

GLOBAL DEVELOPMENTS IN LNG TRADING



This article is the second in a three part series and covers the ascent of the United States to becoming the world's largest producer of natural gas, its transition from a net importer historically to a net exporter for the foreseeable future, and finally the important role of shipping in facilitating that transition to being a key player in the global LNG market. We also discuss the latest developments from three key areas of Asia – Japan, Singapore and Indonesia.

United States

The United States' position in global natural gas trade before and after the shale revolution

Natural gas is traded through two methods: pipelines and LNG shipping. For its entire history, the United States has been a net importer of natural gas almost exclusively through pipelines from Canada. Mexico has also supplied natural gas to the United States through pipelines, however only in nominal amounts. Net pipeline imports grew steadily from 0.9, the levels in

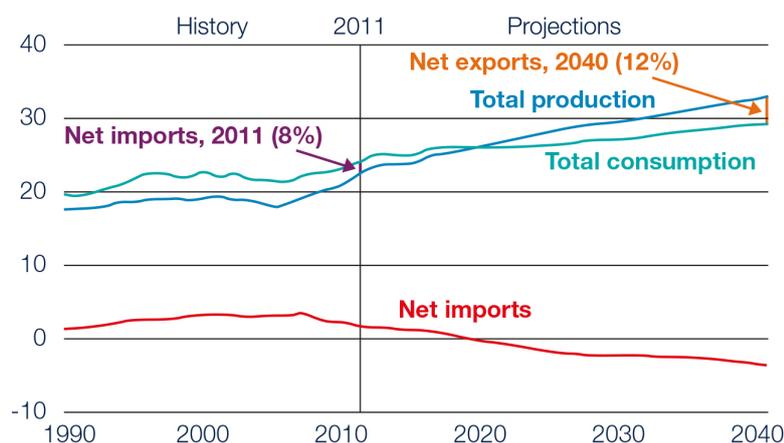
1985, to a peak in 2007 at a 5.6% compound annual growth rate. The 2007 peak turned out to be an inflection point, as net imports have fallen in 2014, showing a decline of over 60% in just seven years. This decline is a direct result of the shale revolution experienced in the natural gas exploration and production industry (E&P).

LNG trading with the United States was historically of very modest size. As natural gas demand grew, the market began to notice the potential for a substantial demand opportunity in the importation of LNG. Certain companies began the permitting and construction of LNG regasification facilities. As these facilities came on-line, LNG import growth began to rapidly accelerate. LNG imports spiked in the period from 1998 to a peak in 2007 - almost a 10-fold increase.¹ Post 2007, there was a collapse of LNG imports that closely paralleled the decline in pipeline imports. In 2014 the United States imported less LNG than it had done in the late 1990s, another industry casualty of the shale revolution.

1 http://www.eia.gov/dnav/ng/ng_move_imp_c_s1_m.htm



Total U.S. natural gas production, consumption, and net imports in the Reference case, 1990-2040 (trillion cubic feet)



The chart from the US Energy Information Administration (EIA) above² shows United States natural gas production, consumption and net imports from 1990-2040. The inflection point of net imports during 2007 is clearly shown as the red line peaks and rapidly declines. In their 2014 report, the EIA forecasts that the United States will become a net exporter of LNG as soon as 2016 and an overall net exporter of natural gas in 2018.³ The discoveries and innovations of the natural gas E&P industry during the mid-2000s forever changed the makeup of the United States' energy policy and in just 10 years the country will go from inelastic off-taker to an integral supplier of LNG.

Scale of the shale revolution (2007-present)

The geology of the United States has always been a rich depository of hydrocarbons, but the technology has not always been available to exploit it. The techniques of horizontal drilling and hydraulic fracturing have caused production from shale plays to increase significantly by 2013, reaching 40% of total US production. The shale plays that were the engine of this growth were the Marcellus in the north east, and the Barnett and Haynesville shale plays across eastern Texas and Louisiana.⁴

The technological exploitation of shale rock allowed a significant increase in both production and proved reserve estimates and the size of possible reserves is even significantly greater

than that.⁵ This amount of proved reserves places the United States as the 5th largest natural gas reserve on the planet.⁶

Planned projects

As confidence has grown that the wave of natural gas production is sustainable, there has been a rush to the door of the US Department of Energy to apply for natural gas export licenses. In 2010, Cheniere proposed the first LNG export project, which was to be a retrofit of their regasification terminals into liquefaction export terminals. As of May 2015, there are over 300 Mtpa of export capacity that are under construction, in the front end engineering design (FEED) stage of development, or simply proposed. Clearly, not all of these projects will be carried through to completion. The highest concentration of proposed facilities are in Louisiana, Texas and floating in the Gulf of Mexico.

The two factors determining which projects will sink and which projects will swim are the ability to effectively control build costs and the ability to secure long-term off-take agreements with foreign buyers.

The breakeven cost curve (US\$/mmbtu) for LNG projects globally is highly variable. The range is from US\$8/mmbtu to as high as US\$16/mmbtu. With such a wide range, it is clear to see that a project at the low end of the curve will carry a significant competitive advantage in the global market. The lowest cost options are projected to be the proposed floating LNG vessel projects.

2 <http://primis.phmsa.dot.gov/comm/LNG.htm>

3 [http://www.eia.gov/forecasts/aeo/er/pdf/0383er\(2014\).pdf](http://www.eia.gov/forecasts/aeo/er/pdf/0383er(2014).pdf)

4 http://www.eia.gov/dnav/ng/ng_prod_sum_a_EPG0_FGS_mmc_f_a.htm

5 <http://www.eia.gov/naturalgas/crudeoilreserves/pdf/usreserves.pdf>

6 http://www.bp.com/content/dam/bp/excel/Energy-Economics/statistical-review-2014/BP-Statistical_Review_of_world_energy_2014_workbook.xlsx



Export capacity of LNG from the United States is projected to grow rapidly even in the most conservative of estimations. A significant amount of shipping capacity will need to be built to transport this new supply around the world.

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The proposed liquefaction projects in the US that will be able to put a long-term offtake agreement in place will ensure their ability to successfully transition from the application or FEED stage to the final investment decision (FID) stage. The sheer size of capital commitment to build a liquefaction facility requires a level of comfort for investors to proceed with funding and solid offtake agreements supply that comfort. An inability to secure sufficient offtakers will cause much of the proposed capacity to fail to ever reach FID.

The projected growth of the LNG carrier market

Export capacity of LNG from the United States is projected to grow rapidly even in the most conservative of estimations. A significant amount of shipping capacity will need to be built to transport this new supply around the world. Using the Gulf of Mexico as

an example, an estimation of required carrier capacity is approximately 1.3 LNG carriers per 1 Mt of LNG exported from that region to potential customers.⁷ Using these assumptions, almost 100 LNG carriers will need to be employed to transport US exports abroad. At a cost of US\$250 million per carrier, the industry is looking at the potential investment of US\$25 billion to build the necessary carrier capacity.

The growth of the United States' LNG export industry is anticipated to be rapid in speed and immense in size. The opportunities to invest capital in the emerging industry will be plentiful and obvious. Liquefaction trains need to be built, new pipelines need to be installed, and a significant amount of midstream shipping capacity needs to be built to service the expected growth. In just the last decade, the United States has inverted its position in the global LNG market from one of potential offtaker to meaningful

supplier, and the next few years will provide ample opportunities for HFW's clients to participate and grow alongside this new market.

This rapid expansion obviously creates a wealth of opportunities in the supply chain and at HFW we have experience throughout the process, from the contracts for the construction of the vessel, to their chartering and the sale and purchase of the LNG, including any adverse incidents relating to the supply.

⁷ <http://www.total.com/en/energies-expertise/oil-gas/exploration-production/strategic-sectors/lng/expertise/shipping?%FFbw=kludge1%FF>



Japan

It was reported by Reuters that Japan's JERA Co. is set to become the world's biggest buyer of liquefied natural gas (LNG) next year and reduce the amount of gas it purchases on long-term contracts.

JERA is a joint venture between Tokyo Electric Power (Tepco) and Chubu Electric Power which was set up to manage the fuel procurement process, and in the longer term it may take over thermal power stations.

It has more than 10 million tonnes of gas on long-term contracts that expire by around 2020 and is currently considering whether these contracts will be renewed. Any decision not to commit to further long term contracts would put pressure on future LNG projects which generally rely on the security of there being underlying long term purchase contracts.

Mid-term and short-term contracts, or spot purchases may be used as an alternative to long term contracts.

It was further reported by Reuters that JERA will surpass Korea Gas Corp as the world's single biggest buyer of LNG with annual purchases of around 40 million tonnes once it fully integrates the partners' existing contracts next summer.

Chubu Electric's unit in Houston is being lined up to commence start LNG trading activities when the Freeport LNG project, in which Chubu invests, starts export in 2018.

The full article can be found here: <http://www.reuters.com/article/2015/10/21/commodities-summit-jera-reuters-summit-p-idUSL3N12L2U420151021>

Singapore

Singapore is aiming to play a role in the pricing of LNG in Asia with a new weekly index, forming part of its ambitions to be a trading hub for LNG.

In a keynote address to Gastech 2015, Teo Eng Cheong, CEO of International Enterprise Singapore, noted the country had seen strong and steady growth in its LNG trading sector and now had more than 30 companies with a trading or business development presence.

"To support trading, you will need to have a good price discovery mechanism, and an Asian LNG price will be helpful despite the reduced tension and pressure because of the Asian premium phenomena in the past," Teo said.

To try and achieve this the Energy Market Company has launched a weekly index the FOB Singapore SGX LNG Index Group (SLInG). The index is based on weekly submissions from around 20 international LNG players offering their assessment on prices.

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"We hope that SLInG will evolve to be the Asian LNG price over time" he said. As neither a major producer or consumer of LNG Singapore was seen as well placed to play role in neutral price setting as it does for some other commodities.

Indonesia

Indonesia is reportedly expanding its LNG presence, buoyed by the rising economy and growing demand for fuel, with an LNG receiving terminal being built in Bojonegara, West Java to open in 2018 at a cost of USD\$810 million.

Tokyo Gas and Pertamina, the state-owned Indonesian oil company, will set up a joint venture to run the terminal whilst Mitsui & Co and Japan Bank for International Cooperation are expected to participate as stakeholders.

Originally reported by the Nikkei Asian Review, the full article can be found here: <http://asia.nikkei.com/Business/Deals/Tokyo-Gas-to-build-Indonesian-LNG-terminal-with-Pertamina>

Related publications

To read our first article about the rapidly developing global LNG market, please visit our website at <http://www.hfw.com/The-role-of-LNG-in-the-global-energy-sector-August-2015>



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