U.S. LNG: Global Game Changer or Fading Hype?

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With the ongoing reverberations from output gains prompted by the surge in hydraulic fracturing in the U.S. being felt on a global scale, most attention has been devoted to the impact on the oil market. While marked by a more segmented and heterogeneous character, global natural gas markets have similarly been infused with increasing instability. Investments made in LNG and pipeline projects prior to the global economic downturn have come online in the midst of a protracted period of soft global demand coupled with a surge in U.S. shale gas production (Hartley 2015). With production in the U.S. increasing each year since 2006 and expected to reach levels upwards of 340 bcm/a by 2030, outpacing domestic consumption, plans for the large scale export of LNG are currently being pursued. This is noteworthy considering the development of new LNG terminals just a decade ago as the U.S. was gearing up to increase their import capacity. This dramatic development is illustrated in Figure 1. Whereas in 2006 net imports were projected to increase to 5,100 bcm/a by 2015, in 2015 the level of net imports have fallen to under 1,000 bcm/a.

With many of these terminals needing to be retrofitted, the commissioning process is still ongoing, having deferred LNG shipments until most recently. The projects currently in commission and those slated to be completed by 2020 are scheduled to infuse the global market with an additional 175 bcm/a. This is set to endow the U.S. with the third-largest export capacity worldwide (IEA 2015).

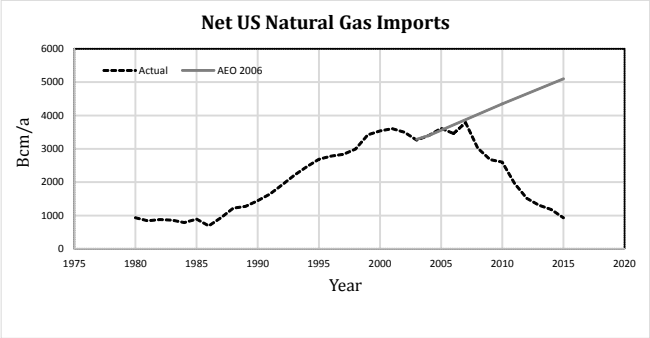

Figure 1: Projected and actual development of U.S. net natural gas imports
Source: Own illustration based on EIA (2006) and EIA (2016b)

As highlighted by Moryadee, Gabriel, and Avetisyan (2014), the potential for U.S. LNG was initially staked to lucrative arbitrage opportunities. In 2012, significant price disparities existed between the U.S. ($3-4 MMBtu) and the European ($9-11 MMBtu) and Asia-Pacific market ($15-16 MMBtu). Furthermore, the international push to decarbonize power systems has prompted the call for an uptake in natural gas usage, e.g., China, as a transitional fuel to accompany the development of renewable generation capacities (Holz, Richter, and Egging 2015). With respect to the European market, recent geopolitical flare ups with Russia have spurred policymakers to call for an increase in the diversification of its import structure (Richter and Holz 2015). The European Commission maintains that this move aims not only to counteract perceived abuses of market power by Russia but also to increase security of supply by diversifying import sources (Tusk 2014). Given this incentive structure, U.S. LNG has been perceived as possessing the potential to put pressure on prevailing structures globally. In this vein, industry experts have eyed the potential for intensifying the shift away from globally fragmented market segments towards the establishment of a global market regime. With implications of this magnitude having been put forward, a brief discussion of the current state of affairs in the LNG market is needed to shed light on the realistic short to long-term impact of U.S. LNG.

GLOBAL LNG GLUT STIFLES EXPORT POTENTIAL IN ASIA-PACIFIC MARKETS

As with any set of long-term investments, a range of economic and political uncertainties can derail projections. In the case of U.S. LNG, the market dynamics have been significantly impacted by a wave of recent developments. A prime example of this concerns the prospects of U.S. LNG in Asia-Pacific markets, initially the most attractive outlet for U.S. LNG. Since investments were laid out post 2010, the prices of oil-indexed contracts in the Asia-Pacific have begun to trend downwards. With oil prices falling to record levels, gas prices have correspondingly sunk. Most recently, the Asia-Pacific natural gas benchmark has fallen all the way to $8.00 MMBtu, depressed by a very mild winter and the reactivation of nuclear power plants in Japan following the Fukushima disaster in 2011. Figure 2 illustrates just how dramatic the fall in regional gas prices has been over the past four years.

According to analysts, as it currently stands Japan has secured enough LNG to meet its demand for the rest of the decade (Meyer, Hume, and Sheppard 2016). As the Asia-Pacific market has been envisaged as the prime market for U.S. LNG, current developments do not bode well for their prospects. To

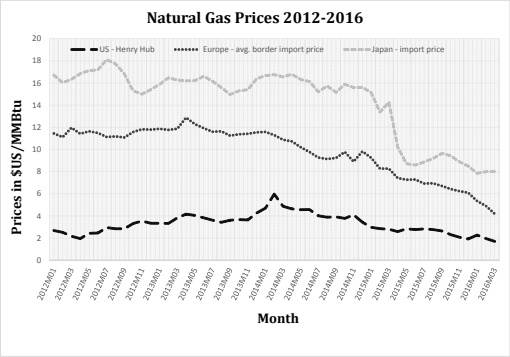

Figure 2: Development of regional gas prices from 2012-2016

Source: Own illustration based on The World Bank (2016)

add to these misgivings, Australia is also in the process of ramping up its LNG export capacities (75 bcm/a by 2020), which naturally increases the competition in the Asia-Pacific LNG trade (Rogers 2015). The first shipment from one of the world´s newest and largest LNG projects (Gorgon) arrived in Japan at the end of March (EIA 2016a). Hence, the prospects for a profitable U.S. LNG trade in the Asia-Pacific region hinge on natural gas prices firming up post 2020 or the emergence of new markets that can be exploited.

Regarding new markets, a significant unknown in the future demand structure in the Asia-Pacific region revolves around the energy policy objectives in China. With China making strong overtures to engage in climate protection efforts by altering its existing power generation structure to bring down carbon emissions, an upsurge in the country´s natural gas demand is highly plausible (Paik 2015). This could put upward pressure on long-term prices that would benefit U.S. LNG. That being said, it is obvious that a switch from carbon intensive energy carriers to natural gas (with a significant lower emission factor) strongly depends on policy decisions, which are frequently subject to change. Hence, demand predictions are highly uncertain as they depend on the effects of local emissions from coal technologies, especially SOx and NOx, as well as the pressure coming from international climate policy aims to introduce a uniform global carbon price. It is also important to note that not only Australia has contracted out new LNG capacities to China, Russia also signed off on a pipeline project with China in 2014 to deliver 30 bcm/a of gas over 30 years starting in 2019 (Paton and Guo 2014). While the completion of the pipeline project continues to be tenuous due to the recent plunge in oil prices, the realization of this project would further undermine U.S. LNG prospects in the country.

EUROPEAN MARKETS SHOW SIGNS OF GROWING COMPETITION BUT RUSSIA CONTINUES TO HOLD SWAY

Even with current conditions proving to be increasingly challenging for U.S. LNG, the effects of existing excess global LNG supply making its way to Europe has already shown an impact on the prevailing design of contractual structures and the strategic behavior of individual suppliers. Accompanied by an ongoing liberalization process that has supported increased market integration and an uptake in hub formation primarily in Northwest Europe, a wave of contract renegotiations as well as a trend toward adopting hybrid pricing schemes in place of oil-linked price formulas has emerged. The influx of greater volumes U.S. LNG on spot markets in Europe could prompt traditional European suppliers, e.g., Russia, to shift volumes of pipeline gas onto hubs in order to deflate prices and undercut the economic viability of LNG imports (Rogers 2015).

While Gazprom itself has shown itself to be reticent in engaging in spot market trading, such a development could aid in the maturation of gas-on-gas (GoG) pricing dynamics in Europe (Henderson 2016). This could especially have a significant bearing on relaxing the rigid contractual structures that continue to prevail in Eastern and Southern Europe. With increasing global liquidity and competition, U.S. LNG could likewise prove to be influential in hindering the exercise of cartel-like behavior from dominant suppliers (Medlock 2012). While this would enhance consumer welfare, with Russia possessing over 100 bcm/a of shut-in gas, the proposition that U.S. LNG can make inroads in Europe in the short to mid-term is questionable at best (Paik 2015).

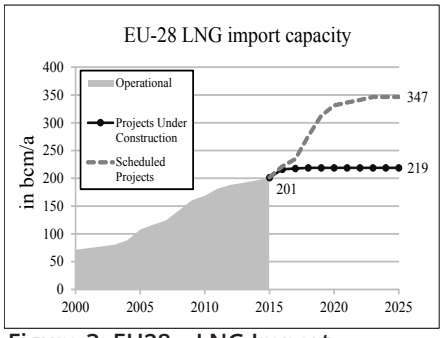

Figure 3: EU28 – LNG Import Capacity

Source: Own illustration based on GIE (2015)

It should also be noted that as of 2015 enough LNG capacity was installed to meet 43% of Europe´s gas demand. As the Figure 3 illustrates, the LNG capacity in Europe has grown around twofold to just over 200 bcm/a in the last ten years. The acute underutilization of this infrastructure (2014: 24% in use[1]) highlights the comparative economic and structural advantage Russian pipeline gas enjoys. Moreover, even before the current dip in natural gas prices, the European market had been assessed as being a secondary option for U.S. LNG. The price differentials in play are considered to be too insignificant to sustain profitable trading conditions.

EU ENERGY UNION: RAY OF HOPE FOR U.S. LNG´S LONG-TERM PROSPECTS?

Boosting the long-term prospects of U.S. LNG, the European Union (EU) has put

forward a proposal outlining the creation of an Energy Union (European Commission 2015). A central element of the draft concerns its dwindling domestic natural gas production and the plan to diversify its supply. As Figure 4 highlights, LNG makes up only around 15% of the EU´s import structure. U.S. LNG could go a long way to enhancing the influence of market fundamentals in Europe and securing the future gas supply considering the decreasing trend in domestic production. If the EU decides to utilize public funds to incentivize the construction of LNG terminals, especially in countries in Eastern and Southern Europe where oil-indexed Russian pipeline gas holds sway, U.S. LNG could provide an attractive diversification option. It should, however, be noted that the European pipeline network has yet to be fully integrated across Europe, which would likely diminish the price effect of an infusion of U.S. LNG (Hauser and Möst 2015). Regarding the current push to diversify the EU´s supply, the draft of the Energy Union also holds out the prospect of developing shale gas domestically. While currently economically unfeasible, public subsidization could undercut the long-term prospects of U.S. LNG in Europe.

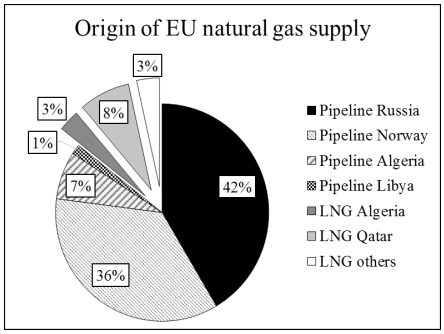

Figure 4: Origin of EU natural gas supply
Source: Own illustration based on BP (2015)

Looking long-term, Europe continues to work towards reaching its climate targets, e.g., 40% reduction in carbon emissions by 2030 and 80% by 2050. In advancing these goals, natural gas has been envisioned as playing a significant transitional role in the eventual de-carbonization of the power system. However, the situation currently playing out in countries such as Germany where the increasing volumes of renewable power supplies are crowding out natural gas as a power generation fuel has contributed to a dip in demand. While the planned decommissioning of the nuclear fleet in Germany by 2022 and the targeted increased stringency in climate policy measures throughout Europe seem to entail an uptick in natural gas demand in the mid-term, recent projections do not necessarily confirm that this supply gap will buoy natural gas deployment (Christie 2012). Even with its dwindling domestic supply, the future prospects for an upswing in the usage of natural gas in the power sector in Europe depends on its price leverage over lignite coal which in turn depends greatly on favorable carbon price dynamics (Neumann and Von Hirschhausen 2015).

SUMMARY

Going from a net importer of gas to being set to become one of the largest LNG exporters worldwide in the span of a decade, shale gas has boosted the U.S.´s prospects of becoming a significant global LNG player. While the initial optimism was well placed, current developments reflect a global market that is becoming ever more contested as demand fades. This brief analysis has highlighted the short to long-term challenges that U.S. LNG is likely to face. An oversupplied Asia-Pacific market and a sluggish European market tied to Russian pipeline gas are dampening the necessary price dynamics needed to open up outlets in the near term. The mid to long-term prospects for U.S. LNG rest on the exploitation of new markets such as China and a consequential implementation of climate policy globally needed to stimulate demand. Nonetheless, U.S. LNG is capable of contributing a large volume of liquidity to the global market. With respect to the European market, this does show indications of fostering growth in competition and improving consumer welfare in the long-term.

Footnote

[1] **Own calculation based on capacity data of GIE (2015) and LNG import data of BP (2015)**

Bibliography

BP. 2015. "BP Statistical Review of World Energy." London. doi:bp.com/statisticalreview.

Christie, Edward Hunter. 2012. "A Second Life for Natural Gas Demand in Europe?" Energy Strategy Reviews 1 (1). Elsevier: 62–65. doi:10.1016/j.esr.2011.11.004.

EIA. 2006. "Annual Energy Outlook 2006: With Projections to 2030." Outlook. Vol. 0383. doi:DOE/EIA-0383(2008).

———. 2016a. "Australia's Gorgon, One of the World's Largest LNG Terminals, Ships First Cargo." Today in Energy. http://www.eia.gov/todayinenergy/detail.cfm?id=25612#.

———. 2016b. "Monthly Energy Review." Washington, DC. http://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf.

European Commission. 2015. Energy Union Package: Communication From The Commission To The European Parliament, The Council, The European Economic and Social Committee, The Committee Of The Regions And The European Investment Bank.

Gas Infrastructure Europe (GIE). 2015. "The European LNG Terminal Infrastructure 2015 : Status and Outlook."

Hartley, Peter R. 2015. "The Future of Long-Term LNG Contracts." 14-022. RISE Working Paper. Houston.

Hauser, Philipp, and Dominik Möst. 2015. "Impact of LNG Imports and Shale Gas on a European Natural Gas Diversification Strategy." In 12th International Conference on the European Energy Market (EEM). IEEE. doi:10.1109/EEM.2015.7216720.

Henderson, James. 2016. "Gazprom – Is 2016 the Year for a Change of Pricing Strategy in Europe ?" Oxford Energy Comment. https://www.oxfordenergy.org/wpcms/wp-content/uploads/2016/02/Gazprom-Is-2016-the-Year-for-a-Change-of-Pricing-Strategy-in-Europe.pdf.

Holz, Franziska, Philipp M. Richter, and Ruud Egging. 2015. "A Global Perspective on the Future of Natural Gas: Resources, Trade, and Climate Constraints." Review of Environmental Economics and Policy 9 (1): 85–106. doi:10.1093/reep/reu016.

IEA. 2015. Medium Term Gas Report 2015. Paris: OECD.

Medlock, Kenneth Barry. 2012. "Modeling the Implications of Expanded U.S. Shale Gas Production." Energy Strategy Reviews 1 (1). Elsevier: 33–41. doi:10.1016/j.esr.2011.12.002.

Meyer, Gregory, Neil Hume, and David Sheppard. 2016. "Gas Price Tumble Comes as Markets Are Increasingly Interlinked." The Financial Times. http://www.ft.com/intl/cms/s/2/3bc0116c-e681-11e5-a09b-1f8b0d268c39.html#axzz47Csyo5u9.

Moryadee, Seksun, Steven A. Gabriel, and Hakob G. Avetisyan. 2014. "Investigating the Potential Effects of U.S. LNG Exports on Global Natural Gas Markets." Energy Strategy Reviews 2 (3-4). Elsevier Ltd: 273–88. doi:10.1016/j.esr.2013.12.004.

Neumann, Anne, and Christian Von Hirschhausen. 2015. "Natural Gas: An Overview of a Lower-Carbon Transformation Fuel." Review of Environmental Economics and Policy 9 (1): 64–84. doi:10.1093/reep/reu022.

Paik, Keun-Wook. 2015. "Sino-Russian Gas and Oil Cooperation: Entering into a New Era of Strategic Partnership?" OIES PAPER: WPM 59. Oxford.

Paton, James, and Aibing Guo. 2014. "Russia, China Add to $400 Billion Gas Deal With Accord." Bloomberg. http://www.bloomberg.com/news/articles/2014-11-10/russia-china-add-to-400-billion-gas-deal-with-accord.

Richter, Philipp M., and Franziska Holz. 2015. "All Quiet on the Eastern Front? Disruption Scenarios of Russian Natural Gas Supply to Europe." Energy Policy 80. Elsevier: 177–89. doi:10.1016/j.enpol.2015.01.024.

Rogers, Howard. 2015. The Impact of Lower Gas and Oil Prices on Global Gas and LNG Markets. The Energy Journal. Vol. 30. doi:10.5547/ISSN0195-6574-EJ-Vol30-NoSI-5.

The World Bank. 2016. "World Bank Commidty Price Data." http://www.worldbank.org/en/research/commodity-markets.

Tusk, Donald. 2014. "A United Europe Can End Russia's Energy Stranglehold." The Financial Times, April 21. http://www.ft.com/intl/ cms/s/0/91508464-c661-11e3-ba0e-00144feabdc0.html#axzz47Csyo5u9.