

## Penetrating new markets for LNG

### New suppliers, new target markets, new products

Dr. Jesco von Kistowski, Managing Director, EconGas GmbH, Vienna

Stephanie Zirl, Head of Marketing & PR, EconGas GmbH, Vienna

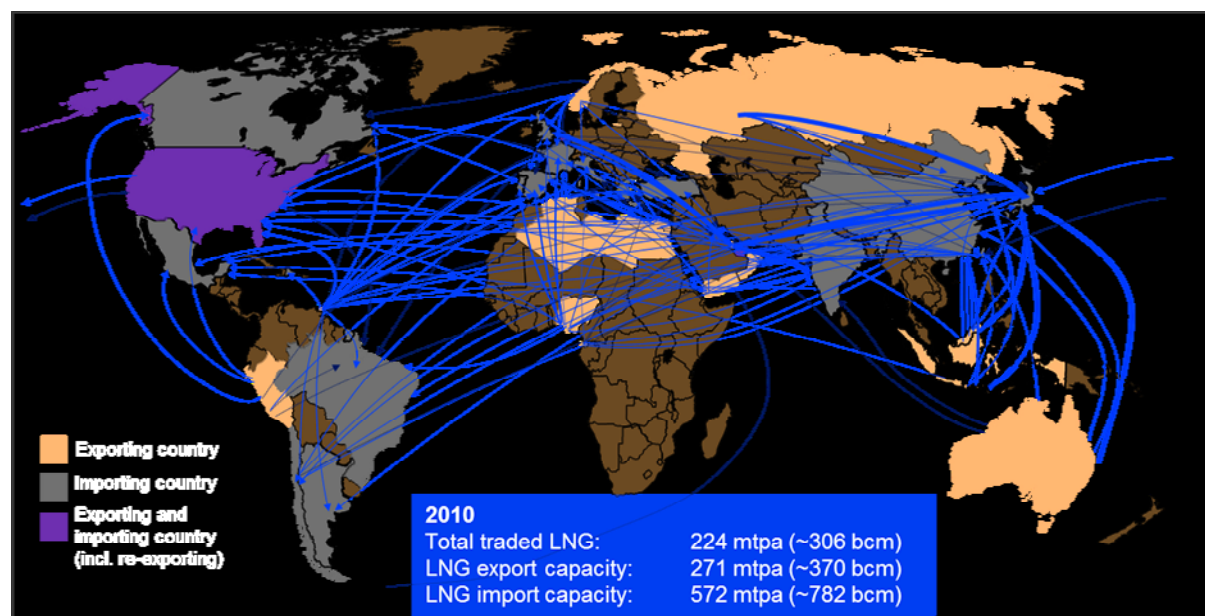
LNG, supply security, single European market, unconventional gas, landlocked countries

#### Background

LNG trade increased at an impressive rate of 21 per cent in 2010 compared to 2009. New markets, both on the supply as well as the demand side and new trade routes added to this remarkable surge. Not only Asian LNG demand recorded a large increase, demand from Europe as a mature market went up by almost 25 per cent too and growing natural gas demand for power generation made South America (especially Argentina, Brazil and Chile) evolve as a new market for LNG with demand tripling from 2009 to 2010. At the same time the number of observed trade routes (country-to-country) increased from 127 to 149 – especially on the spot LNG market<sup>1</sup>, where volumes increased by 40 per cent as compared to the medium to long term markets where volumes went up by 17 per cent from 2009 to 2010.

This development is accommodated by the simple nature of LNG – making transport and trade of natural gas flexible instead of it being bound to a route from point A to point B. Likewise, as trade activities are getting more flexible and short term oriented, financial players and pure merchants are beginning to actively take part in the LNG market, illustrating that it offers more than just another source of physical supply, but also options for arbitrage and portfolio optimisation.

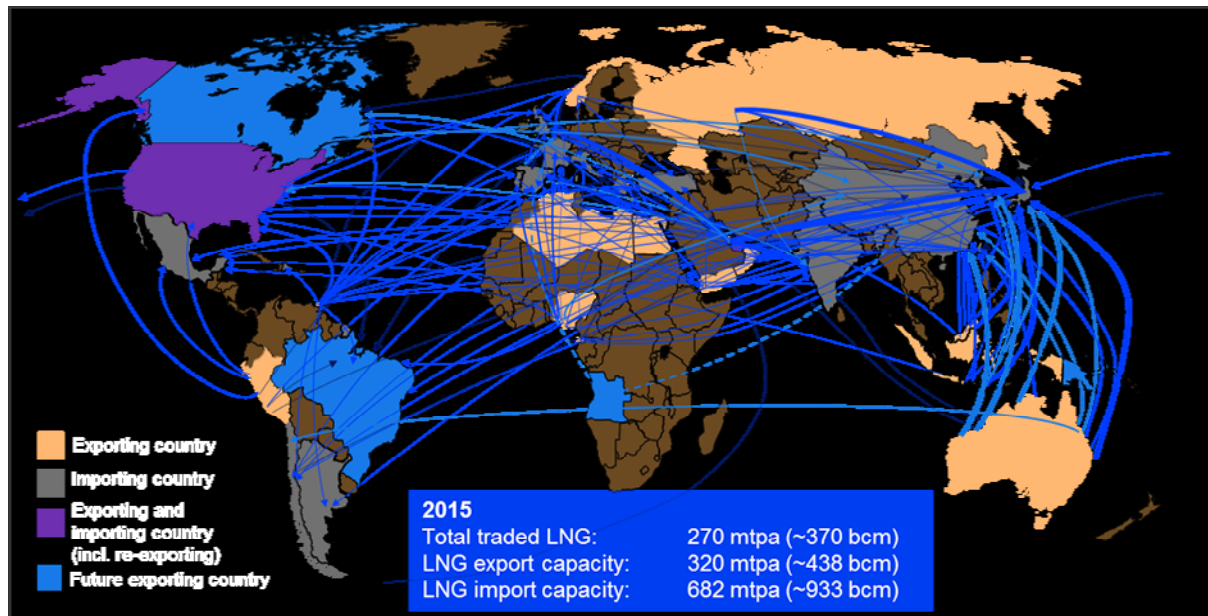
LNG trade routes, exporters and importers in 2010



Source: EconGas based on IGU World LNG Report, Waterborne LNG Reports, US Dept. of Energy, PFC Energy, 06/2011

<sup>1</sup> Contracts with duration of 4 years or less.  
All data: GIIGNL, The LNG Industry 2010

## LNG trade routes, exporters and importers in 2015



Source: EconGas based on IGU World LNG Report 06/2011, International Energy Agency (IEA) 2011, GIIGNL LNG industry 2010, Media

As we are continuously moving from many national or regional European markets to a Single European natural gas market, LNG is becoming increasingly valuable as another source of supply even for a landlocked country as Austria with no access to the sea of its own.

### Aims & Methods

The aim of this paper is to give an overview on how we see LNG trade evolve in the coming years and the consequent opportunities for existing and new markets as well likely challenges and (price) influences. We look at it from the perspective of a player in a landlocked market and ask ourselves what the significance of LNG will be to us and what role it will play in our portfolio.

By pulling together the aspects of global LNG supply and demand fundamentals, the development of new products, the appearance of new players on the short and medium term LNG market (e.g. merchants, financial institutions) we examine the potential role of LNG in our supply mix.

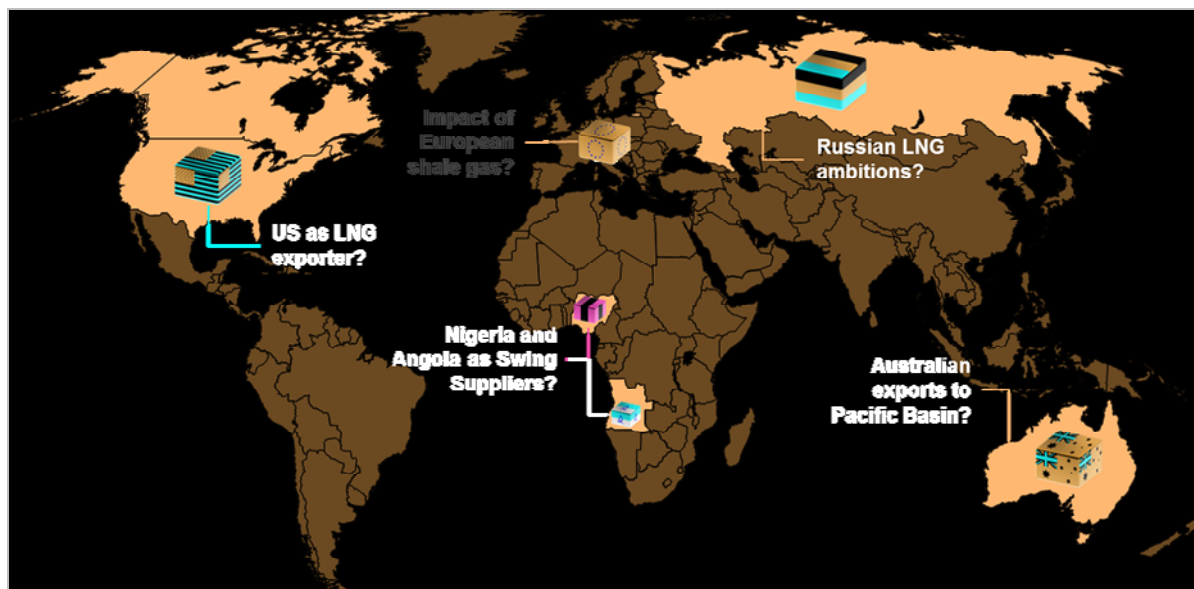
In a side note we will also consider the possible role and impact of unconventional gas reserves in Europe.



## Influencing factors: Exporting countries

Generally speaking the major characteristic of LNG – flexibility – increasingly influences global trading activities, which are becoming more flexible and short term oriented. Hence, financial players as well as merchants<sup>2</sup> are beginning to actively take part in the LNG market, illustrating that it offers more than just another source of physical supply, but also options for arbitrage and portfolio optimisation. But not only the share of spot LNG deals is increasing, so is the number of supply and target markets as another wave of LNG liquefaction and regasification projects are due to come on-line in the near future.

### New suppliers – the global view



### Australia

In the list of new LNG suppliers Australia stands out for various reasons – not only for their technical innovations (e.g. FLNG production, liquefaction in various scales, LNG from coalbed methane, etc.) but also due to the fact that practically all the supply from projects due to come online in the next six or seven years has already been sold off to Asian buyers. Based on the five terminals under construction and currently operating, Australian LNG export capacity could exceed 54.8 million tons (~75 bcm) after 2015, making it the second largest global LNG exporter after Qatar. Adding the terminals with taken FID and further 28 million tons (~38 bcm) that are subject of four planned export projects, it has the potential of even overtaking Qatar as the world's leading LNG exporter.

However, the future of these planned LNG export terminals is rather uncertain. Costly labour and construction, environmental restrictions and rising international competition could delay the operation start-up of planned projects, including those with FID in place, like the Ichthys LNG terminal in Darwin. It is yet not clear to what cost (financial and environmental) probable extensive offshore and unconventional gas resources can be produced. This adds to high labour costs, while the availability of skilled and experienced workers necessary for the construction of such a LNG project is limited in Australia. On the other hand political stability and therefore strengthened supply security make Australian LNG more attractive compared to other competing regions. Furthermore the timing and place is favourable too for Australia

<sup>2</sup> For the purpose of this player, we define a LNG merchant as a company who has neither a financial background nor is it involved in the supply of end customers.

as gas demand of the targeted Asian markets is continuously increasing with the region willing to pay the highest price compared to other buyers at the same time.

In summary Australia is faced with increasing costs associated to gas production and LNG terminal construction while the country lacks skilled work force for the latter. However, investments are sought to pay off due to the Asian market's rising demand and willingness to pay higher prices for LNG imports.

### **Russia**

Not only Australia reacted on the expected surge in Asian natural gas demand. Obviously Russia as largest conventional gas producer has interest in diversifying its target markets, which goes hand in hand with the expansion of the country's LNG activities. The rather small LNG exports that amounted to 10.6 million tons (~15.5 bcm) in 2010 and exclusively targeted Asian markets shall be further increased with new corridors, larger volumes and more facilities. For this reason Russia plans the construction of new export terminals along the west coast, adding around 23 million tons (~31.5 bcm) to its existing plant on the Eastern island Sakhalin<sup>3</sup> that mainly targets the Japanese market. After the start-up of the two projects, Russia plans to grow their exports up to 62.1 million tons per year (~85 bcm). However, this initially planned addition of capacity was undercut by the unconventional boom in North America, which leaves the options that new export terminals, like in Yamal Peninsula, either act as an alternative supply route to Europe or increase Russia's LNG exports to Asia. Contrary to Australia, which has several Heads of Agreement with potential buyers in place, no such similar deals are known to have been concluded in 2010 between Russia and its target markets, which adds uncertainty over the timing of Russia's emergence as a global LNG supplier.

### **Angola and Nigeria**

At the same time West African countries such as Angola and Nigeria are pushing to expand their natural gas export infrastructure. Comparing July 2011 with July the previous year Nigerian supplies to Asia jumped by more than ten times. In 2010 Nigeria recorded the second largest export growth in terms of absolute volumes (just behind Qatar and before Russia and Indonesia). In the meantime construction of Angola's first liquefaction terminal proceeded and will start operation in Q1 2012. As LNG from Angola was intended to go to the North American market (just like some of the volumes from Qatar), market participants expect Angola and/or Nigeria to take over Qatar's position as a swing supplier, benefiting from its even more favourable geographic position between East and West – Atlantic and Pacific Basin. Significant volumes presupposed, arbitrage between the regions might favour an approach of North American, European and Asian LNG prices.

### **Qatar**

As Qatar increases its LNG exports to Asian (especially Japanese) buyers significantly in recent months and with no further capacity expansions to expect in the near future, Qatar's role as swing producer as above mentioned is expected to diminish. While in 2010 almost 75 per cent of all UK LNG imports were sourced from Qatar on a short term basis (23,26 mcm of a total of 31,15 mcm of LNG imported into the UK), this share is set to decrease considerably.

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<sup>3</sup> Shtokman (from 2017) = 7.5 mtpa, Yamal (from 2016) = 15 mtpa, Sakhalin (in operation) = 9 mtpa

## **North America**

While the development of the shale gas industry in the **USA** obviously had a large impact on the import of LNG into the USA, experts are sceptical regarding the economics of US LNG exports. Nevertheless, several players recently announced plans to convert for example Lake Charles LNG terminal into a bi-directional terminal by installing a liquefaction facility, building on the owner's stakes in the production of unconventional gas in the Haynesville and Marcellus shale plays among others. Lake Charles would be the USA's fourth exporting LNG terminal after Sabine Pass, Freeport and Cove Point. Also this summer, Lithuania signed a Memorandum of Understanding with a US LNG player about importing LNG from Sabine Pass terminal.

However, economics do not clearly speak for the viability of U.S. exports to European markets: even with Henry Hub prices moving between 3 to 4 USD/mmBtu, taking transportation and liquefaction costs into account, netbacks to Northern Europe are just positive (at current price levels) to even slightly negative. Furthermore, it becomes increasingly clear that security of (affordable) energy supplies will be one of the most important topics in the upcoming presidential elections. Australia's experience of increasing national natural gas prices, once the country started exports, will not be helpful for currently planned U.S. export projects.

The first liquefaction terminal project – Kitimat LNG – to potentially export LNG from **Canada's** west coast to Asian markets was approved by the nations' regulators in late 2011. This is a first but significant step for the country on its way to join global LNG trade not only as an importer but, intentionally from 2015 onwards, also as an exporter. Main facilitator for this development, as in the US, are vast unconventional gas reserves, with some analysts predicting the unconventional gas reserves to over 650 trillion cubic feet (~18,406 bcm) only in Canada's province of British Columbia.

Consequently the question occurs whether such development is also possible for Europe if unconventional gas reserves turn out to be of promising volume and exploration possibilities.

### *Excursus: The potential of unconventional gas reserves in Europe*

The real potential of unconventional gas reserves in Europe and their impact on Europe's natural gas supply situation has been a question mark in the industry for a while, but specifically since the shale gas boom in the US, which practically turned the nation from an importing to a balanced and potentially exporting country. The share of unconventional gas production in North America's total demand is projected to increase even further from 56 per cent in 2009 to 64 per cent in 2035 with the US maintaining its position as the second-largest global natural gas producer after Russia.<sup>4</sup>

Even though unconventional gas types as "tight gas" and "coalbed methane (CBM)", which have not been produced in significant volumes up to now, are expected to continuously increase their share in total unconventional output, the above mentioned "shale gas" accounts for the bulk of unconventional gas reserves. Latest estimations expect European's shale gas resources to amount to approximately 18 trillion cubic metres (tcm), with Poland and France supposed to hold the most technically recoverable resources. However, the pure existence of these resources is only one aspect of a possible success story of unconventional gas in Europe. On one hand tangible figures are a matter of constant revision as new and more reliable information is being gathered and on the other hand it is not yet clear whether the exploration in Europe will be economical at all.

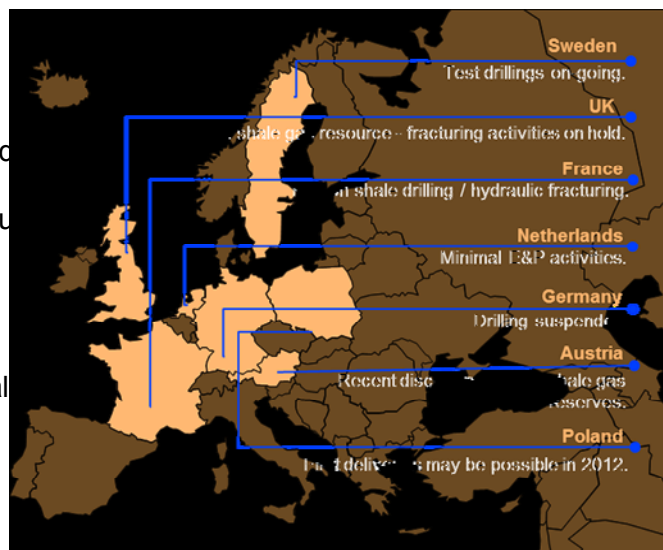
It cannot automatically be assumed that Europe can profit from its shale gas reserves to the same extent as North America. Not only differ the basins in their geological conditions, as the

<sup>4</sup> International Energy Agency (IEA), World Energy Outlook (WEO) November 2011

shale gas fields in Europe are located much deeper than in the US (around 4,000-6,000 metres compared to a range from 180-4,100 metres in North America), but also population density and financial interests of unconventional gas E&P in the two regions vary significantly. Whereas the landowners in the US financially benefit from the shale gas drillings in their 'backyard', European land beneath a depth of 700 metres is owned by the government. Therefore security and environmental issues play a much more critical role and profits from the shale gas establishment will only go to the E&P companies. Additional criticism has been arising in the light of environmental considerations coupled with public acceptance. Especially the technology used for shale resource exploration – the hydraulic fracturing ("fracking") – has increasingly attracted public attention as it is accused to negatively influence the environment, particularly ground water quality.

However, technology is constantly advancing and the industry is aware of the need to develop exploration technologies with less environmental impacts. In the light of Europe's still increasing natural gas demand and the European Commission's aim to enhance natural gas supply diversification while reducing import dependence, unconventional gas represents a feasible option to compensate parts of the declining domestic production. Consequently, several European unconventional gas exploration and production activities have been initiated during the last years with first results:

► UK: In September 2010 a 5.66 trillion cubic metres shale gas resource was discovered in Blackpool and South Lancashire. As the fracturing caused minor earthquakes in the region, further activities have been put on hold.



Netherlands: Total recoverable shale gas resources are estimated to 500 billion cubic metres. To push the minimal E&P activities, public acceptance and proper regulation are needed.

► Austria: Discovery of large shale gas reserves – potentially covering Austria's demand for 30 years. Technical and economic viability of production still uncertain.

► Sweden: Test drillings to gain more information on potential reserves on-going.

► France: Ban on shale drilling / hydraulic fracturing since June 2010

► Germany: Long fracking history, but drilling has been suspended in May 2010. Pending government assessment on safety of unconventional gas exploration.

► Poland: First deliveries from test drills may be possible in 2012. According to first estimates, domestic shale may be cheaper than Russian imports. Industrial scale production not expected before 2015.

Currently, Europe's financing and investment climate for unconventional gas E&P is still challenging due to a number of uncertainties and risks, like geographical conditions and

environmental impacts. Consequently, the full potential and economic viability of unconventional gas has to be further examined, followed by the introduction of a clear regulatory and financing framework for E&P activities on a European level. Putting shale gas on the agenda of Europe's long-term energy roadmap will be a first essential step in doing so.

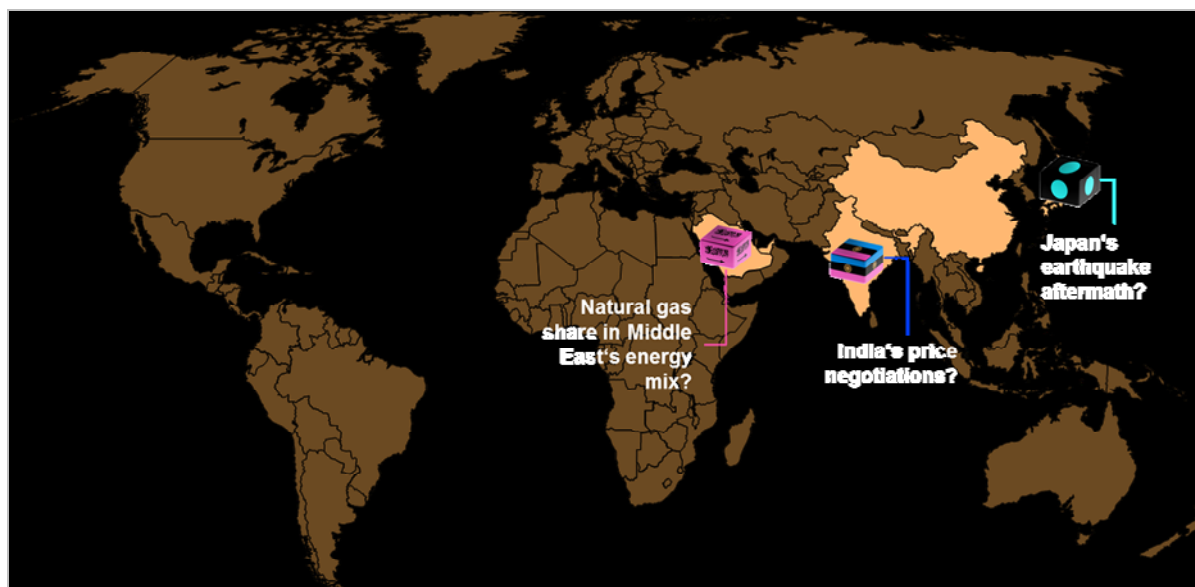




## New target markets: The global view

The number of LNG importers is expected to increase by at least a third over the next decade, while existing markets like Japan, India and China will substantially gain importance due to their substantial gas demand increase. Thereof China is the fastest growing natural gas consumer with an annual growth rate of 6.7 per cent compared to 0.8 per cent in the EU and 1.7 per cent on global level from 2009 to 2035. This growth will make China the second-largest import market after Europe by 2035, also driven by the country's five-year plan that foresees an increase of the country's gas consumption to 8.3 per cent of the total energy mix or 260 bcm respectively by 2015.

However, at this point of time<sup>5</sup> pricing seems to obstruct emerging Asian markets, like India and China, from taking part in the advancing global spot LNG trade, due to higher prices driven by the earthquake and followed shut-down of nuclear plants in Japan. The global reaction was a compensation of parts of nuclear energy with natural gas, which pushed LNG prices upwards and consequently putting emerging countries increasingly under pressure as they cannot pass on spot LNG prices to their end users as they are simply not able afford the volumes at a current price level of around 16\$/Mmbtu.



### Japan:

The accident at Fukushima nuclear power plant caused by the earthquake and tsunami in March 2011, resulted in the immediate loss of 9.7GW of nuclear capacity. In May 2011 the 3.6 GW Hamaoka nuclear power plant was also temporarily shut down. The shortfall in base load nuclear power capacity required additional oil- and gas fired generation, which increased Japan's short-term reliance on fossil-fuel imports. The IEA estimates that Japanese LNG demand could increase by a third in 2012 in case no nuclear reactors can be re-started. Additionally the country is expected to close all of its 54 nuclear plants for maintenance reasons. Preliminary data from Japan's finance ministry confirms the assumption of a significant growth in Japan's LNG imports as volumes hit 78.5 mtpa (~ 107 bcm) in 2011, which is 12.2 per cent up from 2010. According to IEA these additional 8.5 million tons (~ 11.6 bcm) were purely driven by the loss of nuclear power generation and for 2012 it even expects a rise of further 13.7 million tons to 22.8 million tons (18 bcm to 30 bcm) of LNG to compensate lost nuclear energy in 2012, with Qatar being assumed as the main supplier of additional volumes.

<sup>5</sup> September 2011

### **India:**

India's natural gas demand is expected to increase to 86.9 million tons (~ 119 bcm) in 2014 alongside a declining domestic production which together widens the country's supply gap from today's point of view to 29.8 million tons (~ 40.8 bcm). The import needs are supposedly to be covered with LNG volumes, which goes in line with the expansion of India's import capacity by more than 400 per cent by the end of the decade, with total regasification capacity reaching 47.5 million tons (~ 65 bcm) and 62.5 million tons (~ 85.5 bcm) by 2016 and 2020 respectively (from 13.5 million tons / 18.5 bcm in 2011). Therefore the country is in continuous talks with several potential LNG suppliers, including Qatar, Russia, Australia, Africa and Oman. In all these talks it appears that the major interest of India lay in long-term contracts, including the potential investment in or joint developments of liquefaction terminals. A deal of about 2.5 million tons (~ 3.4 bcm) was signed between India and Russia earlier in 2011. No similar agreement could be reached with Qatar in October 2011, where 3-4 million tons (4.1-5.5 bcm) per year (in addition to the present Qatari imports of 7.5 million tons / 10.3 bcm) were under negotiation for a 20-25 years long-term contract as the two parties could not agree on pricing.

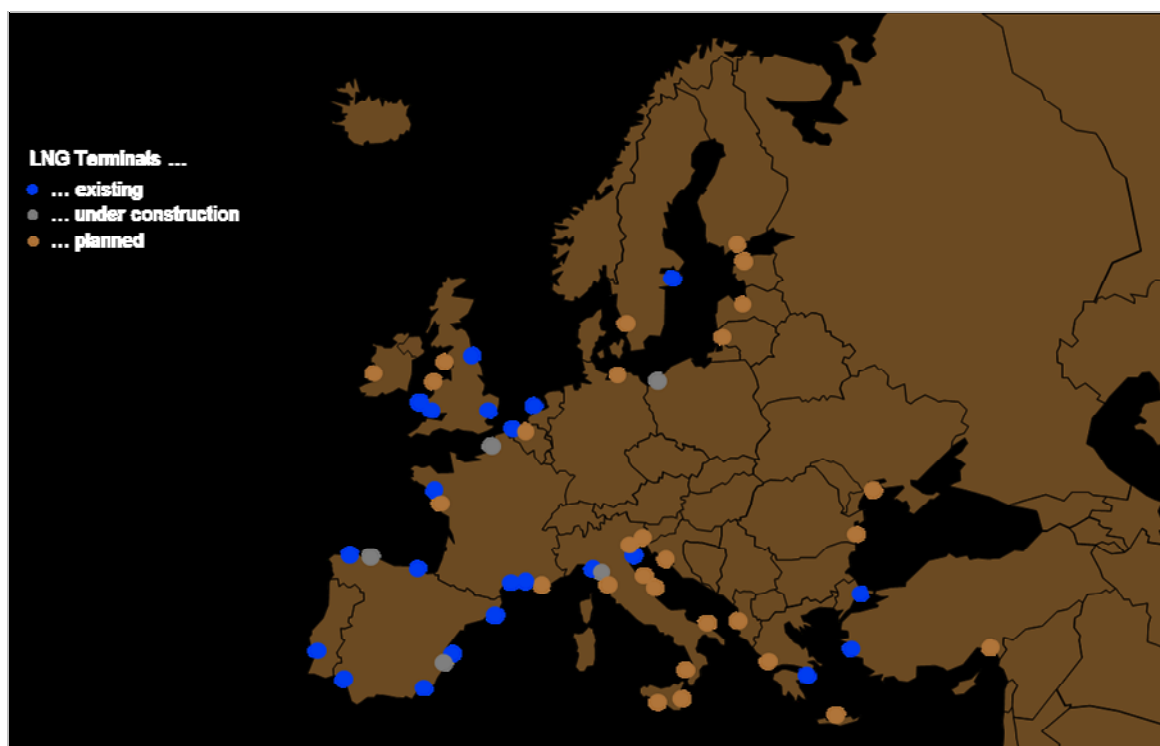
### **Middle East:**

According to analysts the demand for LNG in the Middle East could grow tenfold in the next 10-15 years, especially turning Saudi Arabia into a LNG importer. The country's supply gap is estimated to reach 29.9 million tons (~ 20.7 bcm) by the end of the decade, possibly as early as 2017. Currently only Kuwait and the United Arab Emirates are importing LNG. However, the IEA estimates natural gas to reach a share of more than 50 per cent in the Middle East's energy mix by 2030, overtaking oil as the primary energy source. Especially the increased usage of natural gas for power production is responsible for this trend and consequently the region will join the global LNG market as an importer in the long term, with volumes potentially reaching 15 million tons (~ 20.5 bcm) by 2020 and 20 million tons (~ 27.4 bcm) by 2030. By then – at the latest – Qatar's LNG volumes of 77 million tons (~ 105.3 bcm) will all be contracted, leaving the Middle East looking for other suppliers.

## New target markets: The European perspective as seen by a landlocked country

European<sup>6</sup> demand for LNG grew substantially in the last years: total imports climbed by 25 per cent from 65.4 bcm in 2009 to 81.6 bcm in 2010. If we look at the spot and short term market the increase appears even more impressive with 51 per cent from 2009 to 2010. However, not only since the earthquake and tsunami in Japan, Asian demand for LNG saw new highs as well, offering producers price levels far above those currently seen in Europe. While in recent years European markets cashed in on spot cargoes redirected from the US, Asian buyers (especially Japan, China, Korea and Taiwan) close deal after deal on a long term basis at a time when most new projects and volumes will come online in a few years' time only. Additionally new buyers such as Dubai entered the global LNG market. How can European markets successfully compete in a situation like this in the not too far future? What role can LNG play in an interconnected European market and for a landlocked country like Austria? Those are the questions we have to ask ourselves.

LNG terminals in Europe



Source: EconGas based on GLE August 2011

In 2011 Europe saw an increase of Qatari LNG imports to France, Spain and the UK, while the latter was overtaking Spain as the world's third largest LNG importer after Japan and South Korea. But in the light of growing Asian demand, the region's high price level and the start of deliveries under long-term supply contracts between Qatar and Asian markets, Europe cannot take Qatari imports for granted and needs to be on top of the game before new supplies are bound to competing markets, like South America.

Given these facts the question occurs, whether the increasing competitive pressure will turn Europe into a swing consumer for excess LNG volumes. Taking into consideration Europe's geographical location and natural gas price level it may be assumed that the region will act

<sup>6</sup> Includes imports into Belgium, France, Greece, Italy, Portugal, Spain, Turkey and the UK.

as a 'balancing market' for global LNG in the future. Depending on weather conditions, supply outages and liquefaction utilisation, deliveries are mainly diverted to or from Asia, but even though up to 70 per cent of new liquefaction volumes are targeted to Asian markets, parts will end up in Europe anyway as it is the highest price alternative. Consequently the degree of uncertainty regarding expected LNG supplies to Europe doubles and European storages will more and more serve as protection from increasing uncertainty and volatility. According to estimations from IHS CERA, European LNG imports may grow to 95 million tons (~ 130 bcm) by 2020 (+50 per cent from 2010). Besides West Africa and Qatar, diversions from previously Middle Eastern LNG deliveries to the Pacific basin are being identified as one of the three main LNG supply sources for Europe as these will mainly be compensated by Australia's surging LNG exports.

At the same time the European Union's aim to move towards an integrated European natural gas market is making progress as the number of market zones decreases and cross-border infrastructure expansion is being developed at the same time. This also gives markets in Central and Eastern Europe access to new and diversified supply sources. Pulled together with enhanced trading activities across Europe, volumes and prices of LNG that lands at European coasts, will also affect landlocked countries. Clearly, one reason for that is the fact that LNG offers a whole new possibility for interregional trade and arbitrage, in which landlocked countries as for example Austria can actively take part via the well-established gas exchange at the Central European Gas Hub. The opening of the CEGH Gas Exchange of Wiener Börse in December 2010 was a stepping stone towards the creation of a European gas market and strengthens Austria's role as an energy trading centre. Spot and future trading complements long-term supply agreements and boosts competition on the liberalised market. Furthermore, Europe can benefit of flexibility and supply diversification driven by rising LNG imports by gaining a competitive position in its negotiations with long-term suppliers. Those are increasingly put under pressure due to the dynamic European natural gas industry, which saw major changes in recent years as a result of the global economic crisis, a surge in trading activities, enhancement of supply diversification and thereof expanded LNG imports, building upon a strong and balanced portfolio. This situation ultimately brings us back to the global picture as large natural gas producers, especially Russia, also need to diversify their target markets, where Asia is back in discussion. Hence, the global natural gas market increasingly witnesses interconnection and interdependency while leaving the question open, whether a global benchmark natural gas price will emerge as a result.

## Summary and conclusions

The importance of diversified supply, both in terms of sources and means of transportation has been a broadly discussed topic in the EU for many years. While LNG is obviously a vital part of the supply mix in coastal areas, what is the use of it for a landlocked country like Austria? The answer to this question is not self-evident any longer, as European markets increase their interconnection and national markets are being replaced by larger regional markets, once culminating in the Single European Market for natural gas. Also LNG spot trading is generating new possibilities for portfolio optimisation both with and without investment in own infrastructure.

In Austria, just as in most European countries, the last years were characterised by the (comfortable) situation of a significant supply surplus. This situation has moved the topic of supply security to the bottom of the agenda. However, while companies are busy re-negotiating contracts with suppliers, we shall not forget that surroundings are going to turn around at some point in time, depending on economic rebound.

Security of supply and a producer / buyer relationship based on partnership is to a large extent based on a competitive supply market and as many and various supply sources and channels as economically feasible. Keeping this – and the growing importance of natural gas – in mind, even a landlocked country like Austria cannot ignore the possibilities LNG offers and the importance of LNG in order to build a competitive portfolio.

Given this background, we must re-examine the significance of LNG especially in the light of growing Asian demand and possible competition for new supplies and the still not fully known potential of unconventional gas in Europe, as all of these factors will influence future supply availability, price levels and last but not least security of supply.