Expansion and evolution of the Asia Pacific LNG markets◆

- The role of LNG has never been so important as it is today -

Hiroshi Hashimoto and Tsukasa Koyama*

Summary

The 2011 great earthquake[1] and ensuing nuclear crisis in Japan continue to have profound impacts on the nation's and global LNG business for many years to come.

Portfolio players[2] in the LNG market are enjoying advantageous positions by having flexibility in supply volumes and outlets. In short, many of them procure less expensive LNG originally destined to the Atlantic basin and sell it into the Pacific markets at much higher prices.

In turn, electric power and gas companies have been criticized in Japan for buying allegedly the most expensive LNG in the world, especially after increases of imports in 2011 and wider public awareness of less expensive gas in other regions of the world, especially in North America. The Japanese LNG buyers are often frustrated by the huge gaps between oil-linked long-term contract prices and hub-based spot gas prices in the Atlantic basin.

At the same time, market opportunities vacated by the lost nuclear power present better chances to LNG project sponsors in the Pacific basin to proceed earlier than otherwise. Buyers may be able to place themselves in a better position by having larger demand from the end-use market. They may also try to consolidate their bargaining positions with alliances between buyers of different sizes and regions.

Japanese LNG buyers are increasingly required to devise ways to procure LNG at more competitive prices - for example through active participation in the whole value chain of the LNG business.

1. Introduction

Developments in the Japan's nuclear power sector - when any of the nation's reactors will be allowed to restart - draw attention from the natural gas and LNG industry around the world, as they have profound impacts on the global balance of demand and supply of the fuel. *The World Energy Outlook 2011* published by the International Energy Agency in November 2011 highlighted heavier burdens to the Japanese economy of gas and oil imports with zero nuclear power in 2012, after presenting a "*low-nuclear case*" as a deviation of *the New Policy Scenario*.

While the current focus is on incremental gas demand and its fluctuation in 2012, the

◆ This paper is based on information as of 31 March 2012.

* Lead researchers of Gas Group, The Institute of Energy Economics, Japan

[1] The East Japan Great Earthquake on 11 March 2011

[2] Those players are described in Chapter 9 of this article.

longer-term nuclear policy and nuclear project developments and delays are expected to have huge impacts on future gas demand and newly proposed LNG projects. Countries and regions around the world are also expected to be affected in terms of their nuclear power development and gas and LNG demand.

2. Changing market environments in the short-term and expansion of flexible supply

While Japanese electric power and gas companies buy majority of their LNG under long-term contracts, the companies have increased short-term contract and spot purchases to meet incremental gas demand in 2011 and 2012, as well as additional cargo deliveries from the existing long-term deals. In particular, there have been noticeable increases of short-term contracts backed by the recent surge in global LNG production capacity.

Profound changes in the market environment in 2011 have affected ways to conduct LNG business significantly and made Japanese players aware of the need to improve the terms and conditions of their purchases. It has become more obvious that portfolio players with flexibility in supply volumes and marketing outlets have the upper hand in negotiations. As Japanese buyers introduce more cargoes from the Atlantic basin - where gas prices have plummeted especially in North America - into the Pacific basin where majority of supply is priced with linkage to oil, price gaps between the global regions have become more apparent.

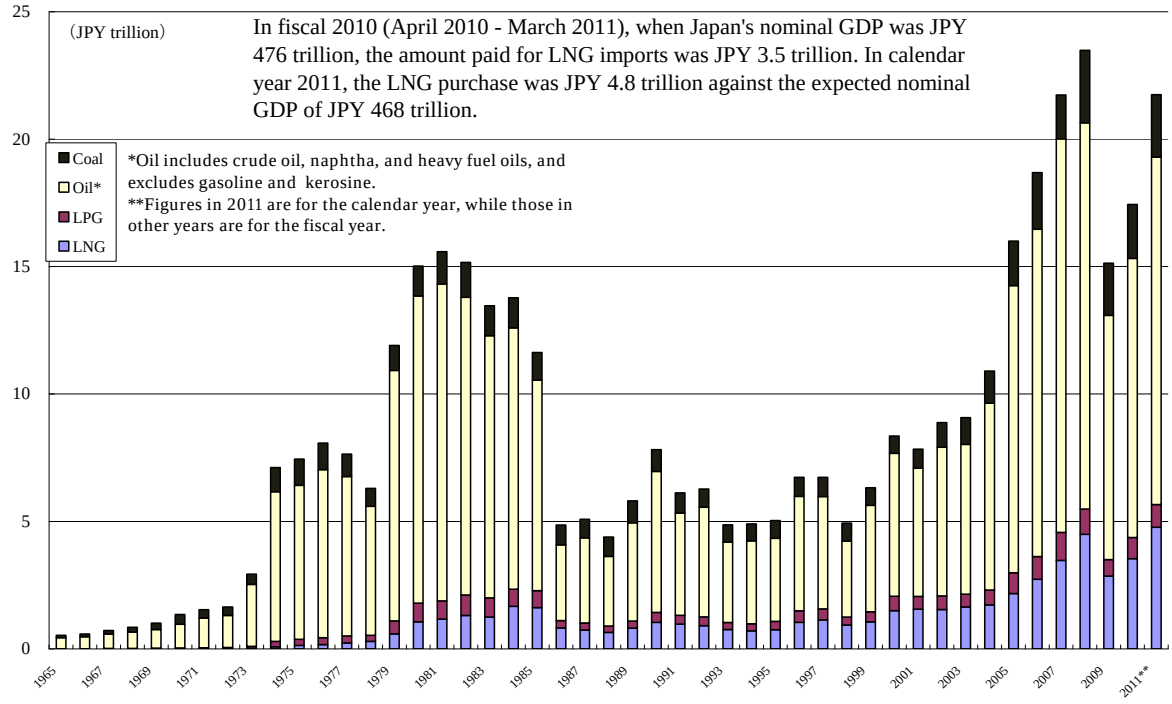
Transactions have sometimes fallen through due to lack of available ships even if there is spare LNG production capacity. A value-chain flow from LNG production to electricity supply cannot stand if there is any missing piece in capacity of thermal power plants, LNG storage tanks, or marine facilities.

Table 2-1: Changes in the LNG market in 2011

What are observed	Challenges to Japanese players
Advantageous positions of portfolio players	Enhancing bargaining power of Japanese players
More apparent gaps between regional prices	Renegotiating contract pricing
Mismatch between elements in the value chain	Optimization of LNG transactions

Japan's LNG imports grew by 12% in 2011, according to the official customs statistics, in line with expectations by industry executives. As well as the increased volumes, higher prices inflated amounts paid for the imports. Japan paid JPY 4.8 trillion (USD 60 billion) for its LNG imports in 2011, an eye-popping 38% jump from JPY 3.5 trillion in 2010. Hence it is quite likely that the total amount for LNG purchases surpassed 1% of the nation's gross domestic product (GDP) for the first time.

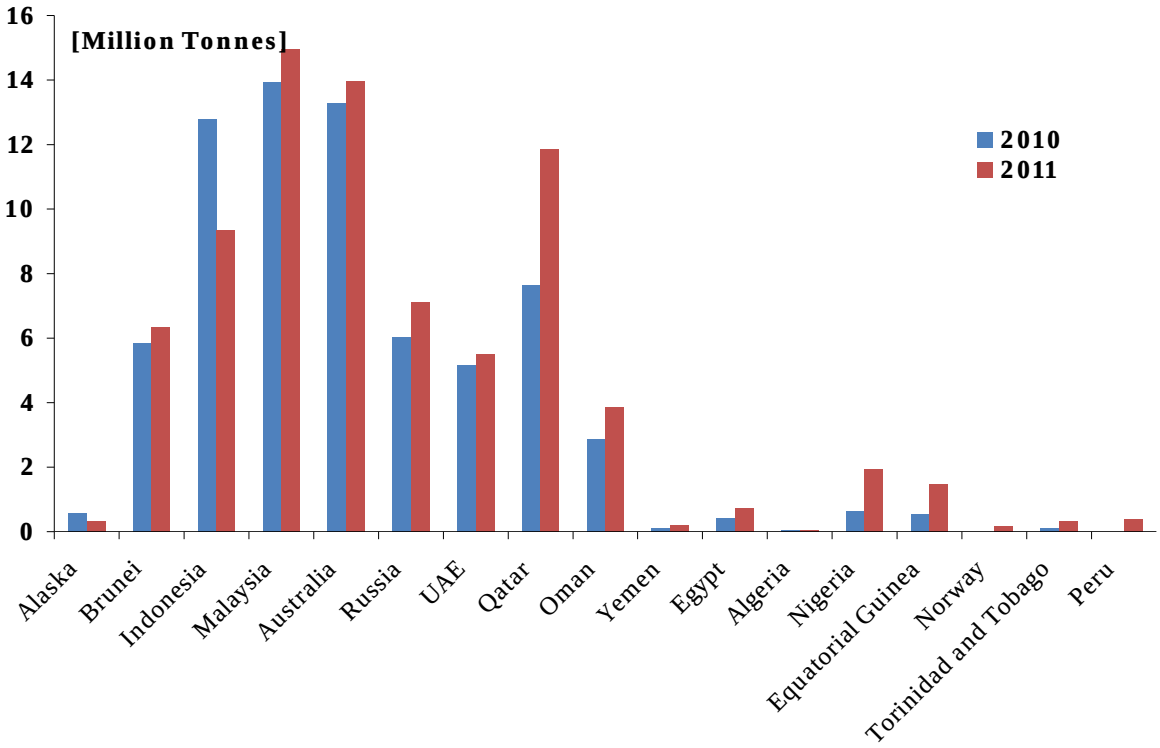
Figure 2-1: Amounts paid to import fuels 1965 - 2011



(Source) Japan's customs statistics

The largest portion of those incremental LNG volumes to Japan came from Qatar, which supplied nearly 12 million tonnes - an increase of more than 4 million tonnes year-on-year. Supply from the Atlantic region exporters, including West Africa, also grew significantly from 3 million tonnes in 2010 to 4.7 million tonnes in 2011. Global LNG trades continued remarkable growth in 2011, reaching 240 million tonnes, an 8% increase from the previous year. The growth was driven by Qatar in exports and Japan in imports.

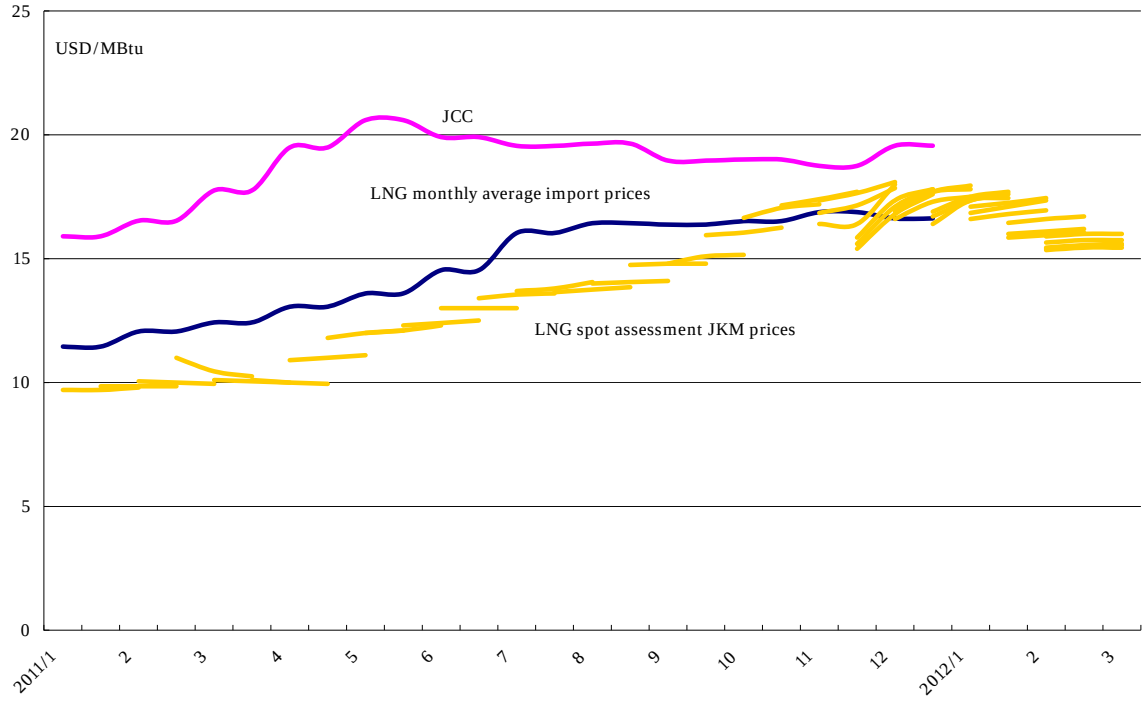
Figure 2-2: LNG imports in Japan by source in 2010 and 2011



(Source) Japan's customs statistics

Reported or assessed prices of spot LNG to North Asia rose from USD 10 before the March 2011 earthquake, USD 12 in early May, and USD 16-17 - for November delivery - in September, coming very close to the level of the region's long-term contract prices. However, spot prices went up only gradually without any excessive surge. Behind this rather orderly development in prices, there has been significantly relaxed supply and demand balance of LNG, at least before the great earthquake. In addition, as buyers have procured incremental supply through short-term contracts, spot prices were stabilized in the winter. Therefore, LNG prices as a whole have followed three tracks since early 2011: long-term contract prices; slightly cheaper medium and short term contract prices; and even lower or more fluctuating spot prices.

Figure 2-2: Comparison of prices: crude oil and LNG imports in Japan and spot LNG



*1 Spot prices in this chart are assessed 4 - 6 weeks before delivery to the destination.
*2 JCC and LNG prices are monthly averages from the customs statistics in Japan.
(Source) Author, based on data from Japan's customs statistics and Platts LNG Daily.

There is sufficient LNG supply capacity to meet incremental demand not only for the short term but also for the medium term. Until 2014 - 15 when another big wave of new supply sources start flowing, diversion from the Atlantic region, short and medium term contracts, and spot cargo deliveries are expected to continue bridging gaps of supply and demand in the Pacific market.

3. Focal points in the international LNG and natural gas markets

In recent years, even before the earthquake in Japan, the following developments and their implications have drawn attention in the international gas markets:

(1) The dramatic increase of North American shale gas production and how long it will last;
(2) Concurrent expansion of LNG supply and how fast the global market will absorb it;
(3) How long the relaxed global supply and demand balance will continue; and
(4) How pricing mechanisms will evolve.

As the increase of North American shale gas production in (1) is often called the "shale gas revolution", the expansion of LNG production in (2) was more than 20% in 2010, the largest ever, and is worth being called an "LNG revolution". Both expansions were driven by accelerated investment in production projects sanctioned in 2004 - 2005 in anticipation of growing natural gas markets, leading to relaxation of market balance in (3), especially in Europe. Companies and observers are watching to see when the balance may change.

The next question is whether those developments will lead to structural changes in long-term contract pricing in Europe as mentioned in (4), and, in turn, whether they will bring any positive impacts to the Asia Pacific region.

As LNG production projects have grown larger in size in recent years and environmentally friendly project development is even more important these days, timing of project implementation and its delays, if any, are expected to have greater impacts on the markets.

4. LNG markets are still balanced and continue being balanced

A "glut" (supply surplus) in the international natural gas market as some industry watchers had pointed out before the great earthquake has never materialised in the end. In the medium term, as some LNG production originally planned for the Atlantic region has been diverted to Asia, supply and demand in Europe have become balanced and, consequently, gaps between oil-linked long-term contract prices and hub prices are shrinking.

While some gas pricing disputes in the European market have already been referred to international arbitration, seemingly deadlocked, there are some signs of progress including the settlement between Algeria and Spain in June 2011.

Looking ahead at the global LNG markets from 2012 to 2015, emergence of new LNG markets in Southeast Asia and other regions, as well as steady growth of demand in existing importing countries in Asia, is expected. On the other hand, as anticipated LNG export capacity addition in the period is expected to be relatively small - from the Pluto project in Western Australia and Angola LNG in 2012 and two units in Algeria in 2012 and 2013 - some experts argue that the supply-demand balance will be tight in the period.

However, slumping energy demand as a whole caused by the economic downturn in Europe and other regions, in addition to ongoing uncertainty over nuclear operations in Japan, casts a shadow over the outlook of the LNG and natural gas markets.

Beyond the middle of the decade, with now smaller forecast nuclear power production, there is greater certainty of realisation of long-term LNG demand in the Asia Pacific region, resulting in greater momentums of LNG liquefaction projects in the region.

Although some LNG sellers have turned bullish in their views on the longer-term future market, many LNG production projects are still competing for limited marketing windows. Buyers with certain volumes of assured demand may be even more advantageous in negotiating long-term contracts against sellers who must secure sizable demand to sanction projects. Buyers are also expected to move to further enhance their bargaining power by, for example, through a buyers' alliance between a major city gas company and smaller ones.

5. LNG and natural gas business continues expanding

The global natural gas market shrunk by 2% year-on-year in 2009 after the economic crisis in 2008, followed by a 7% expansion to 3.2 trillion cubic meters in 2010, surpassing the high before

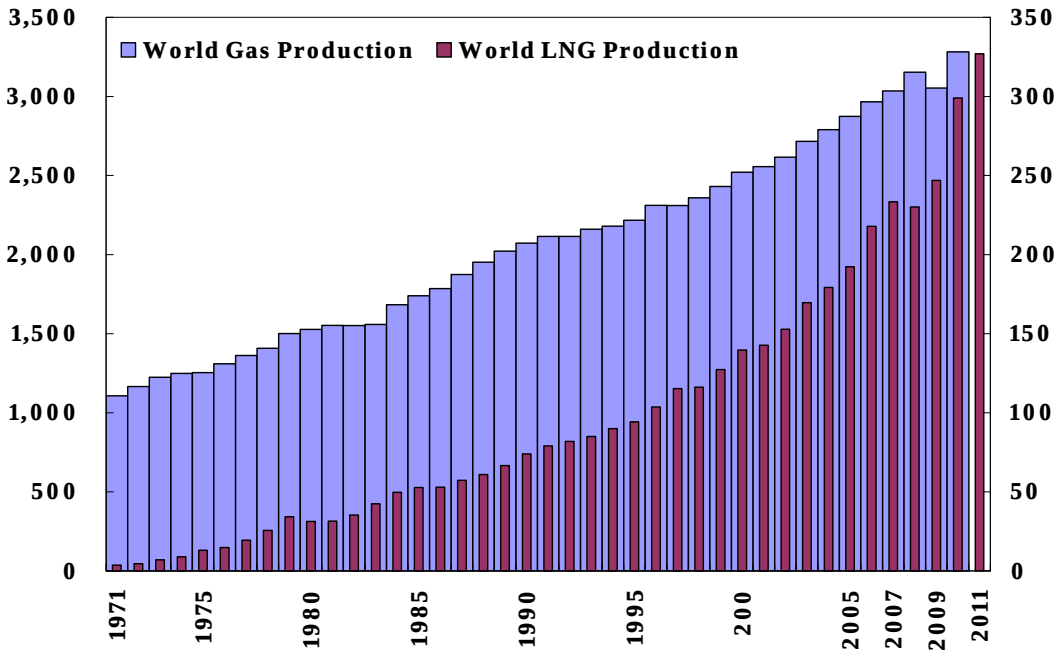
the economic crisis. LNG trades grew by 25%, or 40 million tonnes to over 220 million tonnes in 2010. Both growth rates were the largest ever.

The steady growth has been driven by strong economic performances of emerging economies, relative competitiveness of natural gas against the rising trend of oil prices, and rising expectation of the fuel's continuing competitiveness.

Judging from the overall growth of the global natural gas market, the "shift to natural gas", which was stated as one of the core goals in Japan's previous basic energy plan, has been a global trend and LNG is playing a crucial role in the trend. As LNG trades routes have been diversifying, a growing number of LNG import terminals in the United States and Western Europe are re-exporting LNG after it is imported into them.

Natural gas consumption in the world grew at an average annual growth rate of 2.9% - higher than 2.2% of primary energy consumption - from the 1970s when large-scale commercial use of natural gas started spreading around the world to 2008. While LNG trades has grown at a much higher average annual growth rate of more than 6% since the 1990s, LNG's share in the global natural gas market is still only around 10%. Thus, LNG is expected to expand its share in gas trades further in the future.

Figure 5-1: Growth of natural gas and LNG production in the world



Left axis: Natural gas production in the world (bcm)
Right axis: LNG production in the world (bcm)
(Source) Author, based on data from *Natural Gas Information 2011*, International Energy Agency.

An unprecedented expansion has been underway in the global LNG industry, for both liquefaction plants in producing countries and receiving facilities in consuming countries. The global liquefaction capacity is expected to grow by 50% in five years from 2007 to 2012.

6. Rapid rise of LNG exports from Qatar

The biggest expansion in LNG production in 2009 - 2011 came from Qatar. The Middle East emirate set a new production record three years in a row, exporting 37 million tonnes in 2009, 56 million tonnes in 2010, and 75 million tonnes in 2011. As a result, 48% of LNG trades in the world were originated from the Middle East and North African region in 2011.

Qatar started commissioning its mega liquefaction trains in March 2009. Its LNG production increase since then has translated into Northwest Europe's increase in LNG imports. The Qataris have arrangements to supply LNG to the United Kingdom, Belgium, and Italy through either direct investment in LNG receiving terminals or long-term contract sales.

The United Kingdom, in particular, has increased LNG imports from Qatar rapidly amid decreasing gas production in North Sea, becoming the single largest buyer of Qatari LNG exports in 2010. In that year, Qatari sales to the West of Suez were larger than those to the East for the first time. In 2011, Qatari sales to both the East and West grew significantly again and were divided equally between the East and West.

The Middle East producer's LNG exporting capacity was more than doubled from 30 million tonnes per year as of the end of 2008 to 77 million tonnes in 2011, representing about a quarter of the global total.

This unprecedented expansion has had significant impacts on the balance of global LNG market, as well as Qatar's own LNG marketing strategy. When investment decisions on those mega trains were made in 2004 - 2005, assumptions were that the output would be sent to markets in the United Kingdom and the United States.

As the United States no longer needs much LNG due to rapid increases in domestic gas production and gas prices remain low in that country, Qatar is selling much of the product into other regions, especially in China, under long-term contracts and looking for other new markets.

Table 6-1: Qatar's LNG plant capacity

Project	Train	Start-up	Capacity (Million tonnes per year)	Shareholders	Markets
Qatargas 1	1	1996	6.0 (1997) ↓ 9.2 (2004)	QP(65%), ExxonMobil(10%), Total(10%), Mitsui (7.5%), Marubeni Corp(7.5%)	Japan/ Spain
	2	1997			
	3	1999	9.9		
Qatargas 2	4	2009	7.8	QP(70%), ExxonMobil(30%)	United Kingdom/ Europe/ Asia/ United States
	5	2009	7.8	QP(65%), ExxonMobil(18.3%), Total(16.7%)	
Qatargas 3	6	2010	7.8	QP(68.5%), ExxonMobil(30%), Mitsui & Co(1.5%)	
Qatargas 4	7	2011	7.8	QP(70%), Shell(30%)	
Qatargas total			41.1		
RasGas	1	1999	5.0 (2000) ↓ 6.6 (2003)	QP (63%), ExxonMobil (25%), Koras (5%), Itochu Corp (45%), LNG JAPAN (3%)	Korea
	2	2000			
	3	2004	4.7	QP (70%), ExxonMobil (30%)	India
	4	2005	4.7		Europe
	5	2007	4.7	QP (65%), ExxonMobil (30%), CPC (5%)	Europe/ Asia
	6	2009	7.8	QP (70%), ExxonMobil (30%)	Europe/ Asia/ United States
	7	2010	7.8	QP (70%), Shell (30%)	
RasGas total			36.3		
Grand Total			77.4		

(Source) Qatargas/ RasGas websites, ExxonMobil 2010 Financial and Operating Review

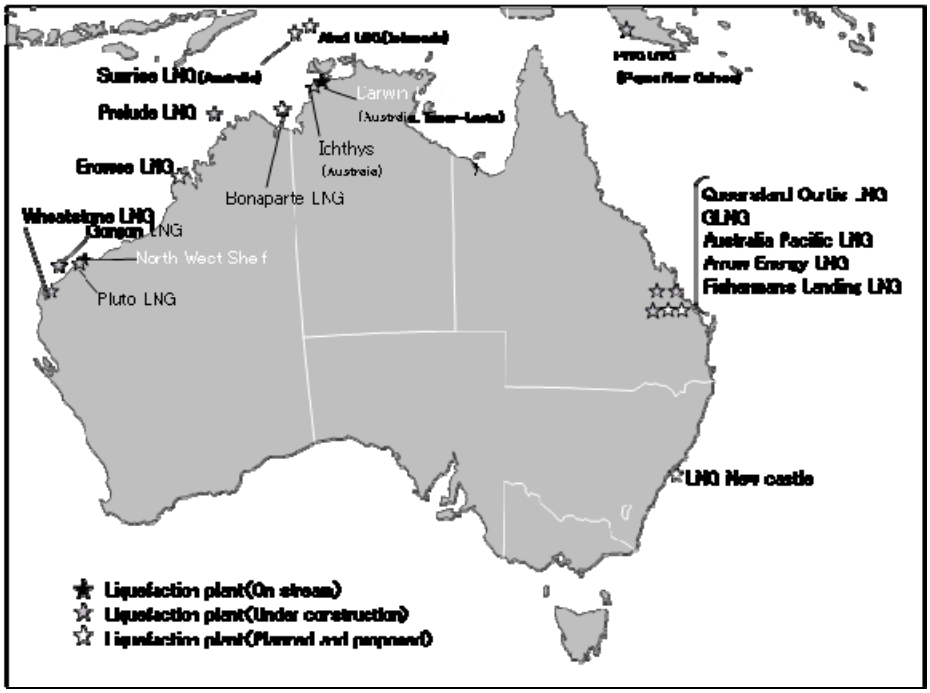
Qatar is utilising its LNG production capacity that was originally planned for sales in the United States to supply incremental LNG into Asia including Japan. While Qatar has used separate LNG pricing policies depending on market regions, its future direction of geographical distribution of sales and accompanying pricing policies are drawing attention in the industry.

As fiercer competition is expected from the next generation LNG supply sources in Australia and other countries after 2014 - 15, Qatari marketers are gearing up marketing campaigns to secure long-term deals. Preliminary sales deals were agreed with Argentina for 5 million tonnes per year from 2014 and with Malaysia for 1.5 million tonnes per year from 2013 respectively in 2011. However, those deals may take time to be finalised as the two countries have historically had lower domestic gas prices than internationally traded LNG.

7. Emergence of Australia as one of the largest LNG producers

While Australia is currently the fifth largest LNG exporter in the world after Qatar, Malaysia, Indonesia and Nigeria, exporting 19 million tonnes in 2011, it is expected to have equivalent LNG exporting capacity as Qatar around 2018 when all those projects - that are under construction, have been sanctioned, and are expected to have final investment decisions (FIDs) shortly - have been completed. In fact the period between October 2010 and January 2012 witnessed several significant FIDs on LNG exporting facilities in Australia, which are due to commence operations in 2015 or later.

Figure 7-1: Australia's LNG projects



The Gorgon project led by Chevron has been under construction since late 2009 off Western Australia after 20 years of engineering and marketing efforts since the discovery of huge reserves. It is attracting attention in its treatment of carbon dioxide (CO_2) in the raw gas stream, development harmonised with surrounding natural environment, and other engineering aspects.

Shell's Prelude project is being developed with the company's floating LNG (FLNG) concept for the first time in the industry.

In the eastern state of Queensland, FIDs have been made on three coalbed methane based LNG (CBM-to-LNG)[3] projects since October 2010.

The Wheatstone project in Western Australia led by Chevron and the Ichthys project in Darwin in Northern Territory supplied with feedgas from Western Australia led by Japan's Inpex were sanctioned in September 2011 and January 2012, respectively. The Ichthys project is the first one operated by a Japanese company in Australia and attracts special attention in Japan as the nation's interest in energy security is recently high.

While Australia has huge potential of ample LNG supply based on its resources, high concentration of construction activities could lead to potential shortage of engineering and labour resources and, in turn, possible cost increases and project delays. The issues are well recognised in Australia at both federal and state levels and are being taken care of.

Western Australia's Pluto project was originally slated to start operations by 2010 when it was sanctioned in August 2007. However, the construction works have been delayed due to labour issues and bad weather conditions, pushing back the first exports to 2012 and increasing project's

[3] "Coalseam gas (CSG)" is used in Australia, instead of "coalbed methane (CBM)".

price tag significantly.

Assuring timely implementation of future LNG projects is the key to the stable market.

8. North American LNG export proposals

Potential LNG export projects are emerging on the Coasts of Gulf of Mexico in the United States and Western Canada. While careful consideration is needed as to impacts on project economics of fluctuation of North American gas prices that are currently traded at historically low levels, there is little doubt of the potential for North American gas to be a major supply source to the international gas market.

Multiple LNG export projects are proposed on the West Coast of Canada, including the 5 million tonnes per year Kitimat LNG project which aims to make an FID in 2012 and to start operations in 2016. In addition to those projects proposed by Shell, Mitsubishi Corporation, Korea Gas Corporation (Kogas), and PetroChina, and Petronas and Progress, respectively, Japan Oil, Gas and Metals National Corporation (JOGMEC), Chubu Electric Power, Tokyo Gas and Osaka Gas have agreed to join a natural gas development project led by Mitsubishi in the Cordova basin in Northeast British Columbia, focusing on shale gas and potential of LNG exports to Japan in the future.

In the United States, the Sabine Pass LNG export project has already secured several sales deals after being granted an export licence from the Department of Energy (DOE), boosting potential to supply Asia, especially after the planned expansion of Panama Canal in 2014. Export projects are also proposed at other locations.

While linking LNG prices to the North American bench mark price may not always mean less expensive LNG, it could certainly introduce a different pricing mechanism that could trigger reconsideration of pricing policies of different LNG suppliers.

9. Thriving portfolio LNG players

Those companies with multiple options in both supply and downstream segments - including international oil and gas companies (IOGCs) and mid-stream players with portfolios of supply and outlets - have been leading the global LNG business. Having portfolios of both upstream and liquefaction and regasification and downstream sales at multiple points gives them the upper hand in negotiations and consequently further expands business opportunities and options. Ups and downs in the LNG market in 2011 and remarkable rises of newly emerging markets have highlighted the strong position of those portfolio players.

United Kingdom's BG Group has been a leading player in this field, as a front runner in several aspects of the global LNG business: a long-term capacity commitment at an LNG import terminal in the United States; securing portfolio of LNG supply with destination flexibility; and secondary marketing of LNG that the company buys to different LNG buyers.

Taking advantage of its ample regasification capacity at multiple receiving terminals and

ensuing LNG supply portfolio, the company has expanded its marketing activities from the Atlantic to Pacific region. Not only diverting LNG cargoes from the Atlantic to Pacific on the short-term basis, but also the company has established access to markets in Chile, Singapore and China on the long-term basis with a newly planned supply source from coalbed methane (CBM) in Eastern Australia to be developed by the company.

The company also has been the first company to commit to buy LNG from North America at the Sabine Pass liquefaction project. By developing the company's own LNG export project on the Gulf Coast, the company could control large volumes of LNG supply from the region.

France's GDF Suez was created in summer 2008 through a merger between two established players in LNG business to become an even stronger LNG group. In addition to LNG receiving capacity on both sides of the Atlantic Ocean, the group has already established a foothold in Asia through its holdings in India's Petronet and Australia's upstream sector.

Through purchasing flexible supply from Yemen LNG that started operations in 2009 the company has expanded its market reach including Chile and Malaysia, in addition to its traditional markets in Europe and North America.

The Spanish alliance of Gas Natural (GN) and Repsol has had established positions in Latin America and Southern Europe. Repsol also established access to both sides of the Atlantic when it opened an LNG receiving terminal in Eastern Canada in 2009. Repsol also has an equity stake in Peru LNG and has purchased all the output from the project. While majority of the product is destined to the recently inaugurated Manzanillo terminal on the Pacific Coast of central Mexico, some cargoes are sent to Asia depending on prices.

In addition to those above-mentioned players with focus on midstream business, super majors and other international oil and gas companies (IOGCs) have been expanding LNG upstream and market positions in recent years. They have also invested in North American unconventional gas plays to boost business portfolios.

10. Japanese gas and electric power companies and trading houses

Japanese gas and electric power companies have played a central role in LNG business by providing stable gas demand.

Japan is expected to remain the largest market of LNG in the world and the country's developments are expected to have significant impacts on the global market, even though the country and its LNG importing companies have a lot of challenges to overcome in its energy and nuclear policy.

Since the inception of LNG business in the 1960s, some Japanese trading houses have brokered LNG import deals for the nation's gas and electric power companies, participated in LNG upstream and liquefaction sector as minority partners, and facilitated project funding by utilising Japanese commercial banks and government backed financing.

They have evolved their role as an essential element in the global LNG business according to changing market environments and requirements, by coordinating short-term and long-term deals

between various regions around the world, not necessarily limited to Japan.

Future LNG procurement and business development strategies by Japanese companies will be more important in connection with the nation's energy security.

11. Conclusion

Natural gas is expected to expand its market reach as the cleanest fossil fuel and a price competitive energy source.

LNG has evolved from a premium energy source in the past to an essential energy source to be utilised in wider geographical areas and different applications.

While Qatar has expanded its presence in LNG production significantly for some years, incremental production capacity is expected to come online toward 2020, mainly in Australia, as well as to the lesser extent in North America, Russia and Africa.

It is important for Southeast Asia to continue developing natural gas resources in order to keep supplying its own needs and export markets, while the region is expected to increase energy consumption rapidly.

Changing outlook of Japan's nuclear power generation has increased assured portion of future LNG demand, facilitating development of LNG export and other large-scale gas projects.

It will be more important for Japanese players to procure more competitive LNG supply in the future through proactive involvement in the LNG value chain as a whole, including upstream, liquefaction and transportation segments of the business. Cooperation and alliances with players in the region and around the world to optimise business will be more crucial in the future.

Contact: report@tky.ieej.or.jp