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CURRENT STATUS AND PROSPECTS FOR LNG IN THE UNECE REGION

CHAPTER ONE: LNG MARKET

1. Introduction

1.1. Purpose of chapter

This chapter provides an overview of world LNG markets in terms of supply, demand, infrastructure, transportation capacity, and developing trade. The goal is to provide a consistent underlying basis of assumptions for subsequent portions of this report dealing broadly with the LNG chain, LNG-related regulatory structures, and important physical and operating considerations.

In recent years, numerous studies, reports, compendia, forecasts and surveys have been issued on the subject of global LNG and natural gas markets, both published and unpublished. To be clear, it is not the purpose of this chapter to add yet another report to that list, but rather, to make use of the most recent and robust studies to accomplish the goal of providing the required overview.

A key element of the discussion in this chapter is an assessment of the formative events and developments that have shaped global LNG supply and demand in recent years, such as the Japanese nuclear outage that occurred following the disastrous Fukushima accident in March 2011 and recent dramatic shale gas production increases in North America. It is a matter of concern in this report to impart an understanding of the extent and durability of these and other impacts.

In summary, this chapter provides a compendium of baseline LNG market intelligence available as of early 2014, or as close as possible to that date as enabled by available data.

1.2. Organization: Narrative and Appendices

LNG markets are, fundamentally, a subset of world natural gas markets, thus this chapter necessarily includes some discussion of the status and direction of world gas markets. With the continual and deep effort put into the subject of natural gas markets by the International Energy Agency and other groups, public and private, however, the subject of overall gas markets cannot be adequately treated in this report, apart from general information in the appendices. Instead, the discussion here focuses on furnishing a review of the status and direction of regional and global LNG supply and predominant issues relating specific to LNG.

1.3. Definitions – Country groups

For purposes of gathering information about the worldwide natural gas and LNG industry, and LNG trade, countries and continents are segmented into the following categories – Europe, Eurasia, Middle East and North Africa ("MENA"), Central and Southern Africa, Pacific Asia, North America, and Central and South America. All listings below are in alphabetical order.

1.3.1. Europe

The European Union (EU), the International Energy Agency (IEA) and the UN Economic Commission (UNECE) each produce energy statistics and economic forecasts relating to Europe, but Europe is defined differently in each case. Consequently, each group of countries comprising Europe is listed below.

UNECE (Europe) - 38	EU 28	OECD (Europe) - 23
Albania	Austria	Austria
Andorra	Belgium	Belgium
Austria	Bulgaria	Czech Republic
Belgium	Croatia	Denmark
Bosnia and Herzegovina	Cyprus	Finland
Bulgaria	Czech Republic	France
Croatia	Denmark	Germany
Cyprus	Estonia	Greece
Czech Republic	Finland	Hungary
Denmark	France	Iceland
Finland	Germany	Ireland
France	Greece	Italy
Germany	Hungary	Luxembourg
Greece	Ireland	Netherlands
Hungary	Italy	Norway
Iceland	Latvia	Poland
Ireland	Lithuania	Portugal
Italy	Luxembourg	Slovak Republic
Liechtenstein	Malta	Spain
Luxembourg	Netherlands	Sweden
Macedonia	Poland	Switzerland
Malta	Portugal	Turkey
Monaco	Romania	United Kingdom
Montenegro	Slovakia	
Netherlands	Slovenia	
Norway	Spain	
Poland	Sweden	

Portugal	United Kingdom	
Romania		
San Marino		
Serbia		
Slovakia		
Slovenia		
Spain		
Sweden		
Switzerland		
Turkey		
United Kingdom		

1.3.2. Eurasia

Eurasia as used in this report consists of the 15 republics of the former Soviet Union. Each country is a member of the UNECE, as listed below.

Armenia	Kazakhstan	Russian Federation
Azerbaijan	Kyrgyzstan	Tajikistan
Belarus	Latvia	Turkmenistan
Estonia	Lithuania	Ukraine
Georgia	Moldova	Uzbekistan

1.3.3. The Middle East and North Africa ("MENA")

From a perspective of data gathering in the natural gas and LNG industries, the 19 countries of the Mediterranean and Persian Gulf States are listed below.

Algeria	Kuwait	Saudi Arabia
Bahrain	Lebanon	Syria
Egypt	Libya	Tunisia

Iran	Morocco	United Arab Emirates
Iraq	Oman	Yemen
Israel	Palestinian Authority	
Jordan	Qatar	

1.3.4. Central and Southern Africa

All countries in the African continent are included in this category, except those included in the MENA region, defined above. This region includes:

Angola	Gabon	Reunion
Benin	Gambia	Rwanda
Botswana	Ghana	Saint Helena
Burkina Faso	Guinea	Sao Tome and Principe
Burundi	Guinea-Bissau	Senegal
Cameroon	Kenya	Seychelles
Cape Verde	Lesotho	Sierra Leone
Central African Repub.	Liberia	Somalia
Chad	Madagascar	South Africa
Comoros	Malawi	Sudan
Congo (Brazzaville)	Mali	Swaziland
Congo (Kinshasa)	Mauritania	Tanzania
Cote d'Ivoire	Mauritius	Togo
Djibouti	Mozambique	Uganda
Equatorial Guinea	Namibia	Western Sahara
Eritrea	Niger	Zambia
Ethiopia	Nigeria	Zimbabwe

1.3.5. Asia Pacific

Countries in the Asia Pacific region include those listed below. It can be seen that this region extends across the Asian Continent in all areas except the Middle East (included in the MENA region) and Eurasia, as follows:

Afghanistan	Indonesia	Pakistan
Amer. Samoa	Japan	Papua New Guinea
Australia	Kiribati	Philippines
Bangladesh	Korea, North	Samoa
Bhutan	Korea, South	Singapore
Brunei	Laos	Solomon Islands
Myanmar	Macau	Sri Lanka
Cambodia	Malaysia	Taiwan

China	Maldives	Thailand
Cook Islands	Mongolia	East Timor
Fiji	Nauru	Tonga
French Polynesia	Nepal	US Pacific Islands
Guam	New Caledonia	Vanuatu
Hong Kong	New Zealand	Vietnam
India	Niue	Wake Island

1.3.6. North America

Countries in North America are listed below:

Bermuda	Mexico
Canada	St. Pierre & Miquelon
Greenland	United States

1.3.7. Central and South America

Countries in Central and South America are listed below:

Antigua & Barbuda	Ecuador	Panama
Argentina	El Salvador	Paraguay
Aruba	Falklands/Malvinas	Peru
Bahamas	French Guiana	Puerto Rico
Barbados	Grenada	St. Kitts & Nevis
Belize	Guadeloupe	Saint Lucia
Bolivia	Guatemala	St Vincent/Grenadines
Brazil	Guyana	Suriname
Cayman Islands	Haiti	Trinidad & Tobago
Chile	Honduras	Turks & Caicos
Colombia	Jamaica	Uruguay
Costa Rica	Martinique	Venezuela
Cuba	Montserrat	Virgin Islands, US
Dominica	Netherlands Antilles	Virgin Islands, British
Dominican Republic	Nicaragua	

1.3.8. UN Economic Commission for Europe

Countries of the UNECE consist of the 38 European countries listed above, under the Europe heading, plus all Eurasian countries listed above (i.e., countries of the Former Soviet Union, FSU) and the United States and Canada.

1.4. Trading Basins

Three LNG trading basins are referred to in this Chapter – Atlantic, Middle East, and Pacific. Broadly speaking, these trading basins comprise the following country groups, and portions of groups:

- Pacific Basin includes all of Asia Pacific, as well as the Pacific coastal regions and states of North, Central and South America.
- Atlantic Basin includes Europe (however defined), North and West Africa, and the portions and states of North, Central and South America situated along, and with direct access to, the Atlantic, Gulf of Mexico, and Caribbean.
- The Middle East includes the MENA group of countries, except those in North Africa, which are included in the Atlantic Basin.

The three LNG trading basins are illustrated in Figure 1.

Figure 1 Pictorial Representation of Key LNG Trading Basins

Two observations are made with respect to the foregoing LNG trading basins.

- First, matching regions (in Section 1.3) to basins (in this Section 1.4) is not an exact science. To analyze properly LNG trading basins would require breaking up lists of countries in regions, and even breaking up individual countries in some cases, e.g., LNG trade the US takes place in both the Atlantic and Pacific basins, depending upon which coast one is considering. Likewise, Trade to western portions of India takes place in the Middle East basin, while trading along India's east coast takes place in the Pacific basin. As a result of the way LNG is traded at the present time, there is no way to avoid this complicating feature.

- Second, the definition of trading basins per se is fluid because the nature of the LNG trade is continuing to evolve. For example, completion of the Panama Canal Expansion project, presently scheduled for 2014, will change LNG trading patterns within and across the Americas, and may have the effect of redefining the LNG trading basins that are illustrated in Figure 1. Consequently, Figure 1 must be considered only a general and illustrative guide as of early 2014.

1.5. Units of Measure

Metric units of measure are used throughout this report with the exception of references to natural gas prices. As data are available, natural gas and LNG prices are given in US dollars per million British thermal units ($/MMBtu), Euro per Kcal, or UK pence per therm. LNG volumes are given in millions of tonnes per annum (mtpa) or, to facilitate comparisons in some cases, in billions of cubic meters (BCM).

2. Key Current Issues in the Global LNG Market

This section reviews LNG supply and demand at year-end 2011 in the context of two seminal developments for the marketplace – the Japan nuclear disaster, and the North American shale gas revolution.

2.1. Introduction

During the early 2010s, global gas markets experienced two overwhelming phenomena that have caused significant changes in the global LNG supply-demand balance. On one hand, the expanding development of shale gas resources in North America reached a turning point, surpassing all production expectations, as technological and programmatic innovations in drilling, marketing, management, and materials handling allowed for exploitation and commercialization of such resources in a far more economically viable manner than in previous years. On the other hand, the nuclear outages that occurred in Japan as a result of the tragic Fukushima incident of March 2011 triggered a significant rise in LNG demand not only domestically, but in the Asia Pacific region as a whole, and increasingly in the UNECE region.

While the former phenomenon, shale gas, has fostered an overflow of gas supply in North America, where LNG demand had been expected to surge by the early 2010s, the latter phenomenon lead to a quantum growth in LNG demand in Japan and neighboring countries following the steep decline of nuclear power production in the region. To some extent, these blockbuster events tended to offset one another – some LNG developed for the North American market has gone to Asia – but the industry has been fundamentally reshaped, as is discussed below.

In addition to the foregoing, other phenomena that are driving the LNG supply-demand balance globally are the following, which have contributed to an underlying, long-term increase in LNG demand:

- Economic growth and increasing reliance on gas-fired electricity generation in China and India, which are both investing in new regasification capacity and making efforts to secure long-term LNG supplies from both the Pacific and Middle East basins, including from North America;
- Economic growth in South-East Asian countries, which will before long become net importers as domestic demand rises and indigenous production slows;
- Economic growth in South America, where counter-seasonal demand has begun to drive Summer increases in spot LNG demand; and

- Decreasing domestic gas production in northwestern Europe, particularly in the UK and the Netherlands, and a need to diversify gas supply sources and indexation.

The foregoing phenomena have produced repercussions on both long term and spot/short term LNG markets. In order to provide a more comprehensive picture of the LNG industry as of early 2014, the following discussion offers a closer description of these two triggering events and their impacts on the global LNG market and, more specifically, markets within the UNECE region.

2.2. LNG Availability, Changing Demand and Role

The advent of LNG was a revolution for the world's energy sector as it widened the global space for natural gas to play its role as an economical and clean alternative to oil, coal and other fuels. Within the framework of long-term contracts for the purchase and sale of LNG, trade routes were initially dictated by the location of gas resources, the availability of liquefaction infrastructure in loco, the availability of regasification infrastructure in destination countries and ultimately by distance from producing countries to receiving countries. This explains the reason for subdividing trade informally into the three basins, as outlined earlier:

- The Atlantic Basin, that saw mainly shipping of LNG from North Africa and West Africa to Europe and from the Caribbean to the United States;
- The Pacific Basin, consisting mainly in trade between Southeast Asian producers (including Indonesia and Papua New Guinea) and Northern Asian tigers (mainly Japan, South Korea and Taiwan);
- The so called Middle East Basin, playing a balancing role with the ability of local producers, especially Qatar, to send cargoes to both the Pacific and the Atlantic basins.

Historically, LNG trade developed first in the Atlantic Basin, beginning in North Africa and later in West Africa and the Caribbean, pulled by demand in the then most industrialized and energy consuming economies, mainly Continental Europe and the United States. Through the 1970s, LNG served principally as a supplemental gas supply source – on one side of the Atlantic, it supplemented US domestic gas production; on the other side, it supplemented pipeline gas imports to Europe, initially from the Soviet Union and then from the Russian Federation. The market soon afterward developed in Asia where Japan, South Korea and Taiwan became world leaders in LNG demand and importation. With the evolution of Asian markets, LNG was no longer simply a supplemental source of gas, but a critically needed base-load as well.

Later on, in the aftermath of the global economic recession that began in 2008 with the sub-prime crisis in the United States, global gross domestic product (GDP) shrank by at least 2% in calendar year 2009 (the World Bank estimated a decline of 5.2%) and world trade declined for the first time since 1982, by more than 11%.[1] The effects of the recession continued well into 2010 (and even beyond, in some regions). Advanced economies in the North American Free Trade Agreement (NAFTA) region, Western Europe and Japan experienced the worst impacts, with GDP dropping 2.0-3.5 percent during 2009. Developing and emerging economies were not immune from this recession, with GDP growth rates reduced by up to 50 percent in some cases.

By 2011 and beyond, however, the global economic situation had largely changed, with strong economic recovery in Asian economies and, to a lesser extent, in the US. Energy demand growth resumed accordingly, and affected all fuels. In 2010-2014, shale gas production expanded radically in North America and a nuclear crisis took place in Japan, consequently raising global LNG consumption.

An estimated 246 million tonnes per year (mtpa) of LNG were produced and exported globally in 2013, with Qatar responsible for nearly a third of that (approximately 32.2% in 2013) through its 8-train liquefaction infrastructure in Ras Laffan. These assets propelled Qatar to its current leading role in the industry, a role that has been fostered by the ability and willingness of Qatar to provide flexibility in long term contracts, allowing it to act as a "balancer" in global LNG trade.

2.3. The Fukushima Daiichi Nuclear Disaster

Before the nuclear disaster occurred, Japan was already the world's largest LNG importer, with 25% of its power generation fueled by natural gas and 82% of its primary energy supply coming from imported energy sources.

The earthquake and tsunami that struck the Fukushima Daiichi nuclear power plants on March 11, 2011, forced 12.4 GW (or 18% of its total electricity generating capacity) to be removed promptly from service on an emergency basis. 90% of this loss was at the Fukushima and Onagawa facilities, owned respectively by Tokyo Electric Power Company (Tepco) and Tohoku. To meet even basic electricity demands, the nation was compelled to switch immediately to additional volumes of LNG as an alternative power source.

Further nuclear plant shut downs followed throughout Japan, as operators sought to ensure public safety. By year-end 2011, less than 10 GW of the nation's 35 GW of nuclear generating capacity remained in service, raising grave concern for the sufficiency of winter service, and all remaining nuclear power plants in Japan were off-line by third quarter of CY2012 (see Figure 2). By 2014, only two units had been restored to service in Japan.

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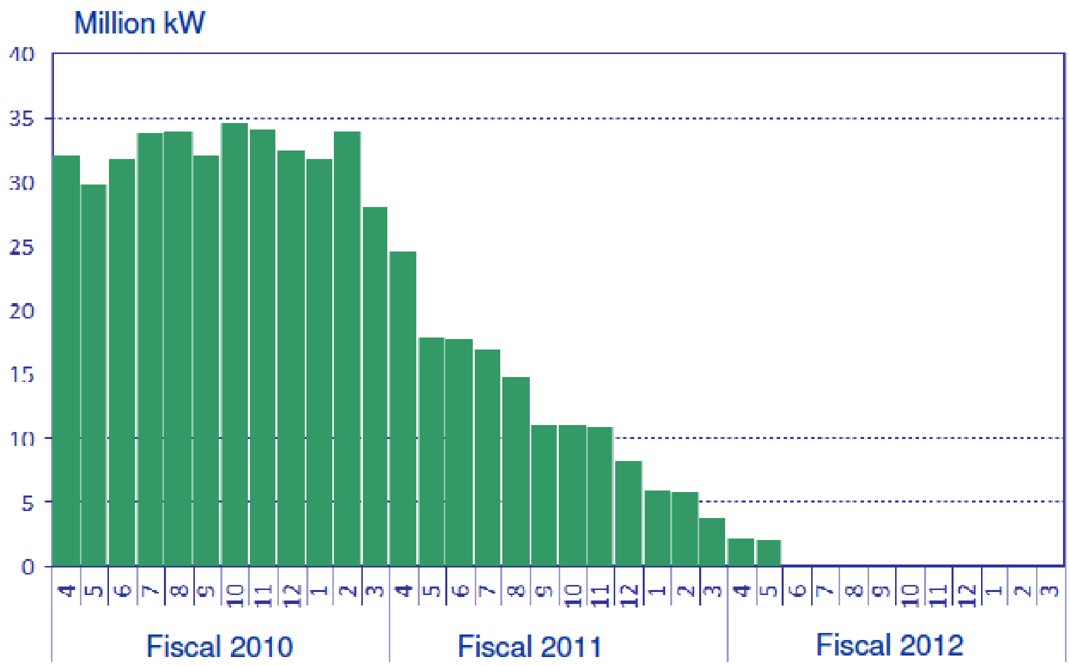
[1] UN Department of Economic and Social Affairs (DESA), World Economic Situation and Prospects (WESP), see http://www.un.org/en/development/desa/policy/wesp/wesp_current/2011chap2.pdf.

Figure 2 Diminishing Nuclear Plant Operations in Japan



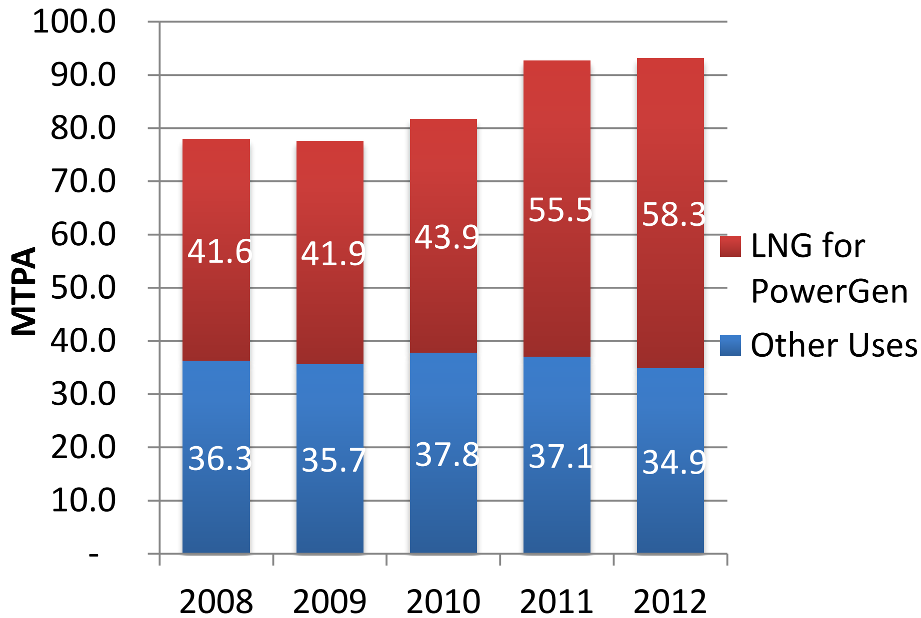
Source: Masakazu Toyoda, Chairman and CEO, Institute of Energy Economics - Japan *"The New Challenges for Japanese Energy Policy after the Great Earthquake,"* before the 30th Annual USAEE North American Conference, Washington, DC, 11 October 2011.

As a result of this nuclear disaster, LNG demand in Japan for power generation and gas utility services together reached 117 BCM in 2012 – the electricity generation requirement alone increased by more than 26 percent in 2011 over 2010 — which was, in itself, a record year (see Figure 3.).

The Fukushima disaster in Japan also affected other countries that were historically dependent on nuclear power. For instance, shortly following the calamity in Japan, both Germany and Taiwan announced the revision of their short and long term energy policies to discontinue nuclear electricity generation altogether, with increases in gas and/or LNG utilization almost certain to make up for much of the gap in electricity supply. Still other countries are procedurally reassessing their reliance on nuclear power, including reconsidering plans to extend the lives of existing reactors.

It appears that the global LNG market will bear the effects of this disaster most likely through 2018, when a number of LNG projects currently under construction in the Pacific Basin and North America are expected to enter service. Until then, the strategy of Asian buyers appears inclined toward securing sufficient LNG to cover immediate needs via spot, short- and possibly medium-term contracts, with volumes in future years guaranteed by long-term contracts. Even in the years beyond, LNG markets will continue to endure impacts related to the nuclear disaster in Japan (coupled with the other phenomena affecting the global LNG markets) as power plants enter and are removed from service, making an optimal supply and demand balance hard to reach in the medium term.

Figure 3 Rise in Japan's LNG Consumption Following Fukushima Disaster



Source: BSA 2014, from EIA, BP, and Federation of Electric Power Companies of Japan.

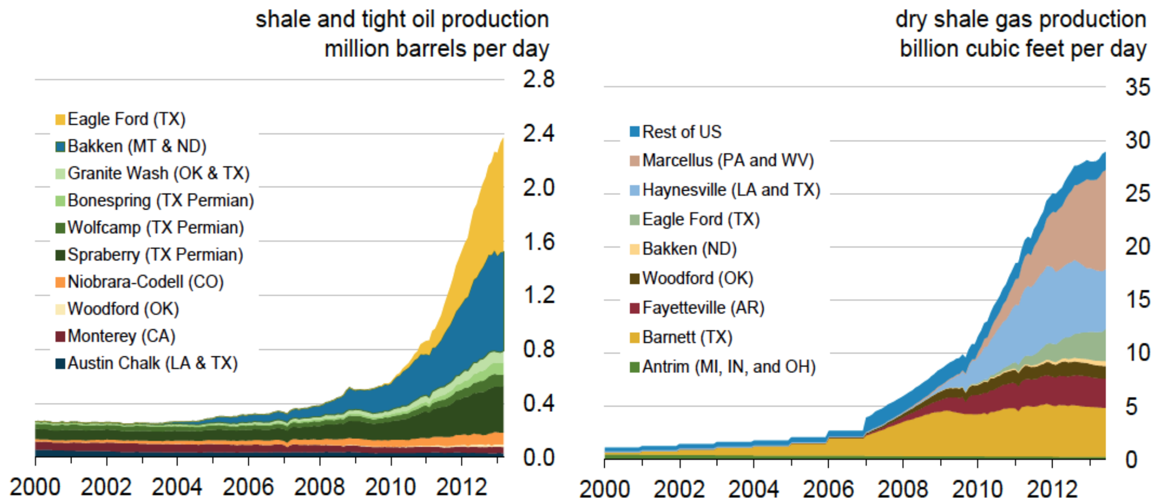
2.4. North American Shale Gas Development

In this section, a review is given of the other seminal event in global gas markets, namely, the rapid upsurge in unconventional gas production in North America, particularly shale gas. This has already greatly affected LNG supply and demand, and is yet to play out more fully in terms of its potential to alter global LNG markets,

2.2.1. Summary

Advanced drilling and extraction technologies and methods have radically increased shale (as well as coal-seam and tight sands) gas production efficiencies and volumes, and have greatly reduced program and gas-well break-even costs. As a result of these technological advances, together with significant institutional impetus, US shale gas deliveries have grown from minor volumes (about 20 Bcm in 2005) to an estimated 290 BCM in 2013. Shale gas now comprises about 40 percent of total US gas production, up from a de minimus contribution only a decade ago. This upsurge has created a vast gas supply surplus in North America which has overwhelmed in-country demand in the both US and Canada, and has strained the existing pipeline infrastructure. The surplus has also notoriously slashed gas prices, with Henry Hub averaging less than $4.00 per MMBtu during 2008-2014. Although severe winter weather in 2014 raised Henry Hub prices to over $5.00 per MMBtu, average NYMEX futures contract prices remain close to $4.00 per MMBtu, averaging $4.22 per MMBtu through 2020 (settlement 12-2-2014). Production of oil from shale, including crude and condensates, has increased equally dramatically, as seen in Figure 4 – but as of early 2014, US gas production from shale remained double that of liquids (5 million barrels/day equivalent versus about 2.5 MBD), thus gas is the major shale play.

Figure 4 US Shale Gas and Oil Production, 2000-2014 (BCM per year)



Source: Presentation by EIA Administrator Adam Sieminski, "EIA Drilling Productivity Report," for Center on Global Energy Policy, Columbia University, October 29, 2013. Note: Dry shale gas production data are based on LCI Energy Insight gross withdrawal estimates as of June 2013, converted to dry production estimates with EIA-calculated average gross-to-dry shrinkage factors by state and/or shale play. From EIA based on Drilling Info and LCI Energy Insights.

Gas supplies from the Marcellus Shale formation – produced largely in Pennsylvania, West Virginia and Ohio – have grown especially quickly, rising from essentially nothing in 2008 to more than 146 BCM per year as of February 2014, a figure that was continuing to increase at the time.[2]. This amount surpassed Qatar's 2012 LNG exports, and gas production levels in both Norway and Nigeria (combined, nearly). Beyond the Marcellus, more shale gas is currently being produced in Texas (over and above its prodigious in-state conventional gas production) than the total gas production of Australia.

A similarly rapid increase in shale gas production has been experienced in Canada, particularly within the Montney and Horn River Basins of British Columbia, where production had reached approximately 30 BCM as of mid-2011.

2 EIA Drilling Productivity Report, February 2014, see http://www.eia.gov/petroleum/drilling/#tabs-summary-2.

Domestic US gas markets – deep as they are, with total in-country demand of over 700 BCM and over 120 BCM of working gas storage capacity – had begun by 2010 to fall short and were unable to absorb these additional volumes. In effect, some US shale gas resources are stranded in the economic sense, in that local markets cannot absorb growing volumes, nor is pipeline capacity in place to remove the gas to markets. As a result, US gas well drilling began to decline in 2011. With some persistent exceptions, US drilling activity has increasingly become targeted toward the more oil-prone shale plays, particularly the Bakken in North Dakota, Eagle Ford in south Texas, and the Niobrara in and around eastern Colorado, where greater values can be extracted (but which have also resulted in increased production of natural gas as a by-product).

2.2.2. US and Canadian LNG Export Terminals

As a result of the foregoing activities, and the likelihood of continued increases in shale gas production in North America even at low prices, some two dozen separate applications have been filed with authorities in the US and Canada to export surplus natural gas in the form of LNG from more than 20 terminals.

As of early 2014, the US Department of Energy had issued approvals to export LNG from five proposed terminals to countries with which the US does not have a free trade agreement (FTA).[3] As listed in Table 1, the DOE has approved to date a total of 63.5 mtpa of such non-FTA exports of LNG from Sabine Pass, Lake Charles and Cameron in Louisiana, Freeport in Texas, and Cove Point in Maryland. All five of these are "brown field" in that they are located at existing LNG regasification and storage terminals in the Atlantic, Basin, although all are expected to export LNG into Pacific Basin markets as well. For its part, Sabine Pass LNG has also received its required certificate from the US Federal Energy Regulatory Commission (FERC) to build and operate its liquefaction terminal and has commenced construction; the four other LNG terminals that have received their non-FTA export approvals from the DOE currently await their FERC facilities approvals, after which they may begin construction as well.

In Canada, the National Energy Board (NEB) has approved LNG exports at a new terminal to be located in Kitimat, BC. LNG from Kitmat would be destined to buyers in Asia Pacific markets. An additional filing has been made by project sponsors of a proposed LNG export terminal to be located in Prince Rupert, BC. LNG export facility approvals are also required in Canada, although these may prove to be somewhat more complex than in the US because 1,200-1,500 km of major new feed gas pipelines, along new routes, must be constructed in order to connect BC export terminal locations with their shale gas supply sources.

[3] The US currently has FTAs in place with the following 16 countries: Canada, Mexico, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Chile, Peru, Morocco, Oman, Jordan, Bahrain, Australia, Singapore and, most recently, South Korea. Approval to export LNG to these countries may not be withheld.

Table 1 US LNG Export Terminals Holding DOE Approvals to Export LNG to Non-FTA Countries, as of Early 2014, and Their Approved Volumes

Terminal	Approximate Quantity, mtpa
Sabine Pass, TX	16.5
Freeport, TX	10.5
Lake Charles, LA	15.0
Cove Point, MD	5.8
Cameron, LA	12.8
TOTAL	**63.5**

Source: US Department of Energy (DOE). Notes: a) Some of the foregoing LNG export capacity has been committed under long-term contracts to South Korea, which holds an FTA with the US, thus the total of 63.5 mtpa understates the actual volume of LNG volumes approved for export from the US. b) DOE approvals are granted in Bcf/day, which were converted in the table to mtpa by a factor of 7.5.

The expectation as of early 2014 is that further US non-FTA LNG export approvals will be limited in number in light of mounting political resistance. Consequently, unless additional FTA agreements are entered between the US and LNG importing countries, it does not appear likely that US LNG exportation approvals will surpass about 100 mtpa, including exports from Alaska.

2.2.3. Pricing and Economics

LNG exports from US and Canadian terminals are economic in all major markets including Europe and Asia Pacific, based on hedgeable gas price differentials between North America and buyer markets. As shown in Figure 5, the IEA demonstrated in a 2013 report comfortable margins for the year 2020, based on current market pricing for that year.

An important caveat to the foregoing kinds of netback analyses in Figure 5 is that they do not represent the whole story. In addition to purely economic considerations, which are of obvious importance, LNG buyers also seek diversity of supplies and suppliers, as well as index diversification, as discussed further below.

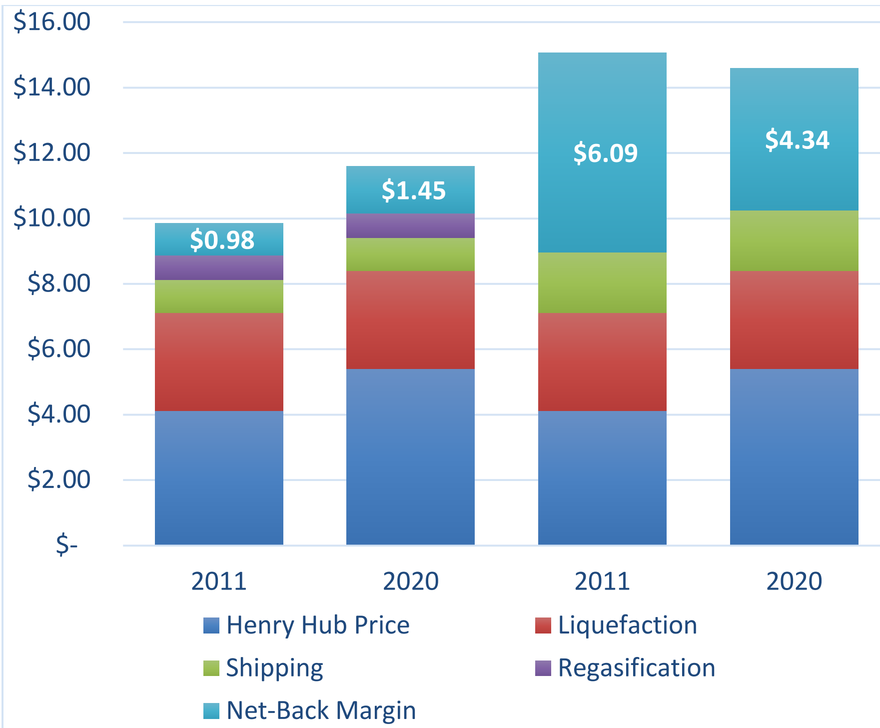
2.2.4. LNG Export Timing and Volumes

Based on current project planning and regulatory approvals, LNG exports from US Gulf Coast – which will be derived largely from nearby shale, tight sands, and other unconventional gas producing fields – are expected to begin shipping in the 2017-2018 time frame at levels rising from 20 mtpa to 65-70 mtpa by the early 2020s, including exports to non-FTA as well as FTA countries. Exports of Marcellus shale gas from the Cove Point LNG terminal are expected to begin in the 2018 time frame to UNECE country destinations in the European market, as well as to South Asia.

Following the initial round of LNG developments, North American export volumes are likely to stabilize as power generation, industrial and transportation markets in the US and

Canada rise to absorb incremental shale gas production volumes, and as competition intensifies from other low cost LNG suppliers – especially Australia, the Middle East, the Russian Federation and potentially Chinese shale gas resources. At some point during or just after the next two decades, North American shale gas production will decline, and LNG exports will decrease. At that point, in the absence of a compensating decline in domestic gas demand, the US will turn its export terminals around (once again) to receive LNG imports.

Figure 5 US LNG Net-Back Margins



Source: IEA, 2012. Notes: a) Liquefaction step includes cost of pipeline transport of feed gas to export terminal. b) Shipment to Japan assumes widening of Panama Canal. c) LNG costs are levelised assuming asset life of 30 years and 10% discount rate. d) Price in Japan is for LNG, excludes regasification.

Going forward, a number of factors will affect volumes of US gas exports to the UNECE region, which are listed in Table 2.

To summarize, the high end of the currently foreseeable LNG export range would position the US as the second-largest single LNG supplier, after Qatar, based on the LNG marketplace as it existed in 2013; however, Australia and other countries are moving to increase LNG exports as well. Viewed from the current global perspective, therefore, emerging US and Canadian LNG exports will be relatively limited in scope and volume and, therefore, acting alone, may not be great enough to challenge the global pattern of LNG price indexation to oil.

Table 2 Factors Indicating More or Less North American LNG Exportation

Factors that point to greater North American LNG export volumes:	• **Slow uptake of surplus gas in the US market.** Apart from the opportunity to displace coal for power generation, traditional (residential, commercial, small industrial) gas markets in the US are largely saturated. Because electric appliances cost less than gas, electricity has replaced gas as the fuel of choice in new housing; in other sectors, efficient appliances and tighter building envelopes have stabilized gas demand. From 1997 through 2009, industrial gas sales declined as North America's manufacturing base continued its long-term shift toward services industries. New gas markets such as NGVs, GTL, and distributed generation are emerging but cannot absorb the shale gas glut until the late 2020s, if at all. The use of gas to replace coal is rising in the US and Canada, but the "low hanging fruit" will soon have been picked clean, i.e., only another 40-50 BCM of potential gas demand exists in gas-connected coal-fired power plants and in under-utilized gas CCCTs. Beyond this, new gas CCCTs must be constructed, a process that is only presently resuming, and is encountering headwinds in the form of renewable portfolio standards (RPS) that enforce growth of wind and solar power generation in most states. • **The durability of the oil-gas price differential.** Oil-price indexation remains the standard of global gas pricing, and is expected to continue as the major commodity influence upon European and Asian LNG buyer prices. North American LNG exports will be contracted against this advantage, enabling sufficient netback price stability, as shown in Figure 5. In addition, North American LNG exports, indexed to Henry Hub, will be sought after both to diversify supplies and as a hedge against oil indexation from other suppliers.
Factors that point to lower North American LNG export volumes:	• **Rapid development of world shale gas potential.** As described in Chapter 2 of this report, the potential for shale gas extraction globally far exceeds that in North America. Should these resources be developed in a timely way and evolve into major supply sources close to markets in Europe and the Asia Pacific region, then North American LNG exports could suffer a geographical disadvantage. • **Environmental restrictions on US shale gas production.** As discussed in Chapter 2 of this report, this factor has thus far not materialized, despite some vocal opposition, because shale gas technology is evolving too quickly for regulators to choose options to mitigate possible impacts, e.g., aggressive wastewater treatment and recycling of return waters have eliminated major pathway to groundwater contamination, while enhancing recovery of valuable liquid hydrocarbons. The U.S. Environmental Protection Agency (EPA) is engaged in a multi-year study, the results of which may form a basis to assess the costs of regulation of future US shale gas drilling. • **Fewer licenses to export LNG, or withdrawn licenses.** The U.S. Department of Energy is pursuing a policy of continued LNG export approvals up to the point where exports would begin to exert an upward impact on U.S. consumer gas prices. Current analysis suggests that U.S. consumer gas prices would hardly respond to about 45 mtpa of LNG exports (about $0.12 per MMBtu),[4] although the DOE has already approved 63.5 mtpa of exports to non-FT countries.

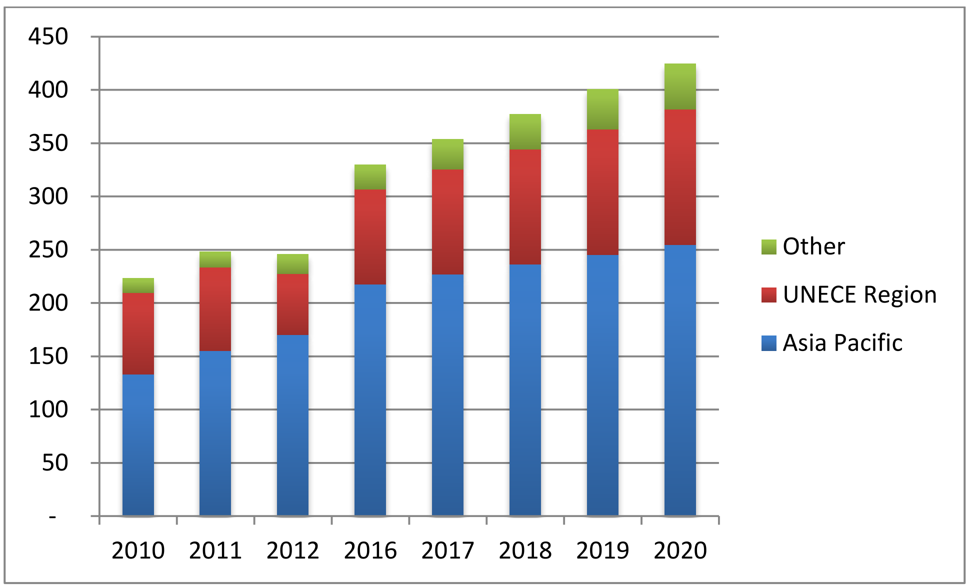
[4] Deloitte Center for Energy Solutions and Deloitte MarketPoint, *Made in America – the Economic Impact of LNG Exports from the United States*, November 2011. The $.12/MMBtu is the average volume-weighted change in U.S. city-gate prices during 2016-2035 resulting from 6 Bcf/day of LNG exports.

3. Global LNG Demand

In this section, the discussion turns to a review and assessment of global LNG demand.

Global LNG demand in 2013 amounted to more than 250 mtpa, of which about 70% was in Asia and about 20% in Europe. As seen in Figure 6, LNG demand is likely to continue increasing steadily through 2020, with Asia and Europe as protagonists – both following a decrease in domestic energy production (nuclear power on one side and hydrocarbons on the other). As of early 2014, market forecasts foresaw continuity in this positive long-term trend for LNG trade.

Figure 6 Demand for LNG, by Region, through 2020

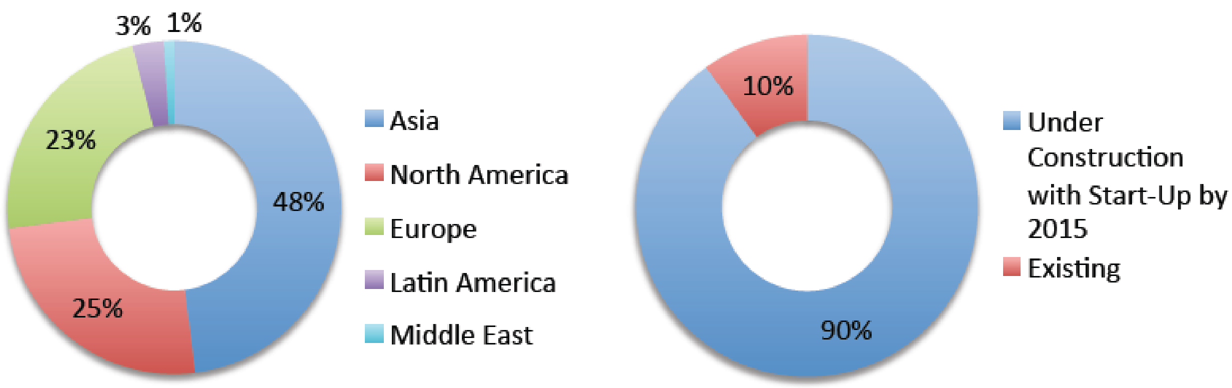


Sources: BP 2013 Statistical Report; Cedigaz, 2011.

At year-end 2013, the largest LNG importer in the world remained Japan. South Korea, in second place with LNG imports less than half of Japan's, was followed by Spain, India, China, Taiwan and the UK. Other major importers in the UNECE Region included France, Turkey, Italy and the US (predominantly to terminals in the Northeast) Further detail may be found in Appendix B.

A significant demand indicator has been the construction of new regasification terminals. Over the past four years, more than 200 new mtpa of regasification capacity entered service, mostly in the Atlantic basin; in the medium term, only approximately 65 mtpa of additional capacity is anticipated, 70% of it in Asia. As of early 2012, there were some 22 ongoing regasification construction projects, of which 8 are located in China, 4 in Japan, 3 in India, 1 in Indonesia and 1 in Singapore – and the remainder in Europe.

Figure 7 LNG Regasification Capacity in 2011, by Region



In the past decade, major investor-owned companies (IOCs) dominated regasification capacity development globally, with projects mainly in the US and Europe, in line with their strategy to expand downstream along the gas value chain to strengthen their portfolios. In the coming years, however, this pattern will change as Asian buyers are likely to add most regasification capacity, e.g., to meet the expected rise in LNG demand consequent to economic growth in the Asia Pacific region and the Japanese nuclear outage in March 2011. As mentioned in previous sections, in fact, the Fukushima incident did not only affect the Japanese energy mix but also that of other countries within and beyond Asia which have become increasingly skeptical towards nuclear energy, prioritizing LNG as a main source of energy.

Clearly, China and India have already begun to play an important role in the definition of future LNG market dynamics, together adding more than 25 mtpa of regasification capacity between 2011 and 2012 to the global LNG infrastructure, and importing more than 30 mtpa in 2012.

In the past half-decade, the LNG industry saw new players adding to demand, namely Dubai, Thailand, Turkey, Argentina, Mexico and the Netherlands. Moreover, some South East Asian countries, such as Indonesia, that were once leading LNG exporters, have had to reduce production or even set up import infrastructure to supply growing domestic energy needs. As a sign of long-term shifts in sources of supply, Malaysia received its first cargo of imported LNG in 2013 (from Nigeria) and Indonesia is expected to follow by 2018 with cargoes from the US.

The main conclusion with respect to global LNG demand is that shipments have redirected steadily over time from the Atlantic Basin to the Pacific Basin. Independent of recent events that occurred in the Far East and in North America, it would be fair to say that such a shift in trade movements would have taken place anyhow; it would certainly have taken longer, depending on gas production trends in Europe and the United States, but macroeconomic trends would have moved gas trading in the same direction, i.e., toward the growing Asian economies.

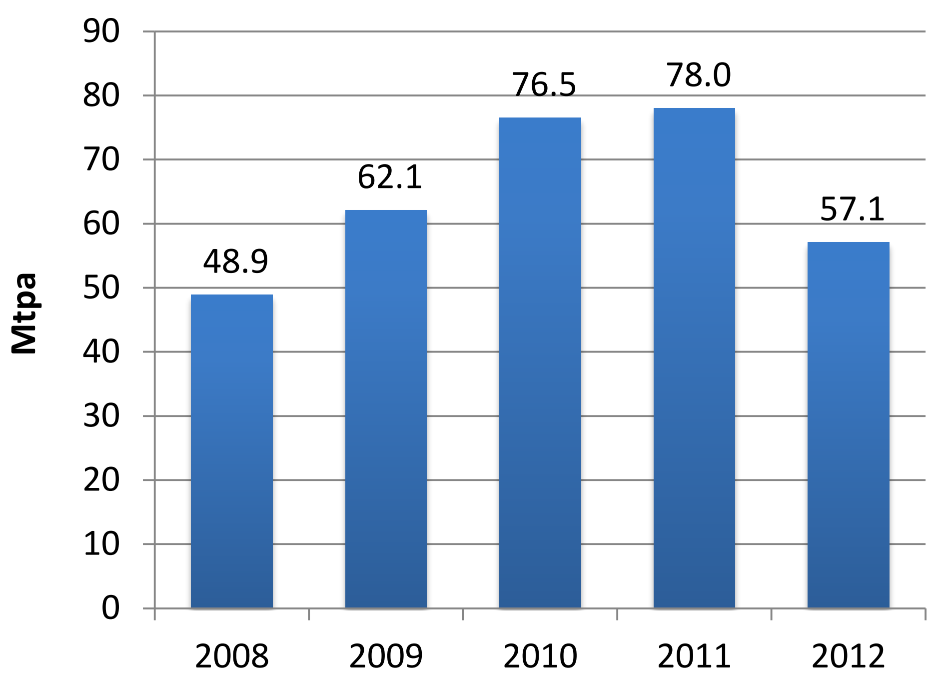
3.3. LNG Demand in the UNECE Region

Figure 6, which is based on the annual BP Statistical Review, shows how LNG imports into the UNCEC Region grew substantially up to 2010, rising from 48.9 mtpa in 2008 to 76.5 mtpa in 2010. Following this rapid rise, however, the added demand created by the Fukushima disaster and aftermath forced Asia Pacific prices upward, enabling the Asian Tigers to outbid Europe, where LNG demand fall in response. In 2012,

Within the UNECE Region, Spain remained the largest LNG importing country in 2012, receiving 28.1% of total LNG imported into this Region, followed by the United Kingdom (18%), France (13.6%), and others as shown in Figure 8.

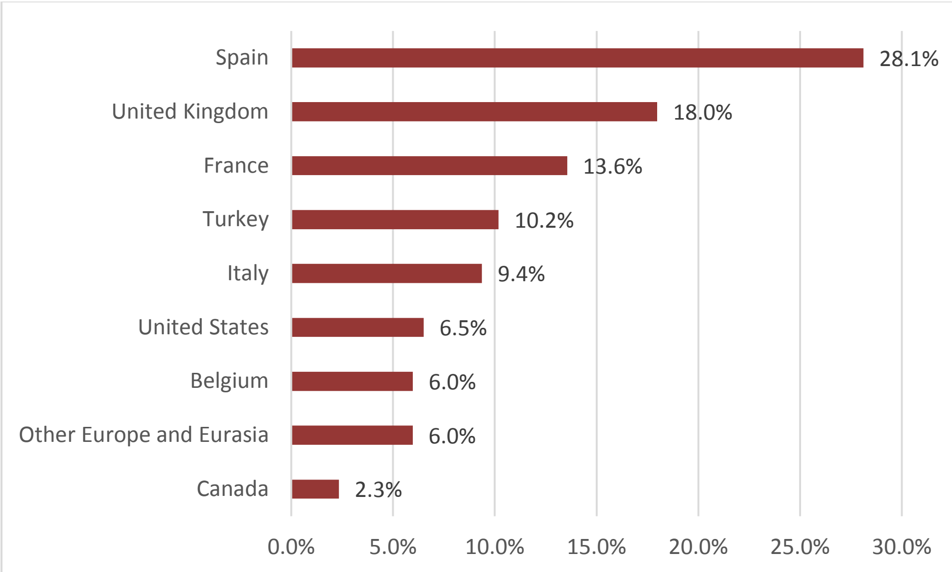
LNG imports to the US and Canada accounted for 8.3% of the UNECE total in 2012, a figure that is likely to decline after major new gas pipelines are completed that will transport Marcellus shale gas into the region.

Figure 8 LNG Importation into the UNECE Region, mtpa



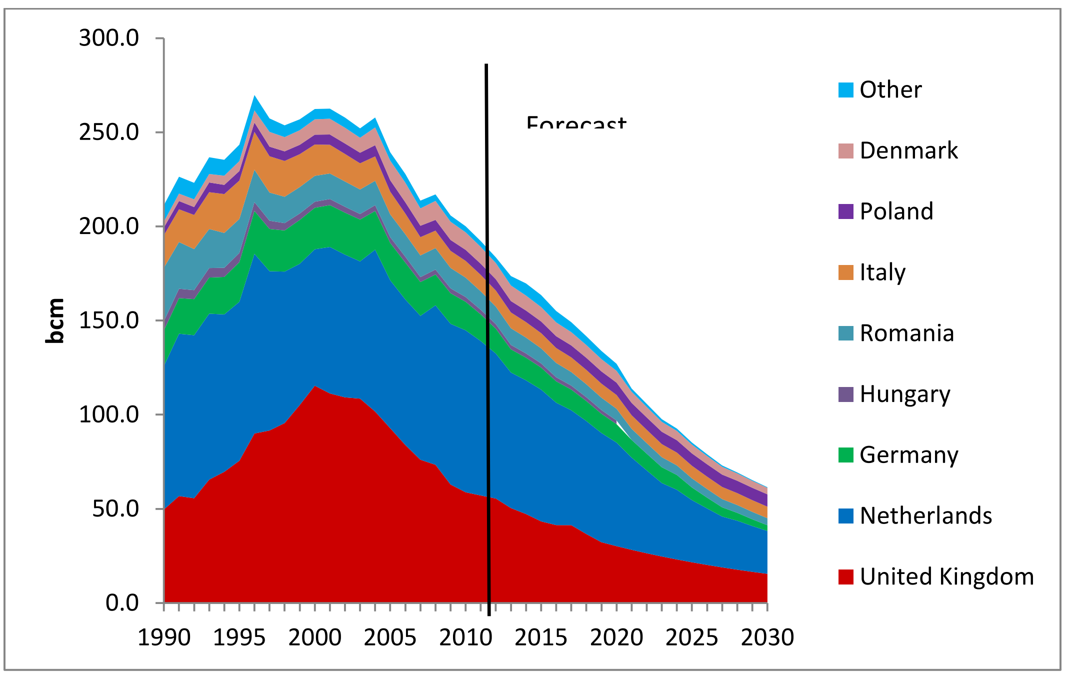
Source: BP Statistical Review, 2009-2013.

Figure 9 Distribution of LNG Imports in the UNECE Region, 2012



Looking forward, growth in Europe's LNG reliance is likely to resume mainly because of the Continent's decreasing domestic production, as shown in Figure 10.

Figure 10 Projected Conventional Gas Production in Europe (BCM)



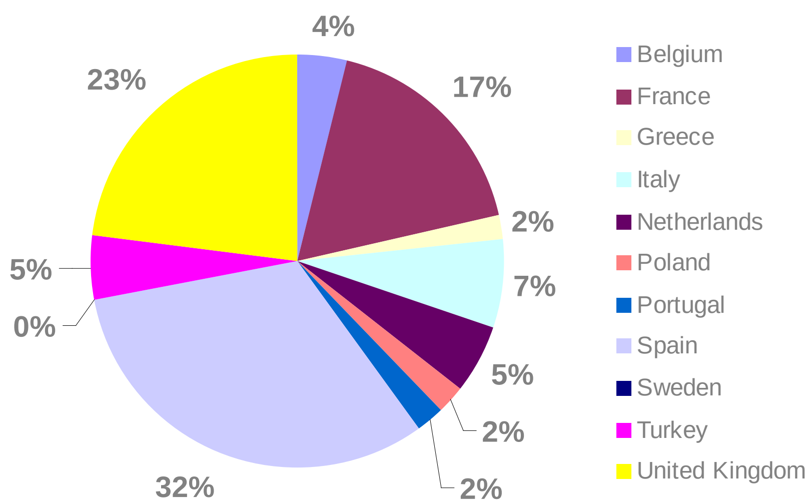
Source: Gas Strategies, Ltd. 2011.

The trend illustrated in Figure 10 is a stark one – gas production decreases are anticipate in the UK, Germany, Denmark, Italy, Poland and Romania, while it is increasing in Norway, which has traditionally been a significant hydrocarbon exporter. Only the development of the Continent's prodigious unconventional gas resources, particularly its shale gas can reverse this decline, as discussed further in Chapter 2.

Total regasification capacity in the European portion of the UNECE region was 183 BCM/year in 2010 (see Figure 11), with proportionate distribution of capacity toward demand concentrations. As mentioned above, there were four regasification projects under construction at year-end 2011 in Europe – including projects in France, Italy, Poland and Spain – and another two projects came on stream by 2012, in Sweden and the Netherlands. Excluding potential delays, the industry should see by 2016 an additional 42 BCM/y of operating regasification capacity.

Furthermore, such other UNECE countries as Romania and Croatia have expressed interest in developing LNG import terminals.

Figure 11 Regasification Capacity in European Portion of the UNECE Region, 2010

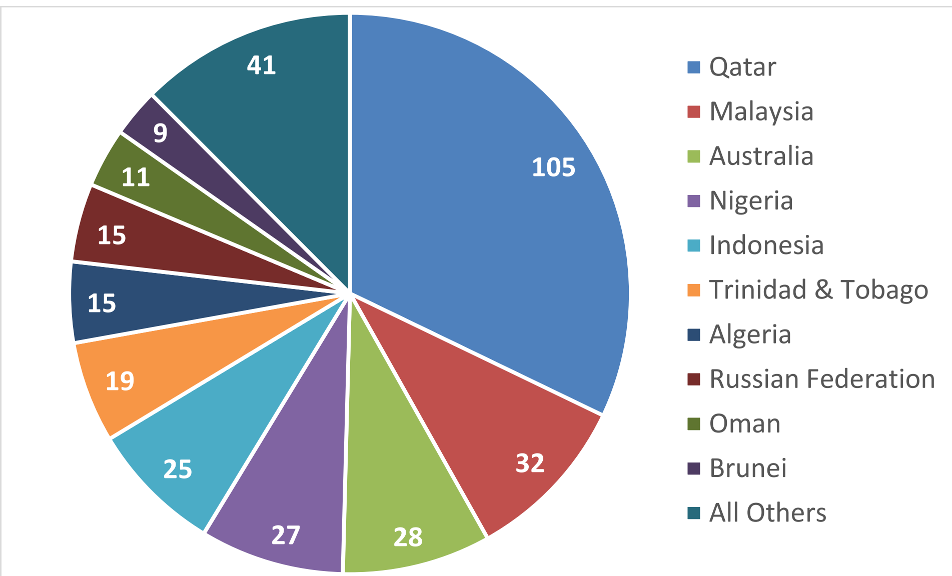


In addition to supply concerns, Europe's rising interest in LNG may also be partly attributed to the European Union's 20-20-20 target, which requires a number of UNECE countries to switch their energy sources away from highly polluting coal and oil. Because renewable energy projects are costly, natural gas may appear to be the most attractive solution. Moreover, not only is LNG a cleaner fuel, it also inherently allows for greater diversification of energy import sources.

4. Global LNG Supply

Today, global liquefaction capacity amounts to ~265 mtpa; utilization of this capacity peaked during 2010, with a load factor of 84%. The chart that follows illustrates market shares of the top 10 and other LNG suppliers in 2012. The recent global phenomena that took place in 2011 as described earlier in this Chapter, highly influenced investment decisions for the future supply of LNG, leading expectations for liquefaction capacity to reach up to ~456 bcm/y in 2018 (close to a 30% increase), excluding projects that are still only potential. The global supply of LNG is expected to shift progressively toward the Pacific Basin, where demand is highest, as the majority of new projects will be settled in Oceania, South East Asia and the North American West and Gulf coasts (the latter utilizing the expanded Panama Canal to reach Pacific Basin markets).

Figure 12 Global LNG Supply in 2012, Highlighting Top 10 Countries (BCM)



Source: BP Statistical Review of World Energy 2013.

In support of the above, it is worth noting that more than 60% of the new LNG export capacity which will enter service in the medium term (+/- 10 projects) is situated in Australia which is expected to overcome Qatar as the largest LNG exporter in the next decade. In addition, as discussed above, general (non-FTA) LNG exports from another five terminals have been approved by the US Department of Energy, totaling 63.5 mtpy.

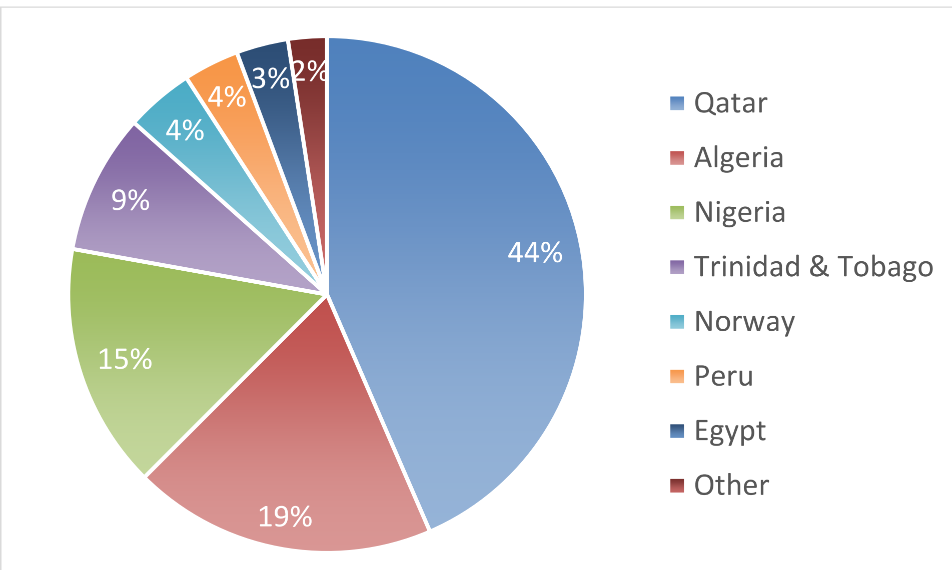
Global LNG capacity will continue to grow as more countries are tending towards cleaner fuels and demand, as detailed above, is expected to increase more and more in the future, led by Japan in the short term and then China and India in the medium to long term.

An interesting supply trend is that the share of natural gas imported via LNG has been increasing against the share of gas supplied via pipeline, though the latter remains greater in absolute volumes.

4.1. LNG Supply in the UNECE Region

For geographic reasons, LNG supply for the UNECE region was historically sourced mainly from the Atlantic Basin. Southern European countries such as Spain and Italy have relied on LNG from North Africa while North Western European economies including UK, France, Belgium and the Netherlands have received more LNG supply from West African producers such as Nigeria and Equatorial. However, as is clear from Figure 13, Qatar is the main LNG supplier to the UNECE region, shipping nearly 33.1 BCM of exports to the region in 2012, or nearly 44% of total LNG imports into the UNECE Region.

Figure 13 LNG Imports into the UNECE Region, by Country of Origin, 2012



Source: BP Statistical Review of World Energy 2013.

Considering recent global events and based on a high demand scenario for the future, Cedigaz has estimated that in spite of a projected growing share of LNG imports in European supply, and also a growing share of pipeline gas from Central Asia, the dependence on Russian gas via pipeline will nonetheless continue to rise in the coming years. In particular, some LNG volumes contractually destined to Europe are so called "flexible" and may thus be diverted by suppliers toward higher value markets with higher prices; this is especially true for Qatari LNG volumes. As a result, it can be expected that given current price scenarios (highest in Asia), most flexible supply components will be re-directed to Asia.

It remains clear as of 2014 that pipeline gas imports will remain the mainstay of European gas supplies, while LNG will occupy the role of supplemental supply, especially during periods of high gas demand, e.g., to meet seasonal peak demand in Northwest Europe.

5. LNG Market Dynamics – Near-Term and Long-Term

Earlier sections of this Chapter described the development of supply and demand over the past few years up until today, providing some insight on future developments. In contrast, this section looks forward toward LNG markets in the coming months and years, with a special focus on the UNECE Region.

5.1 Emerging LNG Supply-Demand Balance

5.1.1 Atlantic Basin – Americas

Depressed US gas market prices and gas supply self-sufficiency have kept North American gas markets largely isolated from the global LNG market. As seen in Table 3, US import volumes have fallen as Marcellus shale gas supplies are increasingly available to Northeastern states, and Mexico's import volumes have fallen as well:

Table 3 North American LNG Importation (BCM)

	2008	2010	2012
United States	9.9	12,1	4.9
Canada	0.0	2.0	1.8
Mexico	3.6	5.7	4.8

Source: BP Statistical Review of World Energy, 2009-2012.

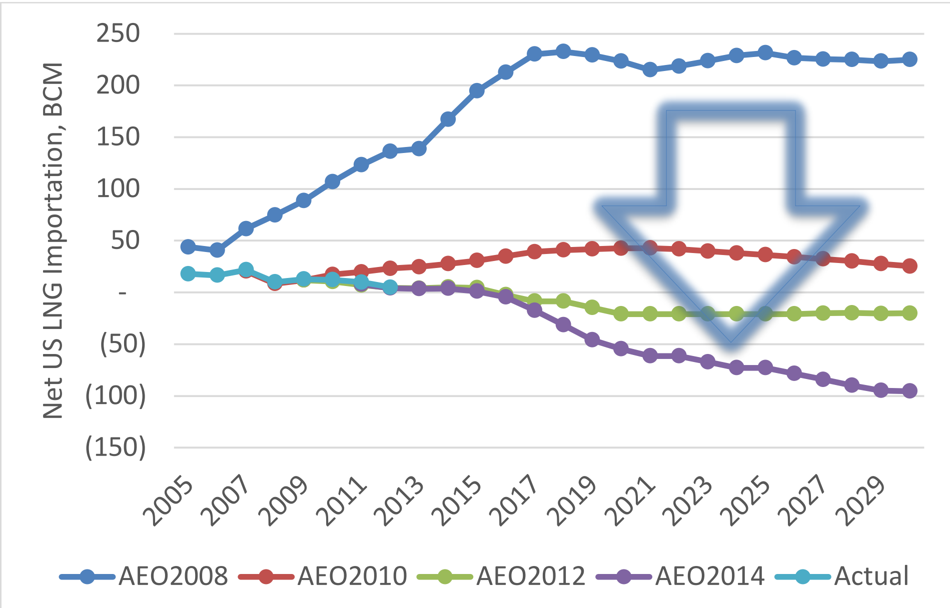
Until LNG exports commence from the five DOE-approved US terminal in 2017-2018, imports to these terminals will continue but at low levels. Low Henry Hub prices will continue to limit LNG importation there to opportunistic transactions more in line with international arbitrage operations than with US markets. Consequently, US Gulf Coast import terminals are finding limited uses as storage and re-loading facilities, with some cargoes imported into the US and then re-exported. In fact, several cargoes were brought to the US at NBP-indexed prices, with linked re-loading sales at higher prices in the post market (main destinations being South America or Far East countries). This LNG hub-and-storage activity around US Gulf Coast terminals may increase following completion of the Panama Canal expansion project in 2014.

Paradoxically, the US and Canada will continue for several more years, perhaps into the early 2020s, to import LNG into US Northeastern markets in order to supplement pipeline supplies, as in Europe.

Looking ahead, even though basic North American gas demand is the largest of any portion of the UNECE region, rising shale gas production has steadily reversed expectations for

LNG importation into the US, with EIA's anticipated LNG imports as high as 250 BCM becoming 100 BCM of LNG exports, as shown in Figure 14.

Figure 14 Declining EIA Forecasts of LNG Imports into the US



Source: BSA 2014; actual: EIA Natural Gas Monthly; forecasts: EIA Annual Energy Outlook (AEO).

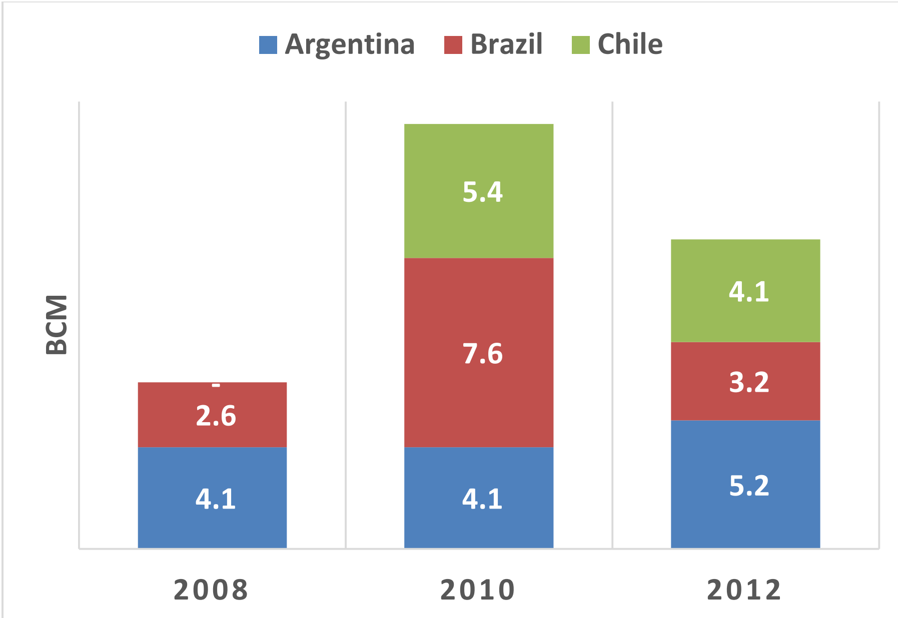
In South America, increasing LNG demand is mainly reflected in rising spot cargo deliveries to Argentina and Brazil, where LNG demand was mainly driven by low utilization of hydro-power plant. The other importing country in South America is Chile, with two terminals currently operational. As seen in Figure 15, a considerable decrease in LNG volumes to the Southern Cone region of South America resulted from diversion of shipments to the Asia Pacific region.

5.1.2. Europe

Since 2008, Europe has dramatically increased its regasification capacity, with an additional capacity of around 75 bcm/y available, mainly due to the new plants in the UK and Netherlands. LNG imports have increased for two main reasons:

- Start-up of Qatari Mega-Trains, with additional LNG available and planned to be partially sold in Europe, where regasification capacity was secured (i.e. South Hook in the UK).
- Depressed HH prices in the US have allowed for progressive cargo diversions from the original destination market to premium markets with capability of absorbing additional volumes.

Figure 15 LNG Importation to Southern Cone Countries of South America (BCM)



Source: BP Statistical Review of World Energy 2013.

In particular, the UK market has radically changed its features because of decreasing domestic production and the start-up of the new regasification plants. The liquidity of the UK market, together with the characteristics of the new LNG terminals – e.g., they are able to receive all Q-types of LNG tankers, but are often unable to discharge in other terminals – and the UK's active pipeline interconnections with the other Continental European markets (i.e. Belgium and Netherlands), have contributed to sharp increases in LNG imports, with Qatari volumes being the first importer.

According to Cedigaz , the UK briefly passed Spain during 2011 as the third global LNG market (after Japan and South Korea), while the additional volumes from Qatar have also reinforced the LNG consumption of Belgium and France.

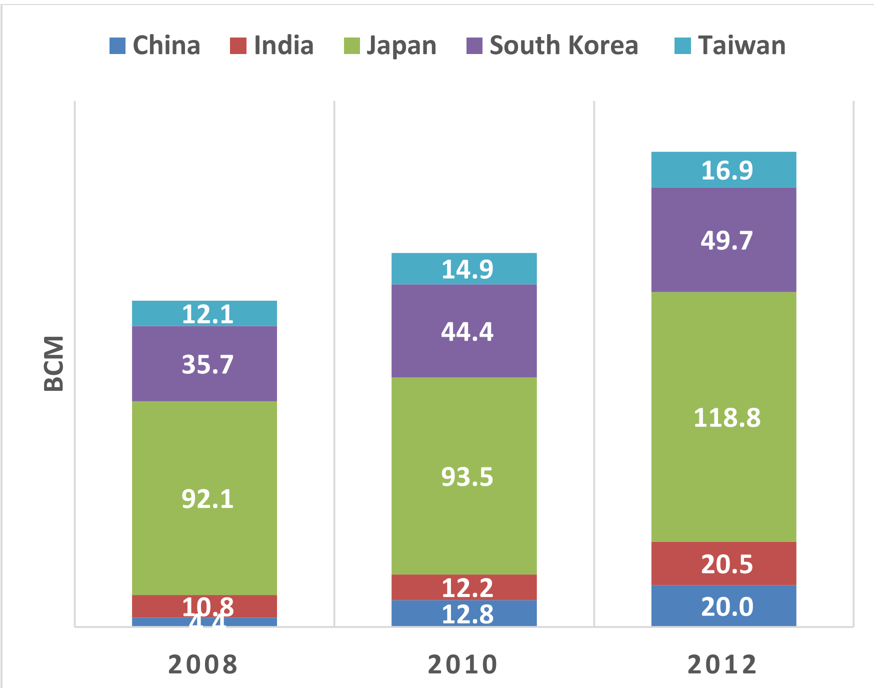
5.1.3. Pacific Basin

Historically the major LNG consuming area, the Asia Pacific region increased its imports even more so as a result of the Fukushima disaster, from 155 in 2008 to 226BCM in 2012, as shown in Figure 16.

Asia Pacific LNG import figures for 2014 and beyond may show a stable or slightly decreasing consumption of LNG as Japan begins its process of re-commissioning nuclear reactors and some nuclear plants are returned to service.

The added requirements of the traditional Pacific Basin importing countries – Japan, South Korea and Taiwan each increased their LNG importation through 2012– were joined by increased demand from the fast growing Chinese and Indian markets. Even modest expectations for economic growth in China and India suggest their combined LNG imports will likely surpass South Korea's by 2015, if they have not done so already. As neither China nor India depend solely on LNG for their gas supplies, their demands have been less steady, thus they have attracted so-called "Flexible" LNG volumes, with both the Qatari and the international portfolio players benefiting from the price-differentials with the other markets and sending as much volumes as possible to the Asian countries.

Figure 16 LNG Importation into the Asia Pacific Region, 2010 (BCM)



Source: BP Statistical Review of World Energy 2013.

5.1.4. Middle East

As anticipated in the previous sections, the Middle East has reinforced its central role in the LNG global supply scenario, with Qatar becoming responsible for nearly a third (32.2%) of global LNG production in 2012. This arena of LNG producers saw in recent years the entrance of Yemen, whose production is sold in both the Atlantic and the Pacific Basin.

Furthermore, the last few years have seen the development of a regional import market of LNG in Middle East, with supplies now going to Kuwait and Dubai, and Bahrain and Iraq expected soon to become importing countries.

Although limited in terms of quantities, such imports from Middle East countries have an important role in the spot market, as the purchases of LNG cargoes are strongly affected by the seasonality, with the summer (April-October period) being the months of highest demand.

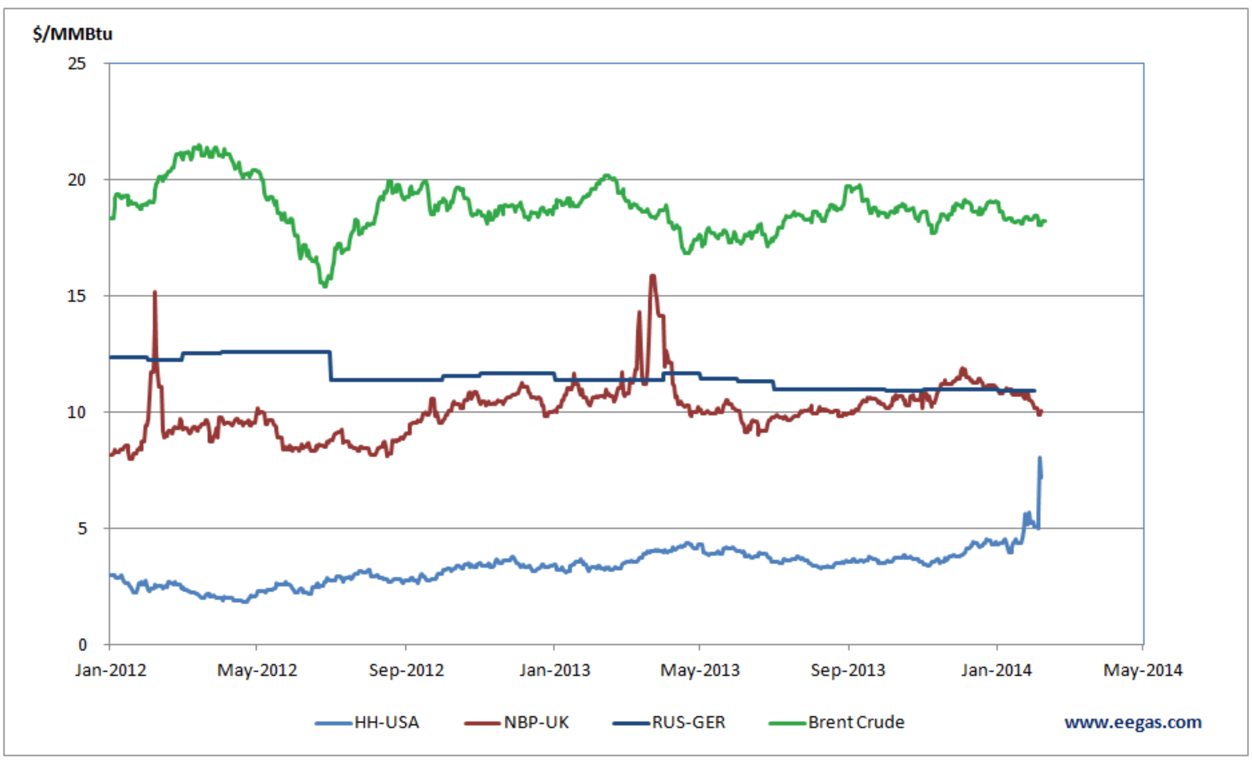
5.2. Spot and Short-Term Markets

The global LNG trade in spot and short-term transactions has increased significantly in the past few years fueled, mainly by increased quantities of flexible supplies from Qatari producers and other global portfolio players, each of which were competing in the market to take advantage of spot opportunities to maximize the value associated to their LNG portfolio.

In particular, the Qatari Joint Ventures (QatarGas and RasGas) have been diverting to premium markets under spot and short term deals most of the volumes originally destined to the US markets, taking advantage of the availability of their latest generation Q-type vessels (Q-Flex and Q-Max, able to transport respectively around 215,000 m3 and 260,000 m3 of LNG).

At the same time, global portfolio players, with a leadership roles played by Shell, BG and Stream, have been diverting several of their cargoes with the goal of optimizing their portfolios of LNG and shipping fleets in order to extract the maximum value from the deliveries. Obviously, the post-Fukushima market has become even tighter, with Japan and the other Far East buyers attracting most of the divertible volumes at high prices.

Figure 17 Comparison of Spot Gas Prices in Key LNG Markets

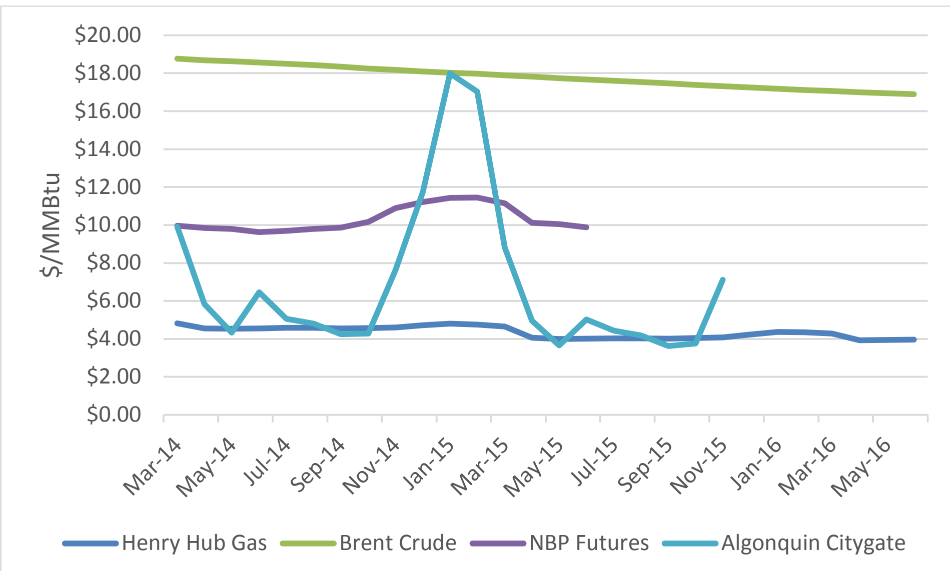


The direction of these diversions is clear from review of spot gas prices, e.g., as shown in Figure 17, which demonstrates that Asia Pacific market prices (represented in the figure by the Brent crude price) greatly exceed European gas market prices let alone prices in e US.

As the shipping market tightened following the surge in Asia Pacific LNG demand, more vessels were needed for longer trips to premium markets, the above-described players have made good use of their access to shipping capacity to lead the market in deals to Far East buyers.

As a result of the foregoing market stresses, pricing of LNG is likely to differ markedly among basins, and the inter-basin differentials are likely to remain quite volatile, as shown in Figure 18.

Figure 18 Gas Futures Prices in Selected LNG Markets



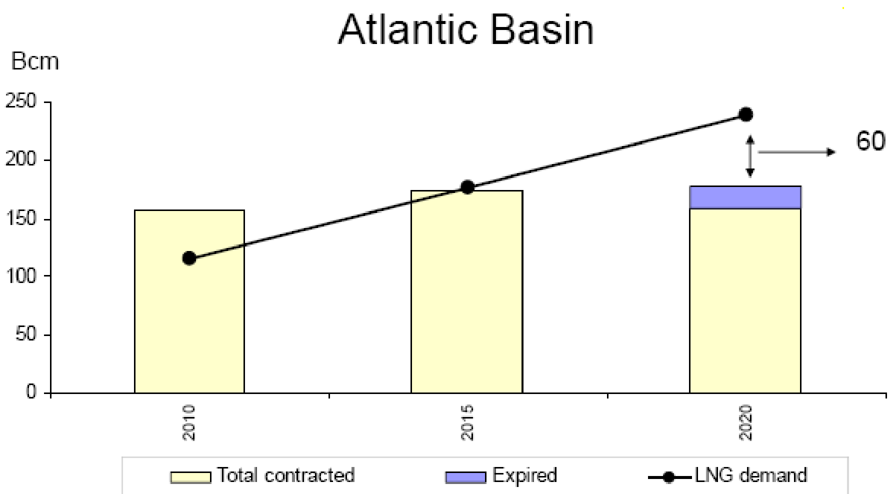
Source: CME-NYMEX Settlement Prices, 13 February 2014.

The unbalanced LNG spot pricing situation shown in Figure 18 among the different basins has led to more diversions away from Europe, where the deliveries were kept at minimum contractual levels if not for optimization hurdles and shipping constrains. It has also minimized LNG diversions to North America, except during seasonal peaks in the northeastern region.

5.3. The LNG Market – Long-Term Outlook

The Atlantic Basin, where Europe and the UNECE region has to be considered the main area importing LNG, as shown in the graph below (Source: Cedigaz) is currently oversupplied, with the consequence of several spot LNG deals inside this market in the short-term (Qatari cargoes initially destined to the US redirected to Europe and Latin America) and a significant development of LNG re-exports from some countries (US, Belgium and Spain) to higher price markets.

Figure 19 Contracted LNG Supplies into the Atlantic Basin



This scenario is expected to change after 2015, as the Atlantic Basin shows a growing supply deficit, reaching an estimated 60 bcm/y by 2020. Nevertheless, power generation, which is the main driver for gas demand, is not expected to develop significantly because of the need to opt for other, lower-cost and/or greener sources.

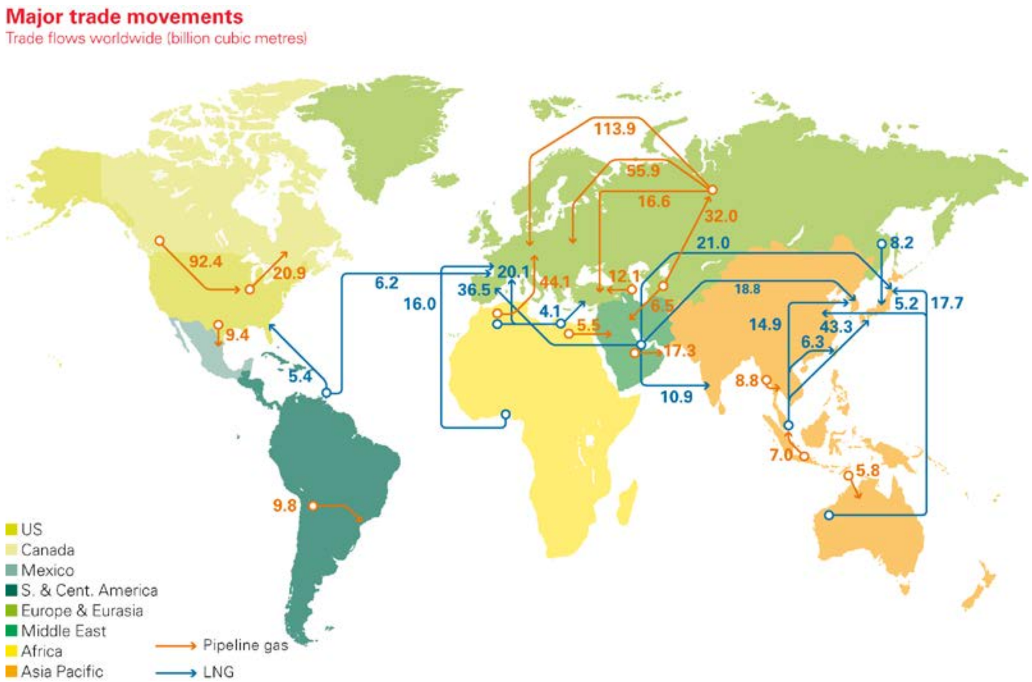
By 2020, the estimated gap for Asian markets is likely to reach approximately 100 bcm/y, with 54% of it in the traditional markets and the remainder in the major emerging markets (China and India). This Asian gap will mainly be covered by new Australian supplies, but also from North America, where new exports from Canada and the US Gulf terminals (via the expanded Panama Canal) are forecast to emerge in the post-2015 horizon.

The supply portfolio of the Asian countries will be decreasing in the next few years, as their contracts with historical suppliers (Indonesia, Brunei, Malaysia) will partially expire, and will largely be replaced by volumes from new trains currently under construction in Australia.

The overall gap in Middle East and Atlantic Basin, accounting for around 60 bcm/y as above, will likely be covered by a diversified portfolio of suppliers, with potential new projects from Africa, North America (US export projects) and Middle East (potential increase of Qatari production via debottlenecking of existing trains).

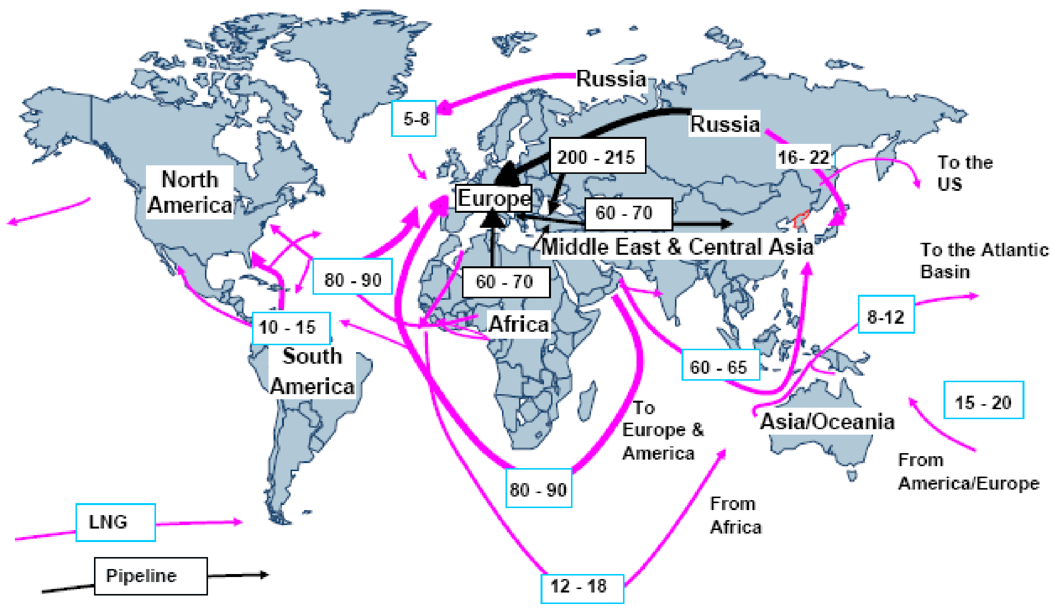
The following two maps reported below and respectively produced by BP (2010 figures) and Cedigaz in April 2011 (2020 forecast), represents their view of the role of international gas trade.

Figure 20 2010 Gas Trade Movements



Source: BP Statistical Review of World Energy 2011.

Figure 21 Projected 2020 Gas Trade Movements



Source: Cedigaz, 2011.

Appendices

APPENDIX A

NATURAL GAS RESERVES, PRODUCTION AND CONSUMPTION

Table A1 – Proved Gas Reserves by Region and Top 50 Countries: 2006-2010 (TCM)

Region	2006	2007	2008	2009	2010
Middle East	72.8	74.2	75.2	75.7	75.8
Eurasia	55.3	57.1	57.1	56.5	58.5
Asia & Oceania	13.8	14.7	15.8	15.8	16.2
Africa	14.4	14.6	14.6	14.7	14.7
North America	8.0	8.9	9.2	9.9	9.9
Central & South America	7.2	7.4	7.4	7.5	7.4
Europe	5.7	5.1	4.9	4.8	4.6
Country	**2006**	**2007**	**2008**	**2009**	**2010**
Russian Federation	43.3	43.3	43.3	44.4	44.8
Iran	26.9	28.1	29.6	29.6	29.6
Qatar	25.5	25.5	25.4	25.3	25.3
Turkmenistan	2.6	2.6	8.1	8.0	8.0
Saudi Arabia	7.1	7.3	7.6	7.9	8.0
US	6.0	6.7	6.9	7.7	7.7
United Arab Emirates	6.4	6.4	6.1	6.1	6.0
Venezuela	4.7	4.8	5.0	5.1	5.5
Nigeria	5.2	5.3	5.3	5.3	5.3

Algeria	4.5	4.5	4.5	4.5	4.5
Iraq	3.2	3.2	3.2	3.2	3.2
Indonesia	2.6	3.0	3.2	3.0	3.1
Australia	2.4	2.3	3.1	2.9	2.9
China	1.7	2.3	2.5	2.8	2.8
Malaysia	2.5	2.4	2.4	2.4	2.4
Egypt	2.0	2.1	2.2	2.2	2.2
Norway	2.3	2.3	2.2	2.0	2.0
Kazakhstan	1.8	1.9	1.8	1.9	1.8
Kuwait	1.8	1.8	1.8	1.8	1.8
Canada	1.6	1.6	1.8	1.7	1.7
Uzbekistan	1.7	1.7	1.7	1.6	1.6
Libya	1.4	1.5	1.5	1.5	1.5
India	1.1	1.1	1.1	1.1	1.5
Azerbaijan	1.2	1.2	1.3	1.3	1.3
Netherlands	1.2	1.2	1.1	1.2	1.2
Ukraine	1.0	1.0	1.0	1.0	0.9
Pakistan	0.8	0.9	0.8	0.8	0.8
Oman	1.0	1.0	0.7	0.7	0.7
Vietnam	0.2	0.5	0.6	0.7	0.6
Romania	0.6	0.6	0.6	0.6	0.6
Mexico	0.4	0.5	0.5	0.5	0.5
Yemen	0.5	0.5	0.5	0.5	0.5
Papua New Guinea	0.4	0.4	0.4	0.4	0.4
Brazil	0.3	0.4	0.4	0.4	0.4

Bangladesh	0.4	0.4	0.3	0.4	0.4
Trinidad & Tobago	0.5	0.5	0.4	0.4	0.4
Peru	0.3	0.3	0.3	0.4	0.4
Argentina	0.4	0.4	0.4	0.4	0.3
Burma (Myanmar)	0.5	0.5	0.3	0.3	0.3
Thailand	0.3	0.3	0.3	0.3	0.3
Brunei	0.3	0.3	0.3	0.3	0.3
Bolivia	0.7	0.7	0.7	0.7	0.3
Syria	0.3	0.3	0.3	0.3	0.3
United Kingdom	0.4	0.3	0.3	0.3	0.3
Bahrain	0.1	0.1	0.1	0.2	0.2
Colombia	0.1	0.1	0.1	0.1	0.1
Poland	0.1	0.1	0.1	0.1	0.1
Italy	0.1	0.1	0.1	0.1	0.1
Germany	0.1	0.1	0.1	0.1	0.1
Denmark	0.1	0.1	0.1	0.1	0.1

Source: BP Global, from bp.com/statisticalreview: proved reserves as reported by BP, June 2011

Table A2 – Gas Production by Region and Top 50 Countries: 2006-2010 (BCM)

Region	2006	2007	2008	2009	2010
Eurasia	809.1	818.2	838.9	722.8	772.0
North America	750.2	766.1	784.7	782.2	803.3
Middle East	334.6	352.6	378.3	411.7	465.9
Asia & Oceania	366.3	389.3	409.8	432.3	475.9
Europe	310.8	300.2	311.1	295.6	303.2
Africa	183.3	191.3	209.3	199.1	206.6
Central & South America	141.7	139.9	145.7	138.5	149.3

Country	2006	2007	2008	2009	2010
Russian Federation	649.0	646.0	655.0	577.0	623.0
United States	518.0	539.0	568.0	576.0	604.0
Canada	183.0	180.0	169.0	158.0	151.0
Iran	107.0	111.0	115.0	140.0	145.0
Qatar	50.0	62.0	76.0	88.0	115.0
Norway	87.0	89.0	98.0	103.0	105.0
China	58.0	68.0	75.0	83.0	93.0
Netherlands	76.0	75.0	83.0	78.0	88.0
Saudi Arabia	73.0	74.0	80.0	78.0	87.0
Algeria	86.0	84.0	86.0	81.0	84.0
Indonesia	62.0	68.0	69.0	72.0	82.0
Malaysia	55.0	55.0	61.0	60.0	61.0
Egypt	45.0	46.0	58.0	62.0	61.0

Uzbekistan	62.0	64.0	67.0	61.0	59.0
United Kingdom	79.0	71.0	69.0	58.0	56.0
India	30.0	31.0	32.0	40.0	52.0
United Arab Emirates	48.0	50.0	50.0	48.0	51.0
Australia	42.0	43.0	44.0	46.0	48.0
Mexico	49.0	47.0	47.0	48.0	48.0
Turkmenistan	62.0	68.0	70.0	38.0	45.0
Trinidad & Tobago	36.0	39.0	39.0	40.0	42.0
Argentina	46.0	44.0	44.0	41.0	40.0
Pakistan	36.0	36.0	38.0	38.0	39.0
Thailand	24.0	26.0	28.0	31.0	36.0
Nigeria	28.0	32.0	32.0	26.0	29.0
Oman	23.4	23.8	23.8	24.5	26.8
Venezuela	25.7	20.5	20.5	18.3	20.0
Bangladesh	15.2	16.1	17.7	19.4	19.9
Ukraine	19.3	19.3	19.6	20	19.2
Libya	13.1	15.1	15.7	16.0	17.0
Azerbaijan	6.8	10.6	16.6	16.2	16.5
Bolivia	13.1	13.9	14.5	12.5	14.2
Germany	19.4	18.4	15.9	14.8	13.0
Brazil	9.8	9.7	12.5	10.2	12.5
Bahrain	11.2	11.7	12.3	12.4	12.1
Burma (Myanmar)	12.5	13.4	12.3	11.4	12.0
Brunei	13.6	13.3	13.2	11.2	11.7
Kuwait	12.3	12.0	12.6	11.4	11.6

Colombia	7.1	7.6	8.9	10.4	11.1
Romania	12.6	12.1	11.3	11.0	10.5
Kazakhstan	9.6	9.7	11.1	10.9	9.0
Syria	6.2	5.9	5.8	6.4	8.9
Italy	10.9	9.6	9.2	7.9	8.2
Vietnam	6.0	6.0	7.0	7.0	8.1
Denmark	10.3	9.1	10.0	8.3	8.1
Peru	1.8	2.6	3.6	3.4	7.1
Yemen	0	0	0	0.78	6.2
Poland	5.9	6.0	5.7	5.8	6.0
Iraq	1.8	1.5	1.9	1.2	1.0
Papua New Guinea	0.14	0.14	0.14	0.11	0.11

Source: US EIA, from IEA.

Table A3 – Gas Consumption by Region and Top 50 Countries: 2006-2010 (BCM)

Region	2006	2007	2008	2009	2010
North America	761.4	799.3	805.4	786.4	816.4
Central & South America	126.6	122.6	130.2	122.1	135.9
Europe	566.4	561.6	572.4	542.6	578.0
Eurasia	662.1	676.5	678.2	591.5	659.1
Middle East	287.4	298.9	326.6	350.0	371.0
Africa	81.2	86.2	101.3	94.8	100.0
Asia & Oceania	428.7	468.6	491.2	515.3	573.0

Country	2006	2007	2008	2009	2010
United States	614.4	654.2	659.1	648.7	682.1
Russian Federation	415.0	422.0	416.0	389.6	414.1
Iran	108.7	113.0	119.3	131.4	144.6
China	56.1	70.5	81.3	89.5	106.9
United Kingdom	90.1	91.1	99.3	91.2	99.2
Canada	96.9	96.2	96.1	94.9	95.0
Japan	83.7	90.2	93.7	87.4	94.5
Saudi Arabia	73.5	74.4	80.4	78.5	87.7
Germany	87.2	82.9	81.2	78.0	83.3
Italy	77.4	77.8	77.8	71.5	76.1
Mexico	66.6	63.5	66.3	72.4	72.5
India	37.3	40.1	41.3	51.0	61.9
United Arab Emirates	43.4	49.2	59.5	59.1	60.8
Ukraine	67.0	63.2	60.0	47.0	52.1

France	44.0	42.6	44.3	42.6	47.4
Uzbekistan	41.9	45.9	48.7	43.5	45.5
Egypt	36.5	38.4	40.8	42.5	45.1
Thailand	33.3	35.4	37.4	39.2	45.1
Netherlands	38.1	37.0	38.6	38.9	43.6
Argentina	41.8	43.9	44.4	43.2	43.3
South Korea	32.0	34.7	35.7	33.9	43.0
Indonesia	33.2	31.3	33.3	37.4	40.3
Pakistan	36.1	36.8	37.5	38.4	39.6
Turkey	30.5	36.1	37.5	35.7	39.0
Spain	33.7	35.1	38.6	34.6	34.6
Malaysia	33.7	33.4	33.8	33.0	34.5
Venezuela	31.5	29.6	31.5	30.5	33.2
Other Africa	25.7	29.3	30.9	26.9	32.4
Brazil	20.6	21.2	24.9	20.1	26.8
Algeria	23.7	24.3	25.4	27.2	26.3
Australia	24.4	26.6	25.5	25.2	25.7
Trinidad & Tobago	21.2	21.9	21.3	22.2	23.2
Turkmenistan	18.4	21.3	20.5	19.9	22.6
Bangladesh	15.1	15.9	17.0	18.5	19.9
Qatar	19.6	19.3	19.3	20.0	19.9
Belarus	19.0	18.8	19.2	16.1	19.7
Belgium	16.7	16.6	16.5	16.8	18.8
Poland	13.7	13.8	14.9	14.4	15.5

Kuwait	12.5	12.1	12.8	12.4	14.5
Taiwan	10.1	10.7	11.6	11.3	14.1
Romania	18.1	16.1	15.9	13.3	13.6
Hungary	12.7	11.9	11.7	10.2	10.9
Austria	9.4	8.9	9.5	9.3	10.1
Vietnam	7.0	7.1	7.5	8.0	9.4
Czech Republic	9.3	8.7	8.7	8.2	9.3
Colombia	7.0	7.4	7.6	8.7	9.1
Singapore	7.1	8.6	8.2	8.1	8.4
Kazakhstan	9.9	8.4	8.1	7.8	8.2
Azerbaijan	9.1	8.0	9.2	7.8	7.4
Slovakia	6.0	5.7	5.7	4.9	5.6

Source: BP Statistical Review 2013.

APPENDIX B

WORLD LNG IMPORTS AND EXPORTS, 2010

(Bcm per year; table in three parts; numbers may not add due to rounding)

PART I	*Qatar*	*Indonesia*	*Malaysia*	*Australia*	*Nigeria*	*Trinidad & Tobago*
IMPORTERS						
North America	2.6	1.9	0.0	0.4	3.4	7.0
United States	1.3	0.0	0.0	0.0	1.2	5.4
Canada	0.3	0.0	0.0	0.0	0.0	1.6
Mexico[1]	1.0	1.9	0.0	0.0	2.2	0.0
Central & South America	1.0	0.0	0.0	0.0	0.9	4.6
Argentina	0.2	0.0	0.0	0.0	0.0	1.6
Brazil	0.6	0.0	0.0	0.0	0.9	0.9
Chile	0.3	0.0	0.0	0.0	0.0	0.5
Dominican Republic	0.0	0.0	0.0	0.0	0.0	0.8
Puerto Rico	0.0	0.0	0.0	0.0	0.0	0.8
Europe	35.8	0.0	0.0	0.0	15.9	6.2
Belgium	5.8	0.0	0.0	0.0	0.2	0.1
France	2.4	0.0	0.0	0.0	3.6	0.4
Greece	0.0	0.0	0.0	0.0	0.0	0.1

Italy	6.2	0.0	0.0	0.0	0.0	0.3
Portugal	0.1	0.0	0.0	0.0	2.7	0.2
Spain	5.5	0.0	0.0	0.0	7.8	3.3
Turkey	1.9	0.0	0.0	0.0	1.3	0.3
United Kingdom	13.9	0.0	0.0	0.0	0.4	1.6
Asia & Oceania	36.2	29.5	30.3	25.3	3.6	20.9
China	1.6	2.5	1.7	5.2	0.2	0.1
India	10.5	0.0	0.0	0.0	0.3	0.7
Japan	10.2	17.0	18.6	17.7	0.8	0.2
South Korea	10.2	7.4	6.4	1.3	1.2	0.9
Taiwan	3.8	2.6	3.7	1.1	0.1	0.0
Apparent Exports	0.2	0.0	0.2	0.1	0.1	0.3
PART II	***Algeria***	***Federation***	***Oman***	***Egypt***	***Brunei***	***United Arab Emirates***
IMPORTERS						
North America	0.0	0.0	0.0	2.2	0.0	0.0
United States	0.0	0.0	0.0	2.1	0.0	0.0
Canada	0.0	0.0	0.0	0.0	0.0	0.0
Mexico[1]	0.0	0.0	0.0	0.1	0.0	0.0

Central & South America	0.2	0.0	0.0	0.6	0.0	0.04
Argentina	0.0	0.0	0.0	0.0	0.0	0.0
Brazil	0.0	0.0	0.0	0.0	0.0	0.04
Chile	0.2	0.0	0.0	0.6	0.0	0.0
Dominican Republic	0.0	0.0	0.0	0.0	0.0	0.0
Puerto Rico	0.0	0.0	0.0	0.0	0.0	0.0
Europe	19.1	0.0	0.2	4.7	0.0	0.0
Belgium	0.0	0.0	0.0	0.2	0.0	0.0
France	6.3	0.0	0.0	0.7	0.0	0.0
Greece	1.0	0.0	0.0	0.1	0.0	0.0
Italy	1.6	0.0	0.0	0.7	0.0	0.0
Portugal	0.0	0.0	0.0	0.0	0.0	0.0
Spain	5.1	0.0	0.2	2.6	0.0	0.0
Turkey	3.9	0.0	0.0	0.3	0.0	0.0
United Kingdom	1.3	0.0	0.0	0.1	0.0	0.0
Asia & Oceania	0.1	13.3	10.4	1.9	8.8	7.6
China	0.0	0.5	0.0	0.1	0.0	0.1
India	0.0	0.0	0.0	0.1	0.0	0.0
Japan	0.1	8.2	3.8	0.6	7.8	6.9
South Korea	0.0	3.9	6.1	1.0	1.1	0.3
Taiwan	0.0	0.7	0.5	0.2	0.0	0.4

Apparent Exports	0.0	0.1	0.9	0.3	0.0	0.3
PART III	***Yemen***	***Equatorial Guinea***	***Norway***	***Peru***	***Other***	***Total Imports***
IMPORTERS						
North America	1.3	0.0	0.8	0.8	0.0	20.0
United States	1.1	0.0	0.7	0.4	0.0	12.2
Canada	0.0	0.0	0.1	0.1	0.0	2.0
Mexico[1]	0.2	0.0	0.0	0.3	0.0	5.7
Central & South America	0.1	1.6	0.0	0.2	0.2	9.2
Argentina	0.0	0.0	0.0	0.0	0.0	1.8
Brazil	0.0	0.1	0.0	0.2	0.2	2.8
Chile	0.1	1.5	0.0	0.0	0.0	3.1
Dominican Republic	0.0	0.0	0.0	0.0	0.0	0.8
Puerto Rico	0.0	0.0	0.0	0.0	0.0	0.8
Europe	0.5	0.1	3.6	0.7	0.7	87.8
Belgium	0.0	0.0	0.1	0.1	0.1	6.4
France	0.1	0.0	0.5	0.0	0.0	13.9
Greece	0.0	0.03	0.0	0.0	0.0	1.2
Italy	0.0	0.1	0.2	0.0	0.0	9.1

Portugal	0.0	0.0	0.1	0.0	0.0	3.0
Spain	0.2	0.0	1.6	0.6	0.5	27.5
Turkey	0.0	0.0	0.3	0.0	0.1	7.9
United Kingdom	0.3	0.0	0.9	0.0	0.0	18.7
Asia & Oceania	3.5	3.2	0.2	0.2	1.4	177.8
China	0.7	0.1	0.0	0.1	0.1	12.8
India	0.4	0.2	0.0	0.0	0.0	12.2
Japan	0.2	0.7	0.0	0.0	0.9	93.5
South Korea	2.3	1.9	0.2	0.1	0.4	44.4
Taiwan	0.0	0.4	0.1	0.0	0.0	14.9
Apparent Exports	0.1	0.3	0.0	0.0	0.1	2.9

Source: BP Global, from bp.com/statisticalreview:Natural Gas Trade Movement. June 2011.

APPENDIX C

LNG LIQUEFACTION AND SUPPLY FACILITIES

Table C1 – Liquefaction Plants in Operation as of November 2011

Basin	Region	Location	Project Name	Train	Participants	Design Capacity (mt)
Atlantic	Central America	Trinidad	Atlantic LNG	Train 1	NGC (10.0%) BP (34.0%) BG (26.0%) Repsol (20.0%) Suez (10.0%)	3.1
Atlantic	Central America	Trinidad	Atlantic LNG	Train 2	BP (42.5%) BG (32.5%) Repsol (25.0%)	3.4
Atlantic	Central America	Trinidad	Atlantic LNG	Train 3	BP (42.5%) BG (32.5%) Repsol (25.0%)	3.4
Atlantic	Central America	Trinidad	Atlantic LNG	Train 4	NGC (11.11%), BP (37.78%), BG (28.89%), Repsol (22.22%)	5.2
Atlantic	Europe	Norway	Nordic LNG	Train 1	Lyse-Energi (Skangass)	0.3
Atlantic	Europe	Norway	Snohvit	Train 1	Statoil (33.532%), Petoro (30.0%), Total (18.4%), GDF (12.0%), Amerada Hess (3.26%), RWE (2.81%)	4.2
Atlantic	North Africa	Algeria	Arzew GL - 4Z Bethioua GL-1Z, GL-2 Z	15 trains	Sonatrach	18.7

Atlantic	North Africa	Algeria	Skikda	Train 40, 5P, 6P	Sonatrach	3.4
Atlantic	North Africa	Egypt	Damietta	Train 1	SEGAS (Union Fenosa Gas 80% (50/50 Union Fenosa & ENI), EGAS 10%and EGPC 10%)	5.0
Atlantic	North Africa	Egypt	Idku Egyptian LNG	Train 1	BG (35.5), Petronas (35.5), EGAS (12), EGP (12), GDF (5)	3.6
Atlantic	North Africa	Egypt	Idku Egyptian LNG	Train 2	BG (38), Petronas (38), EGAS (12), EGP (12)	3.6
Atlantic	North Africa	Libya	Marsa al-Brega	Train 1, 2, 3	Sirte Oil NOC	3.2
Atlantic	West Africa	Equatorial Guinea	Bioko Equatorial Guinea LNG	Train 1	Marathon (60%), Sonagas (25%), Mitsui (8.5%), Marubeni (6.5%)	3.7
Atlantic	West Africa	Nigeria	NLNG	Train 4	NNPC (49.0%), Shell (25.6%), Total (15.0%), ENI (10.4%)	4.1
Atlantic	West Africa	Nigeria	NLNG	Train 5	NNPC (49.0%), Shell (25.6%), Total (15.0%), ENI (10.4%)	4.1
Atlantic	West Africa	Nigeria	NLNG	Train 6	NNPC (49.0%), Shell (25.6%), Total (15.0%), ENI (10.4%)	4.1
Atlantic	West Africa	Nigeria	NLNG	Train 3	NNPC (49.0%), Shell (25.6%), Total (15.0%), ENI (10.4%)	3.0

Atlantic	West Africa	Nigeria	NLNG	Train 1, 2	NNPC (49.0%), Shell (25.6%), Total (15.0%), ENI (10.4%)	6.6
Subtotal, Atlantic Basin						82.7
Middle East	Other Middle East	Oman	Oman LNG	Train 1, 2	Oman(51.0%), Shell (30.0%), Mitsubishi (2.77%), Mitsui (2.77%), Itochu (0.92%), Total (5.54%), Korea LNG (5.0%),Partex (2.0%)	6.6
Middle East	Other Middle East	Oman	Qalhat LNG	Train 1	Sultanate (46.84%), Oman LNG (36.8%), Union Fenosa 7.36%, Mitsubishi (3%), Itochu (3%), Osaka Gas (3%))	3.7
Middle East	Other Middle East	UAE	Abu Dhabi LNG (Adgas LNG)	Trains 1, 2, 3	ADNOC 70%, Mitsui 15%, BP 10%, Total 5%	5.8
Middle East	Other Middle East	Yemen	Yemen LNG	Train 1,2	YGC (16.73%), Total (39.62%), Hunt (17.22%), South Korea Consortium [SK (9.55%), Hyundai (5.88%), Kogas (6.0%)], Yemen GGASSP (5.0%	6.7
Middle East	Qatar	Qatar	Qatargas	Train 1, 2, 3	QP (65.0%), Exxon (10.0%), Total (10.0%), Mitsui (7.5%), Marubeni (7.5%)	10.0
Middle East	Qatar	Qatar	Qatargas II	Train 4	QP (70.0%), Exxon (30.0%)	7.8

Middle East	Qatar	Qatar	Qatargas II	Train 5	QP (70.0%), Exxon (18.3%), Total (16.7%)	7.8
Middle East	Qatar	Qatar	Qatargas III	Train 6	QP (68.5%), Conoco (30%), Mitsui (1.5%)	7.8
Middle East	Qatar	Qatar	Qatargas IV	Train 7	QP (70.0%), Shell (30.0%)	7.8
Middle East	Qatar	Qatar	Rasgas	Train 1, 2	QP(63.0%), Exxon (25.0%), KOGAS (5.0%), Itochu (4.0%), LNG Japan (3.0%)	6.6
Middle East	Qatar	Qatar	Rasgas II	Train 5	QP (70.0%), Exxon (30.0%), CPC (5%)	4.7
Middle East	Qatar	Qatar	Rasgas II	Train 3	QP (70.0%), Exxon (30.0%)	4.7
Middle East	Qatar	Qatar	Rasgas II	Train 4	QP (70.0%), Exxon (30.0%)	4.7
Middle East	Qatar	Qatar	Rasgas III	Train6	QP (70.0%), Exxon (30.0%)	7.8
Middles East	Qatar	Qatar	Rasgas III	Train 7	QP (70.0%), Exxon (30.0%)	7.8
Subtotal, Middle East						100.3
Pacific	Australia	Australia	Darwin	Train 1	Conoco (56.72), ENI (11), Santos (11.4), INPEX (11.3), Tokyo Gas (3.36), Tokyo Electric (6.72)	3.5

Pacific	Australia	Australia	NW Shelf	Trains 1, 2, 3	Woodside (16.67%), BHP (16.67%), BP (16.67%), Chevron (16.67%), Shell (16.67%), MIMI (Mitsubishi 8.33%, Mitsui 8.33%, CNOOC (only in fields)	7.5
Pacific	Australia	Australia	NW Shelf	Train 4	Woodside (16.67%), BHP (16.67%), BP (16.67%), Chevron (16.67%), Shell (16.67%), MIMI (Mitsubishi 8.33%, Mitsui 8.33%, CNOOC (only in fields)	4.2
Pacific	Australia	Australia	NW Shelf	Train 5	Woodside (16.67%), BHP (16.67%), BP (16.67%), Chevron (16.67%), Shell (16.67%), MIMI (Mitsubishi 8.33%, Mitsui 8.33%, CNOOC (only in fields)	4.4
Pacific	Indonesia & Malaysia	Brunei	Lumut	Trains 1, 2, 3, 4, 5	Brunei (50%), Mitsubishi (25%), Shell (25%)	7.2
Pacific	Indonesia & Malaysia	Indonesia	Arun	Trains 1, 2, 3, 4, 5, 6	Pertamina (55%), Exxon (30%), JILCO (15%	13.6

Pacific	Indonesia & Malaysia	Indonesia	Bontang	Trains 1, 2, 3, 4, 5, 6, 7, 8	Pertamina (55%), Vico (20%), Total (10%), JILCO (15%)	24.6
Pacific	Indonesia & Malaysia	Indonesia	Tangguh	Trains 1, 2	BP (37.16%), Mitsubishi (Inpex) (16.3%), CNOOC (13.9%), Talisman (3.06%), Nippon Oil (12.23%), Kanematsu (10%), LNG Japan (7.35%)	7.6
Pacific	Indonesia & Malaysia	Malaysia	MLNG Dua	Trains 1, 2, 3	Petronas (60%), Shell (15%), Mitsubishi (15%), Sarawak (10%)	7.8
Pacific	Indonesia & Malaysia	Malaysia	MLNG Satu	Trains 1, 2, 3	Petronas (65%), Mitsubishi (15%), Sarawak (5%), Shell (15%)	8.1
Pacific	Indonesia & Malaysia	Malaysia	MLNG Tiga	Trains 1, 2	Petronas (60%), Shell (15%), Nippon (10%), Diamond Gas (5%), Sarawak (10%)	6.8
Pacific	North America	Alaska	Kenai	Train 1	Marathon Oil(30%), ConocoPhillips(70%)	1.4
Pacific	Russia	Russia	Sakhalin II	Train 2	Shell (27.5%), Mitsui(12.5%), Mitsubishi(10%), Gazprom(50%)	4.8
Pacific	Russia	Russia	Sakhalin II	Train 1	Shell (27.5), Mitsui(12.5), Mitsubishi(10), Gazprom(50)	4.8

Pacific	South America	Peru	Peru LNG	Train 1	Hunt (50%), SK (20%), Repsol (20%), Marubeni (10%)	4.5
Subtotal, Pacific						110.8
Total, All Basins						293.8

Source: Galway Group, Houston, TX, 2011.

Table C2 – LNG Liquefaction Plants Under Construction as of November 2011

Basin	Region	Location	Project Name	Train	Design Capacity (mt)	Published Start-up
Atlantic	North Africa	Algeria	Gassi Touil (GL3Z)	Train 1	4.7	2014
Atlantic	North Africa	Algeria	Skikda	Expansion	4.5	2014
Atlantic	West Africa	Angola	Angola LNG Soyo	Train 1	5.2	2012
Subtotal, Atlantic Basin					14.4	
Pacific	Australia	Australia	Gorgon LNG	Trains 1, 2, 3	15.0	2014
Pacific	Australia	Australia	Pluto LNG	Train 1	4.8	2012
Pacific	Indonesia & Malaysia	Malaysia	MLNG Dua (debottleneck)	Trains 1, 2, 3	1.7	TBD
Subtotal, Pacific					21.5	
Total, All Basins					35.9	

Source: Galway Group, Houston, TX, 2011.

Table C3a – North America LNG Export Projects Approved

Basin	Region	Location	Project Name	Design Capacity (mt)	Level of Approval
Atlantic	North America	USA	Sabine Pass	16.0	Full
Atlantic	North America	USA	Freeport	9.0	FTA
Atlantic	North America	USA	Cameron	15.o	FTA
Atlantic	North America	USA	Cove Point	7.8	FTA
Subtotal Atlantic				47.8	
Pacific	North America	USA	Jordan Cove	9.4	FTA
Pacific	North America	Canada	Kitimat	0.10	Full
Subtotal Pacific				9.5	
Total				57.3	

Source: FERC. Ferc.org. North American LNG Import/Export Terminals

Table C3b – Other Planned & Proposed LNG Liquefaction Plants as of November 2009

Basin	Region	Location	Design Capacity (mt)	Current Stage Development Reported	Published Start-up
Atlantic	Central America	Trinidad	5.2	Expansion Concept	TBA
Atlantic	Central America	Venezuela	14.1	Expansion Concept	2016
Atlantic	Europe	Norway	4.3	Expansion Concept	TBA
Atlantic	Europe	Russia	20.0	FEED	2014
Atlantic	Europe	Turkey		Greenfield Concept	TBA
Atlantic	North Africa	Egypt	8.6	Expansion Concept	TBA
Atlantic	North Africa	Libya	19.2	Expansion Concept	2012
Atlantic	South America	Brazil	3.0	Greenfield Concept	2015
Atlantic	West Africa	Angola	5.0	Expansion Concept	TBA
Atlantic	West Africa	Equatorial Guinea	5.4	FID	2011
Atlantic	West Africa	Mauritania	4.0	Greenfield Concept	TBA
Atlantic	West Africa	Namibia	1.0	Greenfield Concept	TBA
Atlantic	West Africa	Nigeria	96.3	Greenfield Concept	TBA
Subtotal, Atlantic			186.1		
Middle East	Other Middle East	Iran	47.3	FEED	2011
Middle East	Other Middle East	Iraq	4.5	Greenfield Concept	TBA

Subtotal, Middle East			51.8		
Pacific	Australia	Australia	93.7	Expansion Concept	
Pacific	Indonesia & Malaysia	Brunei	4.0	Expansion Concept	TBA
Pacific	Indonesia & Malaysia	Indonesia	16.0	Expansion Concept	
Pacific	Indonesia & Malaysia	Papua New Guinea	20.0	Expansion Concept	
Pacific	Indonesia & Malaysia	Papua New Guinea	8.0	FEED	2014
Pacific	North America	Canada	5.5	Greenfield Concept	2013
Pacific	Russia	Russia	18.7	Greenfield Concept	2020.0
Pacific	South America	Peru	4.4	Expansion Concept	TBA
Subtotal, Pacific			170.3		
Total			408.1		

Source: Galway Group, Houston, TX, 2009.

APPENDIX D

INVENTORY OF LNG TANKERS

Table D1 – Small LNG Tankers in Service as of November 2009 (<100,000 m³)

Ship Name	Ship Owner	Year of Delivery	Capacity (cu.m.)
Polar Eagle	Teekay LNG	1993	89,880
Arctic Sun	Teekay LNG	1993	89,880
Norman Lady	Hoegh LNG	1973	87,600
Bilis	Brunei Shell Tankers	1975	77,731
Bubuk	Brunei Shell Tankers	1975	77,670
Cheikh El Mokrani	Med. LNG Tpt. Corp.	2007	75,500
Cheikh Bouamama	Med. LNG Tpt. Corp.	2008	75,500
Bekalang	Brunei Shell Tankers	1973	75,080
Bekulan	Brunei Shell Tankers	1973	75,070
Bebatik	Brunei Shell Tankers	1972	75,060
Belais	Brunei Shell Tankers	1974	75,040
Belanak	Brunei Shell Tankers	1975	75,000
Gaz de France Energy	Gaz de France	2006	74,100
SCF Polar	Sovcomflot	1969	71,500
SCF Arctic	Sovcomflot	1969	71,500
LNG Portovenere	ENI	1996	65,000
LNG Lerici	ENI	1998	65,000
LNG Palmaria	ENI	1969	41,000
LNG Elba	ENI	1970	41,000
Hassi R'Mel	SNTM-Hyproc	1971	40,850

Tellier	Messigaz	1974	40,081
Isabella	Chemikalien Seetransport	1975	35,500
Annabella	Chemikalien Seetransport	1975	35,500
Surya Satsuma	MCGC International	2000	23,096
Surya Aki	MCGC International	1996	19,474
Sun Arrows	Maple LNG Transport	2007	19,100
Aman Bintulu	Perbadanan/NYK Line	1993	18,928
Aman Sendai	Perbadanan/NYK Line	1997	18,928
Aman Hakata	Perbadanan/NYK Line	1998	18,800
Total Capacity			1,648,368

Source: Galway Group, Houston, TX, 2009.

Table D2 - Standard (100,000 - 200,00 m3) LNG Tankers in Service and Under Construction as of November 2009

Ship Name	Ship Owner	Year of Delivery	Capacity (cu.m.)	Status
Hilli	Golar LNG	1975	126,227	In Service
Mostefa Ben Boulaid	SNTM-Hyproc	1976	125,260	In Service
Gimi	Golar LNG	1976	126,277	In Service
LNG Lagos	Bonny Gas Transport	1976	122,000	In Service
Larbi Ben M'Hidi	SNTM-Hyproc	1977	129,767	In Service
LNG Aquarius	MOL/LNG Japan	1977	126,300	In Service
LNG Aries	MOL/LNG Japan	1977	126,300	In Service
Khannur	Golar LNG	1977	126,360	In Service
Golar Freeze	Golar LNG	1977	125,858	In Service
Gandria	Golar LNG	1977	125,820	In Service
Transgas	Dynacom	1977	129,299	In Service
LNG Port Harcourt	Bonny Gas Transport	1977	122,000	In Service
Galeomma	Shell Shipping	1978	126,540	In Service
LNG Leo	MOL/LNG Japan	1978	126,400	In Service
LNG Gemini	MOL/LNG Japan	1978	126,300	In Service
LNG Capricorn	MOL/LNG Japan	1978	126,300	In Service
Methania	Distrigas	1978	131,235	In Service
LNG Delta	Bonny Gas Transport	1978	126,540	In Service
Suez Matthew	Suez LNG Shiping	1979	126,540	In Service
Bachir Chihani	SNTM-Hyproc	1979	129,767	In Service
LNG Virgo	MOL/LNG Japan	1979	126,400	In Service
LNG Libra	MOL/LNG Japan	1979	126,400	In Service
LNG Taurus	MOL/LNG Japan	1979	126,300	In Service
Mourad Didouche	SNTM-Hyproc	1980	126,130	In Service
LNG Edo	Bonny Gas Transport	1980	126,530	In Service
LNG Abuja	Bonny Gas Transport	1980	126,530	In Service
Ramdane Abane	SNTM-Hyproc	1981	126,130	In Service
Tenaga Dua	M.I.S.C.	1981	130,000	In Service
Tenaga Tiga	M.I.S.C.	1981	130,000	In Service
Tenaga Empat	M.I.S.C.	1981	130,000	In Service
Tenaga Lima	M.I.S.C.	1981	130,000	In Service
LNG Bonny	Bonny Gas Transport	1981	133,000	In Service
Tenaga Satu	M.I.S.C.	1982	130,000	In Service

Echigo Maru	J3 Consortium	1983	125,568	In Service
Banshu Maru	J3 Consortium	1983	125,542	In Service
Bishu Maru	J3 Consortium	1983	125,000	In Service
Kotawaka Maru	J3 Consortium	1984	125,199	In Service
Dewa Maru	J3 Consortium	1984	125,000	In Service
Senshu Maru	J3 Consortium	1984	125,000	In Service
LNG Fimina	Bonny Gas Transport	1984	133,000	In Service
Wakaba Maru	J3 Consortium	1985	125,000	In Service
Northwest Swallow	J3 Consortium	1989	127,708	In Service
Northwest Swift	J3 Consortium	1989	127,590	In Service
Northwest Sanderling	Australia LNG	1989	127,525	In Service
Ekaputra	Humpuss Consortium	1990	136,400	In Service
Northwest Snipe	Australia LNG	1990	127,747	In Service
Northwest Shearwater	Australia LNG	1991	127,500	In Service
Northwest Seaeagle	Australia LNG	1992	127,452	In Service
LNG Flora	J3 Consortium	1993	127,705	In Service
Northwest Sandpiper	Australia LNG	1993	127,500	In Service
LNG Vesta	Tokyo Gas Consortium	1994	127,547	In Service
YK Sovereign	SK Shipping	1994	127,125	In Service
Shahamah	National Gas Shipping	1994	135,496	In Service
Al Khaznah	National Gas Shipping	1994	135,496	In Service
Puteri Intan	M.I.S.C.	1994	130,405	In Service
Hyundai Utopia	Hyundai MM	1994	125,182	In Service
Dwiputra	Humpuss Consortium	1994	127,386	In Service
Northwest Stormpetrel	Australia LNG	1994	127,606	In Service
Ish	National Gas Shipping	1995	137,540	In Service
Ghasha	National Gas Shipping	1995	137,514	In Service
Puteri Delima	M.I.S.C.	1995	130,405	In Service
Puteri Nilam	M.I.S.C.	1995	130,405	In Service
Hanjin Pyeong Taek	Hanjin Shipping	1995	130,600	In Service
Mubaraz	National Gas Shipping	1996	137,000	In Service
Mraweh	National Gas Shipping	1996	137,000	In Service
Puteri Zamrud	M.I.S.C.	1996	130,405	In Service
Al Zhubarah	J4 Consortium	1996	137,573	In Service
Al Khor	J4 Consortium	1996	137,354	In Service
Hyundai Greenpia	Hyundai MM	1996	125,000	In Service
Al Hamra	National Gas	1997	137,000	In Service

	Shipping			
Umm Al Ashtan	National Gas Shipping	1997	137,000	In Service
Puteri Firuz	M.I.S.C.	1997	130,405	In Service
Al Wajbah	J4 Consortium	1997	137,354	In Service
Al Rayyan	J4 Consortium	1997	135,358	In Service
Broog	J4 Consortium	1998	135,466	In Service
Zekreet	J4 Consortium	1998	135,420	In Service
Al Wakrah	J4 Consortium	1998	135,358	In Service
SK Summit	SK Shipping	1999	138,000	In Service
Doha	J4 Consortium	1999	137,354	In Service
Al Biddah	J4 Consortium	1999	135,279	In Service
Hyundai Technopia	Hyundai MM	1999	135,000	In Service
Hanjin Muscat	Hanjin Shipping	1999	138,200	In Service
SK Splendor	SK Shipping	2000	138,375	In Service
SK Stellar	SK Shipping	2000	138,375	In Service
SK Supreme	SK Shipping	2000	138,200	In Service
LNG Jamal	Osaka Gas/J3 Cons.	2000	135,333	In Service
K Acacia	Korea Line	2000	138,017	In Service
K Freesia	Korea Line	2000	135,256	In Service
Al Jasra	J4 Consortium	2000	137,100	In Service
Hyundai Cosmopia	Hyundai MM	2000	135,000	In Service
Hyundai Aquapia	Hyundai MM	2000	135,000	In Service
Hyundai Oceanpia	Hyundai MM	2000	135,000	In Service
Hanjin Sur	Hanjin Shipping	2000	138,333	In Service
Hanjin Ras Laffan	Hanjin Shipping	2000	138,214	In Service
Golar Mazo	Golar/Chinese Pet.	2000	135,225	In Service
Sohar LNG	Oman Gas/MOL	2001	137,248	In Service
Puteri Intan Satu	M.I.S.C.	2001	137,100	In Service
Hispania Spirit	Teekay LNG	2002	140,500	In Service
Galea	Shell Shipping	2002	134,425	In Service
Puteri Delima Satu	M.I.S.C.	2002	137,100	In Service
Abadi	Brunei Gas Carriers	2002	135,000	In Service
British Trader	BP Shipping	2002	138,000	In Service
LNG Rivers	Bonny Gas Transport	2002	137,231	In Service
LNG Sokoto	Bonny Gas Transport	2002	137,231	In Service
Energy Frontier	Tokyo LNG Tankers	2003	147,599	In Service
Catalunya Spirit	Teekay LNG	2003	138,000	In Service
Gallina	Shell Shipping	2003	134,425	In Service
Pacific Notus	Pacific LNG Shipping	2003	137,006	In Service
Puteri Nilam Satu	M.I.S.C.	2003	137,100	In Service
SK Sunrise	I. S. Carriers	2003	138,306	In Service

Golar Arctic	Golar LNG	2003	140,648	In Service
Methane Princess	Golar LNG	2003	138,000	In Service
Excel	Exmar/MOL	2003	138,106	In Service
Castillo de Villalba	Elcano	2003	138,000	In Service
BW Suez Boston	BW Gas	2003	138,059	In Service
Berge Everett	BW Gas	2003	138,028	In Service
British Innovator	BP Shipping	2003	138,200	In Service
British Merchant	BP Shipping	2003	138,000	In Service
LNG Bayelsa	Bonny Gas Transport	2003	137,500	In Service
Galicia Spirit	Teekay LNG	2004	140,624	In Service
Gemmata	Shell Shipping	2004	138,104	In Service
Disha	Petronet LNG Ltd.	2004	136,026	In Service
Raahi	Petronet LNG Ltd.	2004	136,026	In Service
Fuwairit	Peninsular LNG	2004	138,000	In Service
Muscat LNG	Oman Gas/MOL	2004	149,172	In Service
Puteri Firuz Satu	M.I.S.C.	2004	137,100	In Service
Puteri Zamrud Satu	M.I.S.C.	2004	137,100	In Service
Cadiz Knutsen	Knutsen/Marpetrol	2004	138,826	In Service
Bilbao Knutsen	Knutsen/Marpetrol	2004	138,000	In Service
Dukhan	J4 Consortium	2004	135,000	In Service
LNG River Orashi	BW Gas	2004	145,914	In Service
Berge Arzew	BW Gas	2004	138,088	In Service
Methane Kari Elin	British Gas	2004	138,200	In Service
LNG Akwa Ibom	Bonny Gas Transport	2004	141,000	In Service
Northwest Swan	Australia LNG	2004	138,000	In Service
Lala Fatma N'Soumer	Algeria Nippon Gas	2004	145,000	In Service
Maersk Ras Laffan	A. P. Moller	2004	138,270	In Service
Energy Advance	Tokyo LNG Tankers	2005	145,000	In Service
Madrid Spirit	Teekay LNG	2005	138,000	In Service
Al Thakhira	Peninsular LNG	2005	145,000	In Service
Al Deebel	Peninsular LNG	2005	145,000	In Service
Lusail	Peninsular LNG	2005	138,000	In Service
Nizwah LNG	Oryx LNG Carriers	2005	145,000	In Service
Salalah LNG	Oman Gas/MOL	2005	147,000	In Service
LNG Pioneer	Mitsui OSK Line	2005	138,000	In Service
Seri Alam	M.I.S.C.	2005		In Service

			138,000	
Puteri Mutiera Satu	M.I.S.C.	2005	137,100	In Service
Maran Gas Asclepius	Kristen Navigation	2005	145,000	In Service
Umm Bab	Kristen Navigation	2005	145,000	In Service
Gracilis	Golar LNG	2005	138,830	In Service
LNG Enugu	BW Gas	2005	145,000	In Service
LNG Oyo	BW Gas	2005	140,500	In Service
LNG Adamawa	Bonny Gas Transport	2005	141,000	In Service
LNG Cross River	Bonny Gas Transport	2005	141,000	In Service
Al Marrouna	Teekay LNG	2006	151,700	In Service
LNG Dream	Osaka Gas	2006	145,000	In Service
Ibri LNG	Oman Gas/MOL	2006	147,200	In Service
Ibra LNG	Oman Gas/MOL	2006	147,000	In Service
Arctic Princess	MOL/Hoegh LNG	2006	147,200	In Service
Arctic Lady	MOL/Hoegh LNG	2006	147,200	In Service
Energy Progress	Mitsui OSK Line	2006	145,000	In Service
Seri Amanah	M.I.S.C.	2006	145,000	In Service
Seri Anggun	M.I.S.C.	2006	145,000	In Service
Pacific Eurus	LNG Marine Transport	2006	137,000	In Service
Simaisma	Kristen Maritime	2006	145,700	In Service
Iberica Knutsen	Knutsen OAS	2006	138,000	In Service
Arctic Voyager	K Line	2006	140,000	In Service
Arctic Discoverer	K Line	2006	140,000	In Service
Grandis	Golar LNG	2006	145,700	In Service
Granosa	Golar LNG	2006	145,700	In Service
Provalys	Gaz de France	2006	153,500	In Service
LNG Lokoja	BW Gas	2006	148,300	In Service
LNG Benue	BW Gas	2006	145,700	In Service
Methane Rita Andrea	British Gas	2006	145,000	In Service
Methane Jane Elizabeth	British Gas	2006	145,000	In Service
Methane Lydon Volney	British Gas	2006	145,000	In Service
LNG River Niger	Bonny Gas Transport	2006	141,000	In Service
Maersk Qatar	A. P. Moller	2006	145,000	In Service
Neo Energy	Tsakos Navigation	2007	150,000	In Service
Al Areesh	Teekay LNG	2007	151,700	In Service
Al Daayen	Teekay LNG	2007	151,700	In Service
Bluesky	Taiwan Marine	2007	145,700	In Service
Grace Barleria	Swallowtail Shipping	2007	150,000	In Service
Grand Elena	Sovcomflot/NYK	2007	147,200	In Service

	Line			
Clean Energy	Pegasus Shipholding	2007	150,000	In Service
LNG Borno	NYK Line	2007	149,600	In Service
LNG Ogun	NYK Line	2007	149,600	In Service
Seri Bakti	M.I.S.C.	2007	152,300	In Service
Seri Begawan	M.I.S.C.	2007	152,300	In Service
Seri Angkasa	M.I.S.C.	2007	145,000	In Service
Seri Ayu	M.I.S.C.	2007	145,000	In Service
Clean Power	Lance Shipping	2007	150,000	In Service
Al Jassasiya	Kristen Maritime	2007	145,700	In Service
Maran Gas Coronis	Kristen Maritime	2007	145,700	In Service
Sestao Knutsen	Knutsen OAS	2007	138,000	In Service
Celestine River	K Line	2007	145,000	In Service
Ejnan	J4 Consortium	2007	145,000	In Service
Gaselys	Gaz de France/NYK	2007	153,500	In Service
LNG Kano	BW Gas	2007	148,300	In Service
LNG Ondo	BW Gas	2007	148,300	In Service
Methane Shirley Elizabeth	British Gas	2007	145,000	In Service
Methane Heather Sally	British Gas	2007	145,000	In Service
Methane Alison Victoria	British Gas	2007	145,000	In Service
Methane Nile Eagle	British Gas	2007	145,000	In Service
British Emerald	BP Shipping	2007	155,000	In Service
Grace Acacia	Algaet Shipping	2007	150,000	In Service
Energy Navigator	Tokyo LNG Tankers	2008	145,000	In Service
Tangguh Hiri	Teekay LNG	2008	155,000	In Service
Grand Aniva	Sovcomflot/NYK Line	2008	147,200	In Service
Tangguh Towuti	Sovcomflot/NYK Line	2008	145,700	In Service
Tangguh Batur	Sovcomflot/NYK Line	2008	145,700	In Service
Clean Force	Seacrown Mariti	2008	150,000	In Service
Grand Mereya	Primorsk/MOL/K Line	2008	147,200	In Service
LNG Ebisu	Pioneer Navigation	2008	145,000	In Service
LNG Barka	Osaka Gas	2008	153,000	In Service
	Osaka Gas	2008	153,000	In Service
Seri Bijaksana	M.I.S.C.	2008	152,300	In Service
Seri Balhaf	M.I.S.C.	2008	152,000	In Service
Seri Balquis	M.I.S.C.	2008	152,000	In Service
Alto Acrux	LNG Marine	2008	147,200	In Service

	Transport			
K Mugungwha	Korea Line	2008	151,800	In Service
K Jasmine	Korea Line	2008	145,700	In Service
Tangguh Foja	K Line	2008	155,000	In Service
Tangguh Jaya	K Line	2008	155,000	In Service
Trinity Arrow	K Line	2008	154,200	In Service
Trinity Glory	K Line	2008	154,000	In Service
Hyundai Ecopia	Hyundai M.M.	2008	145,000	In Service
Dapeng Sun	China LNG Ship Mgmt.	2008	147,000	In Service
Dapeng Moon	China LNG Ship Mgmt.	2008	147,000	In Service
LNG Imo	BW Gas	2008	148,300	In Service
British Ruby	BP Shipping	2008	155,000	In Service
British Sapphire	BP Shipping	2008	155,000	In Service
British Diamond	BP Shipping	2008	155,000	In Service
Grace Cosmos	Algahunt Shipping	2008	150,000	In Service
Maersk Arwa	A. P. Moller	2008	165,500	In Service
Maersk Magellan	A. P. Moller	2008	165,500	In Service
Maersk Methane	A. P. Moller	2008	165,000	In Service
Maersk Marib	A. P. Moller	2008	165,000	In Service
Energy Confidence	Tokyo LNG Tankers	2009	153,000	In Service
Tangguh Sago	Teekay LNG	2009	155,000	In Service
STX Kolt	STX Panocean	2009	145,700	In Service
Pacific Enlighten	LNG Marine Transport	2009	145,000	In Service
Tangguh Palung	K Line	2009	155,000	In Service
Cygnus Passage	Cygnus LNG Shipping	2009	145,400	In Service
Abdelkader	Cleopatra Shipping	2009	177,000	In Service
Min Rong	China LNG Ship Mgmt.	2009	147,000	In Service
Ben Badis	Nefertiti Shipping	2009	177,000	Under Construction
	Tokyo LNG Transport	2011	177,000	Under Construction
	Unknown	2012	177,000	Under Construction
	Elcano	2010	173,600	Under Construction
Barcelona Knutsen	Knutsen OAS	2010	173,400	Under Construction
	Knutsen OAS	2010	173,400	Under Construction
	Knutsen OAS	2010	173,400	Under Construction
	Knutsen OAS	2010	173,400	Under Construction
	Taiwan Marine	2010	171,800	Under Construction
	Taiwan Marine	2010	171,800	Under Construction
Methane Julia Louise	British Gas	2009	170,000	Under Construction
	British Gas	2010	170,000	Under Construction

	British Gas	2010	170,000	Under Construction
	British Gas	2010	170,000	Under Construction
Woodside Donaldson	A. P. Moller	2009	165,500	Under Construction
Maersk Meridian	A. P. Moller	2010	165,500	Under Construction
BW Suez Paris	BW Gas	2009	162,400	Under Construction
BW Suez Brussels	BW Gas	2009	162,400	Under Construction
	Sonangol	2011	160,500	Under Construction
	Sonangol	2011	160,500	Under Construction
	Sonangol	2011	160,500	Under Construction
	Mitsui/NYK/Teekay	2011	160,400	Under Construction
	Mitsui/NYK/Teekay	2011	160,400	Under Construction
	Mitsui/NYK/Teekay	2011	160,400	Under Construction
	Mitsui/NYK/Teekay	2012	160,400	Under Construction
	GasLog LNG	2009	155,000	Under Construction
	GasLog LNG	2009	155,000	Under Construction
	K Line	2009	155,000	Under Construction
Suez Point Fortin	Trinity LNG	2009	154,200	Under Construction
STX Frontier	STX Panocean	2009	153,000	Under Construction
	Brunei Shell Tankers	2011	148,000	Under Construction
	Brunei Shell Tankers	2011	148,000	Under Construction
	China LNG Shipping	2009	147,100	Under Construction
	China LNG Shipping	2009	147,100	Under Construction
	NYK Line	2009	145,000	Under Construction
	NYK Line	2009	145,000	Under Construction
	NYK Line	2010	145,000	Under Construction
	NYK Line	2010	145,000	Under Construction
Total Capacity			40,509,299	

Source: Galway Group, Houston, TX, 2009.

Table D3 - Qflex Tankers (200,000 - 220,00 m3) in Operation and Under Construction as of November 2009

Ship Name	Ship Owner	Year of Delivery	Capacity (cu.m.)	Status
Al Huwaila	Teekay LNG	2008	217,000	In Service
Al Kharsaah	Teekay LNG	2008	217,000	In Service
Al Shamal	Teekay LNG	2008	217,000	In Service
Al Khuwair	Teekay LNG	2008	217,000	In Service
Al Gattara	Overseas Shipholding	2007	216,200	In Service
Tenbek	Overseas Shipholding	2007	216,200	In Service
Al Gharaffa	Overseas Shipholding	2008	216,200	In Service
Al Thumama	J5 Consortium	2008	216,200	In Service
Al Sahla	J5 Consortium	2008	216,200	In Service
Al Hamla	Overseas Shipholding	2008	216,200	In Service
Mesaimeer	QGTC	2009	216,200	In Service
Al Kharaitiyat	QGTC	2009	216,200	In Service
Al Rekayyat	QGTC	2009	216,200	In Service
Al Ghashamiya	QGTC	2009	216,000	In Service
Al Utouriya	J5 Consortium	2008	215,000	In Service
Al Ruwais	ProNav Ship Mgmt.	2007	210,100	In Service
Al Safliya	ProNav Ship Mgmt.	2007	210,100	In Service
Duhail	ProNav Ship Mgmt.	2008	210,100	In Service
Al Ghariya	ProNav Ship Mgmt.	2008	210,100	In Service
Al Aamriya	J5 Consortium	2008	210,100	In Service
Al Oraiq	J5 Consortium	2008	210,100	In Service
Muraq	J5 Consortium	2008	210,100	In Service
Fraiha	J5 Consortium	2008	210,100	In Service
Umm Al Amad	J5 Consortium	2008	210,100	In Service
Al Shahaniya	QGTC	2009	210,100	In Service
Al Sadd	QGTC	2009	210,100	In Service
Onaiza	QGTC	2009	210,100	In Service
Al Khattiya	QGTC	2010	210,100	Under Construction
Al Kharaana	QGTC	2010	210,100	Under Construction
Al Dafna	QGTC	2010	210,100	Under Construction

Al Nuaman	QGTC	2010	210,100	Under Construction
Total Capacity			6,606,400	

Source: Galway Group, Houston, TX, 2009.

Table D4 – Conventional Qmax Tankers (>260,000 m^3) in Service and Under Construction as of November 2009

Ship Name	Ship Owner	Year of Delivery	Capacity (cu.m.)	Status
Mozah	QGTC	2008	266,000	In Service
Umm Slal	QGTC	2008	266,000	In Service
Bu Samra	QGTC	2008	266,000	In Service
Al Mayeda	QGTC	2009	266,000	In Service
Mekaines	QGTC	2009	266,000	In Service
Al Mafyar	QGTC	2009	266,000	In Service
Al Ghuwairiya	QGTC	2008	261,700	In Service
Al Samriya	QGTC	2008	261,700	In Service
Lijmilya	QGTC	2009	261,700	In Service
Al Bahiya	QGTC	2009	266,000	Under Construction
Shangra	QGTC	2009	266,000	Under Construction
Zarga	QGTC	2009	266,000	Under Construction
Aamira	QGTC	2010	266,000	Under Construction
Rashida	QGTC	2010	266,000	Under Construction
Total Capacity			3,711,100	

Source: Galway Group, Houston, TX, 2009.

Table D5 – FSRU Qmax Tankers (>260,000 m³) in Service and Under Construction as of November 2009

Ship Name	Ship Owner	FSRU In-Service	Capacity (cu.m.)	Status
Explorer	Exmar/Excelerate	2008	150,900	In Service
Express	Exmar/Excelerate	2009	150,900	In Service
Golar Frost		2009	138,830	FSRU
Golar Winter		2009	138,250	FSRU
Excalibur	Exmar/Excelerate	2002	138,200	In Service
Excelsior	Exmar	2005	138,000	In Service
Excellence	GKFF Ltd.	2005	138,000	In Service
Excelerate	Exmar/Excelerate	2006	138,000	In Service
Golar Spirit		2009	129,000	FSRU
Exquisite	Exmar	2009	150,900	Under Construction
Expedient	Exmar	2009	150,900	Under Construction
Exemplar	Exmar	2010	150,900	Under Construction
	Hoegh LNG/MOL	2009	145,000	Under Construction
	Hoegh LNG/MOL	2010	145,000	Under Construction
Total Capacity			2,002,780	

Source: Galway Group, Houston, TX, 2009.