/index_en.htm).

<sup>13</sup> "During some cold day in the winter Iran cuts the gas flows to Turkey cuts them from Greece..." Thierry Bross, After the shale gas revolution, (2012).

<sup>14</sup> The Russian government provides with all necessary infrastructure including construction of the port, airport and the widening of the channel. See Novatek annual report 2014.

Corporation (CNPC) in May 2014 for the supply of 38 bcm of gas. The route selected was through the Power of Siberia pipeline and not from the Altai which Russia favored. First gas flowing to China is expected in 2019. This agreement was reached a decade after their first co-operation agreement in 2004. The East Gas Program<sup>15</sup> seems to be a priority for Gazprom since the European demand is not there and further investments would not be rational<sup>16</sup>.

### Turkey's role

On December 1<sup>st</sup> 2014, following a meeting between the Russian and Turkish presidents, president Putin and Gazprom CEO Alexey Miller announced that South Stream is cancelled. Gazprom claimed that the reason for the cancellation has been the combined failure of the Bulgarian government to provide assurances that the pipelines could be laid; and the European Commission to provide assurances that gas would be allowed to flow through them. South Stream had an estimated CAPEX of 15bn Euro (10bn offshore section & 5bn onshore section)<sup>17</sup>.

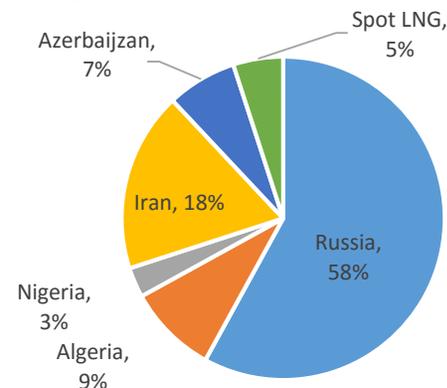
Immediately Turkish Stream was announced in place. Turkey is a country which Russia dominates its natural gas imports and is also of strategic importance. The annual gas capacity of the Turkish Stream will be of a total of 63 bcm and will consist of four strings with the capacity of 15.75 bcm each. Gas from the first string is intended exclusively for the Turkish market which is expected to be constructed by December 2016<sup>18</sup>.

<sup>15</sup> In 2007 the Russian Industry and Energy Ministry the state-run Development Program for an integrated gas production, transportation and supply system in Eastern Siberia and the Far East, taking into account potential gas exports to China and other Asia-Pacific countries.

<sup>16</sup> From Dr. Tatiana Mitrova's presentation: "Russia Natural Gas Production and Export Policy", 2014

<http://globalenergysystemsconference.com/wp->

**Chart 4. Turkey's natural gas imports by country as of 2012 (total 46 bcm)**



Source: OME

For the moment the negotiations between the Turkey's Petroleum Pipeline Corporation (Botas) and Gazprom have frozen due to the fact that still there is no government formed since the Turkish national elections were held in June 2015. Turkey is to become an important player in the international energy markets. Even though the EU integration process and bilateral negotiations between the country and the EU have frozen, still Turkey has made a lot of progress in the liberalization process of both its domestic natural gas and electricity market.

[content/uploads/presentations/GES2013\\_Day1\\_Session1\\_Tatiana Mitrova.pdf](content/uploads/presentations/GES2013_Day1_Session1_Tatiana_Mitrova.pdf)

<sup>17</sup> See Gazprom presentation on South Stream

<http://www.gazprom.ru/f/posts/45/640967/presentation.pdf>.

<sup>18</sup> See Gazprom/Projects/Turkish Stream

<http://www.gazprom.com/about/production/projects/pipelines/turkish-stream/>.

## Game Changers

Two major recent political decisions which can be defined as gamechangers for the international natural gas markets has been Japan's decision to restart its nuclear program and the nuclear deal with Iran. As already mentioned, the main game changer of last decade in the energy industry has been undoubtedly the shale gas revolution in the US. In terms of the positive impacts of the shale gas revolution, Europe does not seem to be on the same line with the US. On the contrary, in Europe gas cannot compete with coal anymore in power generation, hence the switch is from gas to coal.

The utilities have been stricken by the return on profitability of coal fired power plants due to abundant cheap American coal which reduces coal generation's costs. In the aftermath of the shale gas revolution and high oil prices we saw European refineries closing down one after the other, over 15 refineries shut down from 2008 to 2013 translating to 8% reduction in total refining capacity<sup>19</sup>.

### Convergence of European and Asian spot prices

In case, U.S. proceeds with massive gas exports analysts expect that the European gas market will tend to be second on American preferences as Asian prices have been the most attractive. However, since mid-2014 oil price benchmarks have suffered a tremendous fall following OPEC'S historic decision not to cut on production squeezing US producers.

<sup>19</sup> Clingendael International Energy Programme (CIEP) "Cinderella Story", (2013)  
[http://www.clingendaelenergy.com/inc/upload/files/A\\_cinderella\\_story.pdf](http://www.clingendaelenergy.com/inc/upload/files/A_cinderella_story.pdf).

<sup>20</sup> From Reuters September 21<sup>st</sup> 2015  
<http://www.reuters.com/article/2015/09/21/cheniere-edf-lng-idUSL5N11R3B920150921>.

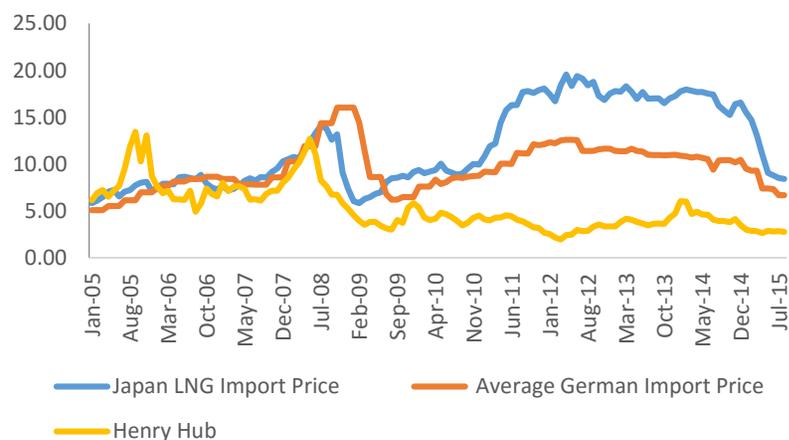
LNG arriving at the European coasts from the other side of the Atlantic means that the operational and strategic security of supply of the EU will be strengthened. This event seems not to be so far in the future with US LNG exporter Chreniere Energy agreeing to sell up to 24 cargoes to French energy giant EDF from 2017 through 2018<sup>20</sup>. What is most interesting of this deal is that sales price of the shipments will be linked to the Dutch Title Transfer Facility (TTF).

After four years of high LNG prices in the Asia Pacific basin mainly due to high crude prices now the Japan's LNG import price is found at the same levels as prior to the Fukushima disaster. In 2014 China's LNG demand grew by 8% compared to 2013, Japan's grew by 1.2% while Korean imports decreased by 9% as reported by Enerdata.<sup>21</sup> This drop in demand in the Asian market coupled with the current low oil prices resulted in price convergence with the average German import price.

To this end, the European market turned to be once again attractive and at the same time proved able to absorb the oversupply developed in the Asian market. In the first quarter of 2015, imports in the Netherlands, Belgium and the United Kingdom grew from 1.7 mtpa to 3.7 mtpa, as estimated by Cedigaz<sup>22</sup>. However, according to 2015 BP statistical review natural gas consumption in the European Union had the biggest volumetric and percentage decline on record (-11.6%).

<sup>21</sup> See Enerdata LNG Market: Developments in 2014 and 2015 Outlook (June 2015).

<sup>22</sup> See Cedigaz Monthly LNG Trade Bulletin, Special Issue Q1 2015 (June 2015).

**Chart 6. Natural gas prices (\$/mmbtu)**

Source: EIA, METI (Japan), EEX - elaborated by the author

Japan's decision to restart its nuclear program approving a new target, in August 2015, which calls for nuclear to account for as much as 22% of the nation's electricity mix by 2030 coupled with the fact that more Australian<sup>23</sup> and US LNG is coming on stream might maintain this downward trend in Asian Prices.

### The opening of Iran

The nuclear deal with Iran is definitely a game changer for the international natural gas markets. Iran has the potential to become one of the world's top gas producers, thanks to its 34 tcm of natural gas reserves which count for 18% of the world's total. The after sanction's Iran has to deal with a number of critical issues in order to exploit and benefit from its potential<sup>24</sup>.

<sup>23</sup> "Projects from Australia are expected to contribute as much as 70% of the new supply capacity in 2015." Enerdata LNG Market (June 2015)

<sup>24</sup> Paul Stevens "Prospects of Iran's Oil and Gas Sector" Chatham House, The Royal Institute FOR International Affairs (2015) [https://www.chathamhouse.org/sites/files/chathamhouse/field/field\\_document/20150305IranOilGasStevens.pdf](https://www.chathamhouse.org/sites/files/chathamhouse/field/field_document/20150305IranOilGasStevens.pdf).

Iran's oil and gas sector is critical to the country's economy and the Iranian government has been unable to satisfy its domestic natural gas demand while natural gas is injected to maintain oil production. Iran needs foreign capital and know how. However, it is a big question for international oil companies (IOCs) what will be the terms that Iran is prepared to offer. In this context the current low oil-price environment is not at all ideal. Iran's opening comes at a time of strong competition and an oversupply of the LNG market in sight. However, the country's priority remains to export any surplus gas in a regional level to countries such as Pakistan, Iraq and Oman.

### Zohr: an unexpected discovery

Last but not least, in the 30<sup>th</sup> of August the Italian giant Eni Spa announced a massive natural – gas discovery of the coast of Egypt. The discovery in the Zohr field is estimated at about 30 bcm<sup>25</sup> and Eni plans to start drilling in early 2016 and estimates for production to commence in the year after.

This discovery is definitely a game changer not only for Egypt, which will be able to cover its own demand and become again a net exporter but also for the international gas markets and the European one in particular. Egypt can become another supplier of natural gas to the EU adding an important element in strengthening the long term security of supply of the union.

<sup>25</sup> See Eni Press Release August 30<sup>th</sup> 2015

[http://www.eni.com/en\\_IT/media/press-releases/2015/08/Eni\\_discovers\\_supergiant\\_gas\\_field\\_in\\_Egyptian\\_offshore\\_the\\_largest\\_ever\\_found\\_in\\_Mediterranean\\_Sea.shtml](http://www.eni.com/en_IT/media/press-releases/2015/08/Eni_discovers_supergiant_gas_field_in_Egyptian_offshore_the_largest_ever_found_in_Mediterranean_Sea.shtml).

## Conclusion

Due to LNG trade the regional natural gas market are connecting. A price convergence between Europe and Asia Pacific is already happening, while the commence of exportation of LNG from the US is expected to strengthen the connectivity of import prices in different regions, hence strengthen the globalization of gas pricing.

In Europe the role of spot pricing will continue to grow as this is what the EU energy policy stands for, however, long term oil linked contracts are going to remain dominant in the short and middle term. Europe's main challenge toward the energy transition remains whether EU energy policy will be directed by soft laws or will leave the sovereign power of the states and be governed by the institutional bodies of the union.

The LNG strategy to be published in early 2016 by the European Commission is expected to define a single European strategy probably with more powers at the hands of the union's institutional bodies.

All in all, the main challenges ahead for the international gas markets though, derive from the supply side and the Asian market with Japan restarting its nuclear program, Korean demand dropping and China revising its growth rates as concerns over the country's economic growth fueled world slump in global markets. The growth in Chinese energy intensive sector for 2014 was dramatically below the 10 year average<sup>26</sup> foreshadowing a drop a in the energy demand of the country which will impact the whole world.

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<sup>26</sup> See 2015 BP Statistical Review

<http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf>.