

U.S. Access to the Global LNG Market

by

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Abstract

This paper discusses U.S. participation in the global liquefied natural gas (LNG) market. Although recent U.S. production of natural gas is up, Canadian production is fairly stable and LNG imports by the United States have been on the rise. The current U.S. portfolio of LNG importers is described and the future prospects for each of the current importers are discussed. Changing conditions in the global marketplace have resulted in higher prices and more recent declines in U.S. importation of LNG. With temporary increases in U.S. domestic supply and transportation costs rising, the U.S. will find it increasingly difficult to compete with other global consumers of LNG. Overcapacity of regasification and high prices are pushing the industry into increased integration. Under these conditions, it seems unlikely that consumers of LNG will experience price declines. In addition, because of global reserve distribution, increased reliance on LNG may jeopardize even further U.S. energy security.

Introduction

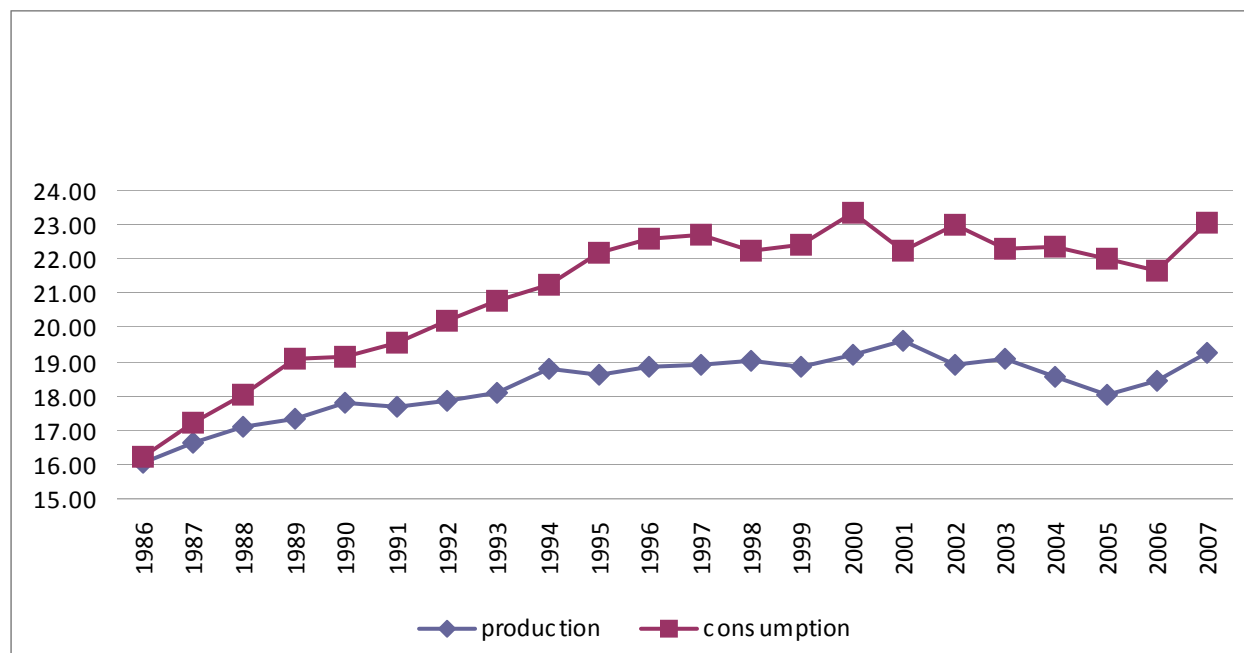
Not too long ago LNG (liquefied natural gas) was seen as the answer to the growing gap between North American production and increasing demand. Many in the energy field were clamoring for additional LNG regasification terminals in the United States. In 2002, regulatory rules were rewritten to encourage investment in these projects. We now have regasification capacity that far exceeds current and future demand projections. In 2003, Alan Greenspan predicted that LNG would create a “price-pressure safety valve” to stabilize prices in the United States (Davis and Gold, 2008).¹ But natural gas prices have

continued to rise and consumers face seasonal price levels never seen before. As Derek Brower (2006) points out “Things have changed.”² This paper describes the historical and current LNG imports of the United States and examines the feasibility of LNG filling the gap between its consumption and domestic and Canadian production.

The Gap

Figure 1 depicts the gap between domestic production and consumption of natural gas in the U.S. The largest gap of 4.15 Tcf (trillion cubic feet) occurred in 2000 and then narrowed to 2.62 Tcf during the recession of 2001. The gap widened again in 2002 and has never dropped below 3.18 Tcf. Although high gas prices have stimulated additional drilling and increased production in recent years, production has yet to reach the recent high of 2001. U.S. production peaked in 1973 (EIA, “Natural Gas Gross Withdrawals and Production,” 2008).³ Although there is general agreement amongst industry insiders that current and historical production estimates provided by the U.S. Geological Society (USGS) and Energy Information Agency (EIA) are reliably accurate, their supply projections are viewed with considerable skepticism. USGS and EIA projections are notorious for a generally consistent rosy outlook. In fact, as Richard Heinberg (2003) has pointed out in his book, *The Party’s Over*,⁴ the EIA documents its “non-technical adjustments” as being designed to equalize supply and demand projections. So although, the EIA projects total domestic production of natural gas to increase from 19.3 trillion cubic feet in 2007 to 20.56 trillion cubic feet in 2022 before declining to 20.0 trillion cubic feet in 2030 (EIA, *Annual Energy Outlook 2008*, 2008)⁵, Bill Powers (2004), editor of *Canadian Energy Viewpoint*, believes, “U.S. natural gas production has entered into a permanent and irreversible decline.”⁶ After thorough analysis of historical data on past discoveries and production and estimates of undiscovered supplies, Jean Laherrere (2003) concluded, “U.S. gas production will stay stable for a while before declining. Any growth in U.S. demand has to be filled from imports from Canada or by LNG.”⁷

Figure 1
U.S. Consumption and Domestic Production
(Tcf)



Source: U.S. Department of Energy (DOE) Energy Information Administration (EIA), U.S. Dry Natural Gas Production and U.S. Natural Gas Total Consumption, available at <http://tonto.eia.doe.gov/dnav/ng/hist/n9070us2a.htm> and <http://tonto.eia.doe.gov/dnav/ng/hist/n9140us2a.htm>.

Under investment in global energy supply has been the mantra of the International Energy Agency (IEA) over the past several years. However, in its World Energy Outlook (WEO) for 2006, IEA has revised average annual growth for natural gas downward to 2.0 percent, as compared to 2.6 percent during 1980-2004, slightly lower than the WEO-2005. These projections were scaled downwards because of rising price assumptions and growing concerns of supply security. Because of the geographical mismatch between reserves and demand, inter-regional gas trade is expected to expand faster than production. LNG exports to Europe and North America are expected to account for most of this increased trade. Most of the gas-supply infrastructure spending is expected to occur in North America, on maintenance of current capacity. Fifty-six percent of global spending occurs upstream and

most of that investment up until 2010 is already committed. After 2010, it is uncertain that sufficient investment will occur in the producing regions to enable the expected growth in LNG exports.⁸

Canada, the knight in tarnished armor?

U.S. imports of natural gas have been steadily increasing since 1987 (EIA, “U.S. Natural Gas Imports by Country,” 2008).⁹ The vast majority of imported gas arrives via pipeline from Canada. Although Canada is the only country in North America with production exceeding consumption, some Canadians are questioning the long-term consequences of exporting increasing amounts of their natural gas to their southern neighbor. Chapter Six of NAFTA, known as the proportional sharing agreement, was not signed by Mexico. It requires Canada to export its oil and gas to the United States in the same proportion as an average of the last three years, until its reserves are exhausted. Since Canada exported 54 percent of its production to the United States, that means that as production declines, Canada must still export around 54 percent of this declining production.

Although Canada is the third largest producer in the world, it is ranked 19th for reserves. Its reserve to production ratio is 8.6 (EIA, *Canada Country Analysis Brief*, 2008).¹⁰ Canadian production peaked in 2002 at 6.631 Tcf. Production in 2006 was 6.548 Tcf (EIA, “World Dry Natural Gas Production,” 2008).¹¹ Even though high prices have stimulated well drilling activity, production per well has drastically decreased. Production per well drilled has fallen from .69 Bcf in 2002 to .38 Bcf in 2004 (Natural Resources Canada, 2002-2005).¹² Nearly 80 percent of Canada’s natural gas output has occurred in Alberta (EIA, *Canada Country Analysis Brief*, 2005).¹³ However, analysts forecast minimal growth for natural gas production in western Canada. A report by Canada’s National Energy Board indicates that new shallow gas wells are producing 45 percent less than wells drilled five years ago in the Western Canadian Sedimentary Basin (WCSB) (EIA, *Canada Country Analysis Brief*, 2004).¹⁴ The decline rate in the WCSB has been offset by the Lady Fern discovery, but production peaked in 2002 and the pool will be depleted at a rate faster than expected. In 2003, Shell downgraded the reserve base of the Sable Offshore Energy Project by 11 percent. Analysts also remain skeptical of Nova Scotia’s offshore

potential (EIA, *Canada Country Analysis Brief*, 2004).¹⁵ All this calls into question Canada's ability to increase production and exports to the U.S. in the long run.

Rising demand will also exert pressure on the Canadian natural gas market. Dalton McGuinty, the Premier of Ontario, made a campaign promise to shut down Ontario's coal-fired power plants by 2007 (Powers, 2004)¹⁶. As coal-fired plants shut down, additional natural gas will be necessary for electricity generation. In addition, the oil sands projects in Alberta are heavily dependent on large amounts of natural gas. Rob Woronuk, a senior analyst with the Canadian Gas Potential Committee, an independent resource assessment body in Calgary, observes, "One of the sad realities is that North America is natural gas impoverished." Dave Hughes, a geologist with Natural Resources Canada, says, "Canada is unlikely to be able to fill the supply gap." (Nikiforuk, 2004).¹⁷ The Canadian National Energy Board indicates that it will be increasingly difficult for Canada to sustain and replace Canadian natural gas production (NPC, 2003).¹⁸ In the future with U.S. natural gas production falling, Canadian reserves and production declining, and Mexico a net importer, increasing natural gas demand will have to be met by supplies from outside North America in the form of Liquefied Natural Gas. In 1995, 99 percent of U.S. natural gas imports came from Canada. That percentage was 82 in 2007 (EIA, "U.S. Natural Gas Imports by Country," 2008).¹⁹ An increasing proportion of U.S. natural gas supply is being imported as liquefied natural gas (LNG).

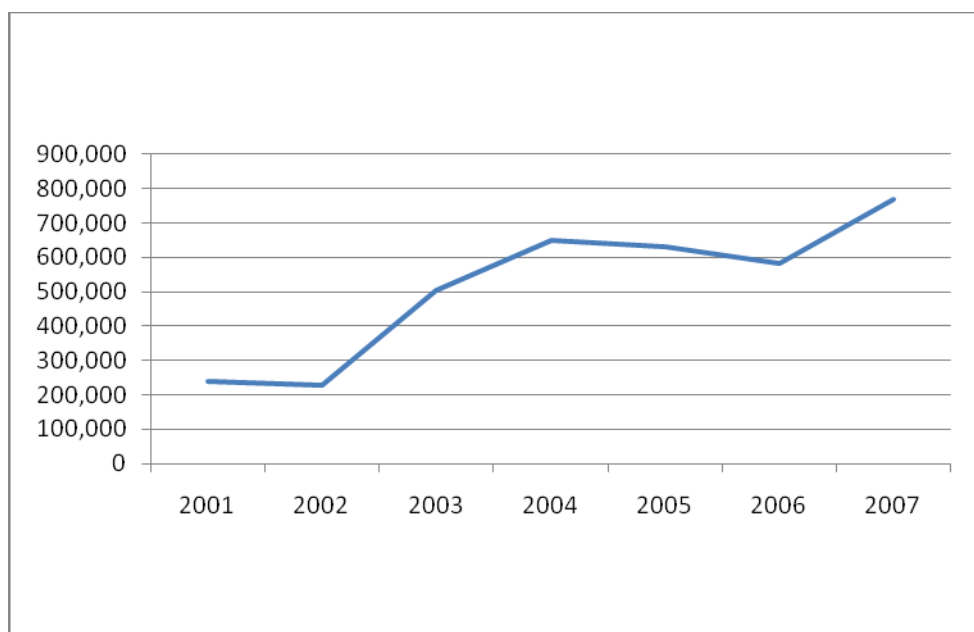
Current LNG Imports

Most of the world's natural gas reserves are located in geographically remote regions. LNG requires a complex and extremely expensive infrastructure to link the source to final consumption. Natural gas is transformed to LNG by cooling it to about minus 260 degrees Fahrenheit in order to reduce its volume (liquefaction). It can then be shipped overseas in tankers and offloaded at regasification terminals where it is distributed into the pipeline system of the importing country. All the links of the chain must work together for natural gas to be processed, liquefied, transported, regasified, and delivered

to customers. Not long ago, LNG was too expensive for the U.S. market. However, with soaring prices and technology reducing production costs, it has become an economically viable option.

Figure 2 depicts the increasing volumes of LNG imported by the United States since 2001. The liquefied natural gas (LNG) portion of U.S. imports rose sharply (120%) in 2003 in response to the price spike of wellhead gas. Although volumes tapered off after 2004, imports reached a new peak during 2007 of 770.8 billion cubic feet (EIA, “U.S. Natural Gas Imports by Country,” 2008).²⁰ This amount represents a 32 percent increase over last year’s total and an 18 percent increase over the peak of 2004.

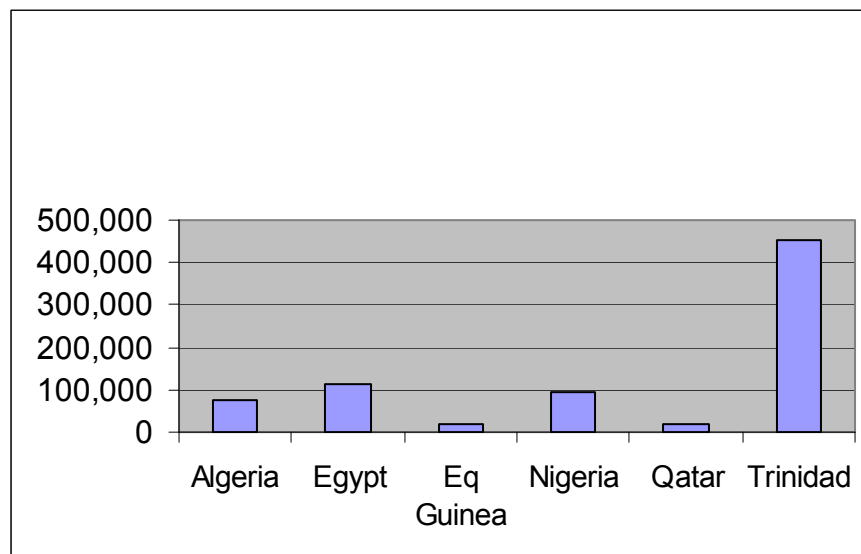
Figure 2
U.S. Imported LNG Volumes
(MMcf)



Source: U.S. Department of Energy (DOE) Energy Information Administration (EIA), U.S. Natural Gas Imports by Country, available at http://tonto.eia.doe.gov/dnav/ng/ng_move_imp_c_s1_a.htm.

The portfolio of LNG importing countries for 2007 is depicted in Figure 3. Although adding small amounts, Qatar and Equatorial Guinea were added to the 2006 portfolio. The United States received LNG from Qatar for the first time in 1999. After a year of no imports, they resumed again in

Figure 3
U.S. LNG Portfolio 2007
(MMcf)



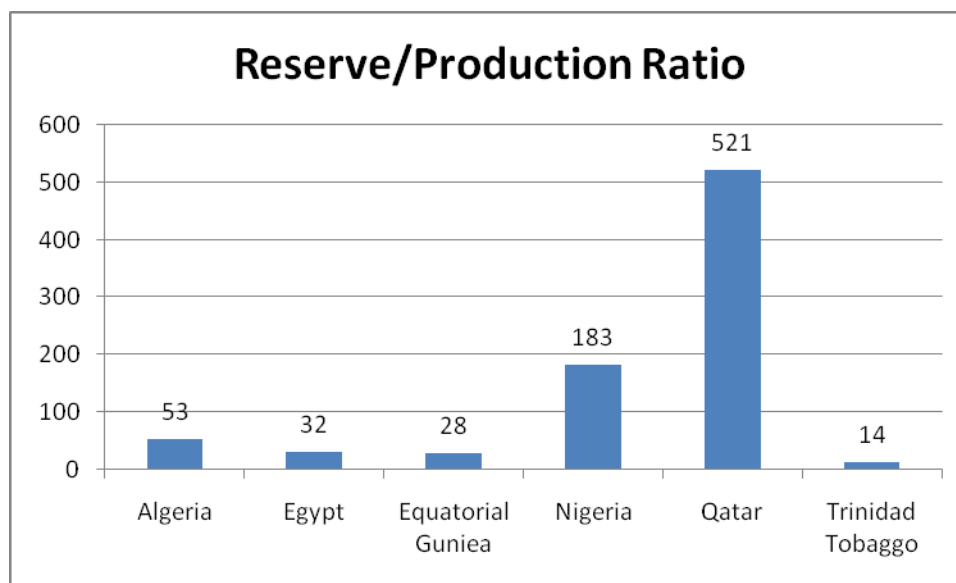
Source: U.S. Department of Energy (DOE) Energy Information Administration (EIA), U.S. Natural Gas Imports by Country, available at http://tonto.eia.doe.gov/dnav/ng/ng_move_imp_c_s1_a.htm.

2007 but the 2007 volume is still only 40 percent of the maximum import volume from Qatar in 2000. In 2005 U.S. imports represented two percent of Qatar's LNG exports. Qatar has the third highest natural gas reserves in the world behind Russia and Iran. However, imports from Qatar represent a low percentage of the U.S. portfolio and Qatar is not considering expansion until 2013 when it plans to reassess its production options. Equatorial Guinea started up its LNG operations in 2007 and also represents a small percentage of the U.S. portfolio. LNG exports to the United States represent five percent of Equatorial Guinea's LNG exports (EIA, "U.S. Natural Gas Imports by Country," and "World Dry Natural Gas Exports," 2007).²¹

Trinidad and Tobago imports represented 75 percent of U.S. LNG imports in 2003 and 58 percent in 2007 (EIA, "U.S. Natural Gas Imports by Country," 2008).²² Global competition for LNG intensified

late last year when Spain lost hydroelectric capacity because of drought. Spain generally depends on Algeria and Egypt for LNG imports but these countries were shipping to Japan, which was willing to pay twice the going price in Spain (Davis and Gold, 2008).²³ Spain entered the lower priced Trinidad and Tobago market resulting in less for the United States. U.S. shipments from Trinidad and Tobago during the first two months of the year are down 34% from this same period last Year (EIA, “U.S. Natural Gas Imports by Country,” 2008).²⁴ In addition, Trinidad and Tobago reported a decline of 7 trillion cubic feet in 2006 bringing its reserves down to 18.77 trillion cubic feet, (Radler, 2006)²⁵ giving it the lowest reserve to production ratio of U.S. importers (figure 4). Trinidad and Tobago may no longer serve as a cheap, uncontested source for the United States.

Figure 4
Reserve/Production Ratio
(Tcf)



Source: Reserves: PennWell Corporation, *Oil & Gas Journal*, Vol. 104.47 (December 18, 2006). U.S. Department of Energy (DOE) Energy Information Administration (EIA), World Dry Natural Gas Production, Most Recent Annual Estimates, 1980-2007, available at <http://www.eia.doe.gov/emeu/international/RecentNaturalGasProductionTCF.xls>.

The United States has been importing natural gas from Algeria since the 1970s. Imports from Algeria fell off dramatically in 2006 but increased by more than 400 percent in 2007. However, the U.S. share of Algerian exports has diminished from nearly 8 percent in 1990 to slightly over 4 percent in 2005. Egypt started exporting LNG to the United States in 2005. There was a substantial increase in 2006 followed by a slight decrease in 2007 (EIA, “U.S. Natural Gas Imports by Country,” 2008).²⁶

LNG imports from Nigeria have increased dramatically in the past two years but there is supply uncertainty due to continued political unrest. Nigeria has become the second largest provider of U.S. LNG. However, just like Trinidad and Tobago, the U.S. percentage of Nigerian exports is falling—slightly above 6 percent in 2000 to slightly under 2 percent in 2005 (EIA, “U.S. Natural Gas Imports by Country,” 2008).²⁷ Nigeria is in the process of implementing “The Gas Master Plan Initiative” to more evenly balance domestic needs with exports. Most of Nigerian production goes to the Bonny LNG export project and lesser volumes to the domestic industrial and power consumers. Despite its large gas reserves, Nigeria has little gas-fired power generation capacity, which constrains economic growth. One reason for this is the inability of the power sector to outbid the cement manufacturers and LNG exporters. Another problem is the lack of developed reserves. The initiative stipulates that a certain volume of *newly developed supply* would be dedicated to the domestic market, perhaps insinuating that the existing LNG production would be exempt from the domestic supply condition. Discounts on domestic gas would also be eliminated over a period of several years making domestic sales more attractive to the international field operators. Another unresolved issue is the level of funding the Nigerian government will provide to gas development projects as compared to ownership claims (“Balancing Nigeria’s home, export markets,” 2008).²⁸

U.S. percentage of exports from its two major long-time suppliers is falling. Although the United States has increased its LNG consumption by picking up new importers such as Egypt and Equatorial Guinea and increasing imports from Nigeria it is uncertain whether those volumes can be maintained or increased without a considerable increase in willingness to pay.

In July, an earthquake cast doubt on the ability of the largest Japanese nuclear complex to safely withstand such events and there was a massive eastward swing in supply. Volumes shipped to the United States fell off dramatically and continued below the monthly volumes of 2007 (EIA, U.S. Liquefied Natural Gas Imports,” 2008).²⁹ In December, U.S. imports averaged 1 Bcf/d, less than one-fifth of existing terminal capacity (“Topsy turvy US LNG import record year,” 2008).³⁰ U.S. imports remain under one-third of year-ago levels and market sources say that most available cargos are going to Asia (“Market insight: LNG market nuances,” 2008).³¹ Overall, U.S. Imports of LNG have fallen over the past nine months to a five-year low (Davis and Gold, 2008).³²

Excess Capacity

Prior to 2008, there were five LNG receiving points in the United States—the four onshore terminals operating in Everett, Massachusetts, Cove Point, Maryland, Elba Island, Georgia, and Lake Charles, Louisiana and the Gulf Gateway Energy Bridge, Deepwater Port, an offshore terminal in the Gulf of Mexico which started receiving shipments in 2005. The combined total peak capacity for these facilities is above 5.8 billion cubic feet per day (EIA, *International Energy Outlook*, 2007).³³ Since 2002, two regulatory rules were passed to encourage the construction of regasification terminals. Three of the four onshore terminals that were built decades ago are subject to open access regulation. But the Hackberry Decision terminated open access requirements for LNG terminals. Terminals are also no longer subject to regulatory pricing.

Five additional U.S. import terminals are expected to come on line between 2008 and 2009—the offshore buoy, Northeast Gateway near Boston, and four terminals in the Gulf of Mexico. The Northeast Gateway commenced operations on May 20, 2008. The new Freeport LNG terminal operated by ConocoPhillips is to receive its second and last commissioning cargo in May and then start commercial operations in June. In addition to the five new domestic terminals, Canada’s first LNG import facility is expected to come on line sometime in 2008. Canaport, which will serve both U.S. and Canadian markets,

is located in New Brunswick. Initial send-out capacity will be 1 Bcf/d (Canaport Webpage, 2008).³⁴ According to *World Gas Intelligence*, the five new terminals will have regasification capacity exceeding 6.5 Bcf/d, “but committed supplies are miniscule.” (“Topsy turvy US LNG import record year,” 2008)³⁵ Costa Azul located in Baja California Mexico is expected to come on line this year with average production capacity of 1 Bcf/d (California Energy Commission, 2008).³⁶ California will receive half of this volume via pipeline (Helman, 2007).³⁷ That will put total U.S. daily LNG capacity up to nearly 15 Bcf/d.

Overall capacity far exceeds DOE’s projected LNG imports of 2.9 trillion cubic feet for the United States in the year 2030 (EIA, *Annual Energy Outlook 2008*, 2008).³⁸ This projection is down 36 percent from the 2007 projection of 4.5 trillion cubic feet (EIA, *Annual Energy Outlook 2007*, 2007).³⁹ This number has been revised downward for several reasons—lower demand due to higher prices, productivity improvements, lower economic growth and faster projected growth in the use of renewable energy (EIA, *Annual Energy Outlook 2008*, 2008).⁴⁰ The EIA is not alone in reducing their gas demand projections. The International Energy Agency has also reduced its gas demand estimates. Jensen Associates (2007) forecasts North America demand to be 10.13 Bcf/d in its 2020 Base Case,⁴¹ less than U.S capacity for 2008, not to mention all the new capacity planned in the United States, Mexico and Canada.

Uncertain Supply

Europe has even more import capacity than the United States, with at least 15 operational terminals located across eight countries. Based on existing capacity, terminals under construction, approved or that have applied for approval, world regasification will be 448.2 Bcm/yr at the end of 2008. Liquefaction capacity will rise to 254.1 Bcm/yr resulting in a 1.76 ratio of regasification to liquefaction. Despite this ratio there are many more LNG regasification facilities on the drawing boards for both North America and Europe. By 2013, this ratio is expected to climb to 3.22. Based on the same criteria,

regasification capacity will be 131.55 Bcm/yr and liquefaction capacity of 419.1 Bcm/yr (LNG regas capacity is outstripping new liquefaction plant at a rapid rate,” 2008).⁴² The problem is upstream. As Jensen points out, “Terminals are the tail--the dog is upstream.” LNG delivery requires a long expensive chain of capital investment in which regasification terminals are a relatively minor link, 10-15 percent of the capital expenditure. Upstream investments are huge, requiring long lead times, lumpy supply additions and complex negotiations among the various stakeholders in the project (Jensen, 2006).⁴³ According to the IEA, investment of \$520 billion by 2010 will be needed to meet forecast demand growth. But just \$210 billion has been put to work (Brower, 2006).⁴⁴

Some delays in new supply are related to environmental concerns such as Australia’s Gorgon LNG project. National Oil Companies are being blamed for delaying supply projects as well. Nigeria has been slow in building capacity and the role of the state-owned Nigerian National Petroleum Corporation in the proposed Olokola LNG project adds additional uncertainty and delay in supply expansion. Nigeria is crucial to U.S. gas security given that much of the incremental production in the Atlantic basin will come from Nigeria. In addition, local politics are constraining supply as Egypt, Algeria, the UAE and Qatar rationally consider the needs of gas for indigenous economic development against LNG exports to foreign industry (Brower, 2006).⁴⁵

Russia has the largest reserves in the world, representing 27 percent of the total. Russia currently exports natural gas to the Commonwealth Independent States, the European Union (EU), Turkey and Asia. Gazprom has recently announced that it wants to provide a quarter of the world’s LNG by 2030. The Sakhalin-2 project, now led by Gazprom in partnership with Royal Dutch Shell and a Japanese consortium tops the list as a supply source. That two-train, 9.6 million ton/yr project is set to start LNG exports early in 2009. Most of this will be sold on a long-term basis to Japanese utilities. The first LNG production from Shtokman isn’t expected before 2013 (“Gazprom talks big LNG—now the walk,” 2008).⁴⁶ Shtokman field is a super giant natural gas field with almost 60 percent of the natural gas

reserves of the entire United States, but it is located 300 miles offshore in the Barents Sea under shifting ice (Brower, 2006).⁴⁷ At this point it is difficult to tell if Russia will be able to reach its 2030 target.

Currently, the four major producers hold similar market shares and together provide 60 percent of world supply. The major producers include Indonesia, Malaysia, Qatar and Algeria. The second league producers include Australia, Trinidad and Tobago and Nigeria. The smaller producers include Oman, Brunei, UAE, and Egypt. The United States and Libya have minor production. Qatar with the third largest natural gas reserves in the world is poised to overtake Indonesia as the largest producer but is postponing any expansion plans until 2013. Nigeria could become the number two producer if political obstacles are overcome and expansion plans move forward (Quinlan, 2007).⁴⁸

In the long run, supply of LNG could become highly concentrated and could easily evolve into the cartel situation currently found in the petroleum market. As mentioned above, Russia has 27 percent of world gas reserves. Second greatest reserves are located in Iran with nearly 16 percent. Along with Qatar with nearly 15 percent, these three countries possess nearly 60 percent of world reserves (Quinlan, 2007).⁴⁹ LNG potential may be limited if the emphasis shifts to pipeline exports to the EU, China and India.

A Global Marketplace

As domestic and Canadian production declines, the United States will be forced to increase its participation in the global market for LNG. And this global market is a seller's market with increasing demand and very inelastic short-run supply. A seller's market is expected to persist at least until 2013 (Harris, 2006).⁵⁰ Regasification capacity is no longer and perhaps never was the constraining factor for U.S. LNG imports. The constraint now is willingness to pay.

The global LNG market has traditionally been divided into two markets—the Atlantic and Pacific Basins. Production and consumption occur in both basins. Japan and South Korea who have no

indigenous supply are the largest consumers in the Pacific Basin. Indonesia and Malaysia are the largest producers. Europe is the largest consumer in the Atlantic market but North American demand will continue to grow in the future as U.S. and Canadian production fall. North America is an anomaly, in that it belongs to both market basins—the east belongs to the Atlantic market as a consumer and the west belongs to the Pacific market participating as both a producer (Alaska to Japan) and as a consumer (California and Mexico). There are many producers in the Atlantic Basin. Nigeria is expected to provide much of the future incremental supply in the Atlantic. The Pacific Basin market has a long history of LNG trade and the bulk of LNG trade has occurred in this basin. LNG volumes imported by the Pacific Basin, Europe and North America in 2006, were 4,959, 1,998 and 631 Bcf respectively (EIA, “World LNG Imports by Origin,” 2007).⁵¹

Because LNG projects demand high capital investments, producers have traditionally secured long-term contracts to guarantee cost recovery and mitigate exposure to price risk. Most of the LNG contracts in the Pacific Basin are long-term. However, short-term contracts are becoming increasingly common as producers favor the flexibility to take advantage of the highest netbacks in a market of tight supply. In the Atlantic Basin in 2004, short-term contracts represented more than 70 percent of all U.S. LNG imports, compared to 25 percent in 1988. The Atlantic market is becoming much more liquid, as prices on both sides of the Atlantic are based on transparent gas indices, such as the Henry Hub and Zeebrugge (Davis and Gold, 2008).⁵²

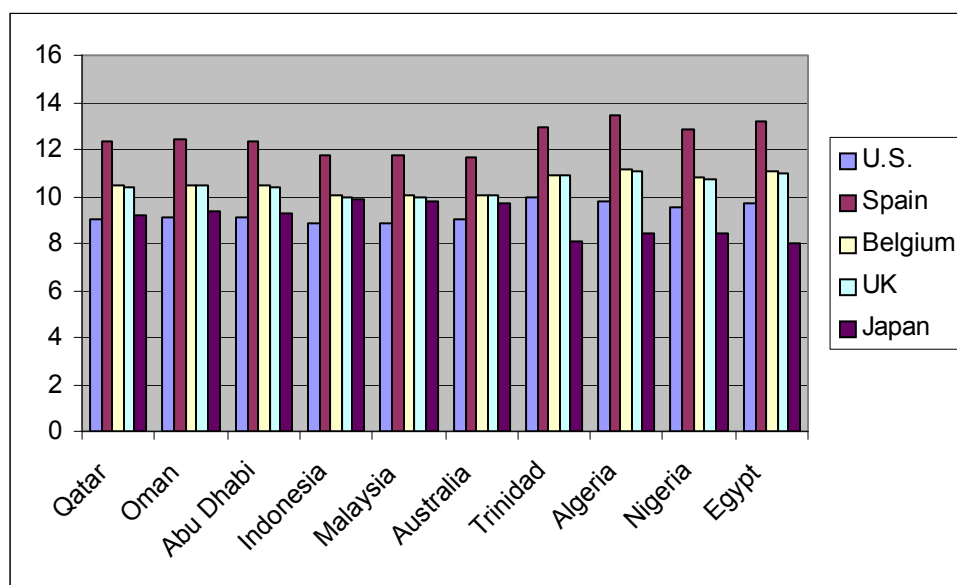
The Atlantic Basin has become the major arbitrage market, with cargos from Nigeria and Trinidad and Tobago shifting between the United States and Spain. The Middle East has recently emerged as a swing producer between the two basins providing both long-term contracts to Asia and short-term contracts to either basin depending on price. Although U.S. and European demand and regasification capacity are growing, Japan and South Korea make up just over half of the world’s total regasification capacity. Utilization at regasification terminals runs at an average of about 50-60 percent, indicating that the lack of new construction is not a barrier to increased imports for the next five years.

However, based on new construction plans, that capacity utilization could diminish to 18 percent by 2013 (LNG regas capacity is outstripping new liquefaction plant at rapid rate,” 2008).⁵³

The United States faces substantial price competition for LNG shipments. One way to measure the pull of destination markets is to look at producer netbacks. The netback for LNG exports is calculated by: revenues from downstream sales, less costs associated with bringing the commodity to market, excluding production and liquefaction costs. The largest cost included in the netback calculation is the cost of transportation. LNG exporters will ship spot cargoes to those import terminals with access to markets offering the highest netback.

Figure 5 below provides the netbacks at receiving terminals for spring of 2008. The highest netback available at any U.S. receiving point goes to Trinidad and Tobago. However the netbacks to Trinidad and Tobago are higher from receiving points in Spain, Belgium and the United Kingdom.

Figure 5
Netbacks
(\$/MMBtu)



Source: **World Gas Intelligence** 19.18 (April 30, 2008): p. 6.

European pricing has at most times been significantly higher than the U.S. market prices. Pacific buyers such as Japan and Korea with no domestic supply are willing to sign long-term, high-volume take-or-pay contracts and have been successfully bidding Middle Eastern gas away from the Atlantic Basin market. U.S. imports are under one-third of year-ago levels, and market sources report that most available cargoes are going to Asia, where spot supply still sells for around \$13/MMBtu. In Europe, Spain remains the center of activity, with April and May cargoes fetching \$12-\$13/MMBtu (“Balancing Nigeria’s home, export markets,” 2008).⁵⁴ With increasing oil prices and therefore rising transportation costs, the United States will have to offer much higher prices to compete successfully in the world market for LNG.

Cheniere Energy has decided to sell its Sabine Pass LNG receiving terminal located in Louisiana because long-term supply cannot be secured (Independent U.S. LNG terminal plot thickens,” 2008).⁵⁵ In order to compete under these new market conditions, BG Group has attempted to become an international integrated gas company. BG has become involved in both the upstream, through gasification projects in Egypt and downstream through its capacity rights in two U.S. import terminals. Shell, Total and others have adopted a similar strategy, getting involved at both ends of the LNG supply chain (Brower, 2006).⁵⁶ Upstream and downstream integration, acquisition of a diversified portfolio of LNG projects across the three regional producing regions and ownership of undedicated tankers in order to take advantage of price arbitrage would require huge capital expenditures only possible the modern gas equivalent of the “Five Sisters”—BP, ChevronTexaco, ExxonMobil, Shell and TotalFinaElf (Jensen, 2003).⁵⁷

ExxonMobil the largest private-sector participant in the LNG market had sales, including its joint ventures of 27 m tonnes of LNG in 2005 and predicts that figure to rise to 80 m tonnes/y by 2015. The supermajor claims to participate in about 20% of the industry’s capacity. BP does not give its sales figure, but says its equity interests add up to 8.5 m tonnes, while Total is estimated to have had LNG sales of 7.5 m tonnes and BG says it produced 4.1 m tonnes in 2005. Challenges also come from the regional

majors such as Repsol and Eni and the large gas producers—Russia’s Gazprom, Norway’s Statoil and Algeria’s Sonatrach (Quinlan, 2007).⁵⁸

Conclusion

In 2003, Alan Greenspan predicted that LNG would create a “price-pressure safety valve” to stabilize prices in the United States (Davis and Gold, 2008).⁵⁹ In 2006, forecasters were predicting LNG as a price taker among fuel options for power generation in North America due to its relatively low delivered and regasified cost (Donnelly, 2006).⁶⁰ As Derek Brower (2006) points out “Things have changed.”⁶¹ Natural gas prices have continued to climb and consumers face seasonal price levels never seen before. Even as domestic supply increased, prices have continued to rise. Some predict that increased competition will lead to price convergence and increased stability (Niles, 2007).⁶² Others warn of increased volatility as sellers can more easily divert shipments to the highest netback. In addition, U.S. gas is much cheaper than it has historically been relative to crude oil. Until 2004, the price for a barrel of oil was roughly the same as the price of 6,000 cubic feet of gas, the equivalent amount of energy. Now oil is almost double the price of gas on that basis (Davis and Gold, 2008).⁶³ Although LNG as a percentage of world production has increased from 21 percent in 1993 to 29 percent in the preliminary estimate for 2006 production, (EIA, “World Dry Natural Gas Production,” 2008 and “World LNG Imports by Origin,” 2007)⁶⁴ it is difficult to predict whether LNG production will continue to increase at that rate as more pipeline projects come on line and more gas is devoted to domestic consumption in the producing nations. The recent increase in U.S. domestic production of natural gas is temporary and as LNG reliance increases, the United States could face high volatile prices not only for petroleum but for natural gas as well.

In light of current overcapacity, building additional LNG receiving terminals may not be economically feasible (Sabine Pass). Looking forward, the physical and market conditions for natural gas look very reminiscent of the petroleum situation faced by the United States thirty years ago. Does the United States want to expand its foreign dependency beyond petroleum into natural gas as well? Tam

Hunt, Director of Energy Programs for the Community Environmental Council in California asks this very question as it relates to California. In his 2006 two-part paper he argues that energy efficiency and conservation goals, the Renewable Portfolio Standard, and community choice aggregation would greatly reduce the demand for natural gas. He further argues that energy policy focused on expanding LNG capacity may preclude the pursuit of more preferable options such as renewables and increased efficiency and is a less desirable focus from an environmental and energy security perspective (Hunt, 2006).⁶⁵ Even Boone Pickens, long-time veteran of the oil industry, advises the United States to move towards energy independence with more reliance on wind and solar (Pickens, 2008).⁶⁶

With the super-majors moving towards increased integration, and with Europe and North America become increasingly dependent on LNG, the movement towards a liberalized competitive natural gas market will fade into a passing fantasy. In addition, 60 percent of natural gas reserves are concentrated in three countries, two of which may not be the most congenial of trading partners. Russia has already revealed its willingness to withhold natural gas supply based on political disagreements. In the long run, Europe and North America could become hostage to yet another vital energy source.

¹ Davis, Ann and Russell Gold, "Surge in Natural Gas Pice Stoked by New Global Trade; Further Gains likely despite 93% Spike; Bidding with Japan," *Wall Street Journal* (April 18, 2008), p. A.1.

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