Structural Shifts in the Global LNG Market

Hiroshi Hashimoto, Shinya Tanaka, and Takeshi Yoshiyasu

The global LNG market has doubled its size every ten years, and expected to have 400 million tonnes per year (MT/y) by 2020. The LNG industry has been often characterized by rigid long-term contracts because it requires huge upfront investment. However, in recent years, as a result of weaker LNG demand especially in the Atlantic market and number of players entering the LNG business, spot and short-term LNG trades have increased and the flexibility in the LNG market has improved. Through 2020, new LNG projects in the United States and Australia will contribute to supply source and pricing diversifications, and more flexibility in the LNG market. While in the demand side where the strong growth in Asia and the recovery of the European market are expected, there are various uncertain factors, such as Japan's nuclear re-starts and slower economic growth in China and India, LNG buyers are increasingly in the need of more flexibility. In the dramatically changing environment, LNG players are adjusting their business activities to procure LNG at reasonable prices as well as to boost long-term investment throughout the LNG value chain.

1. Introduction

The global LNG market is expected to continue expanding steadily to reach 400 million tonnes per year by the year 2020. In conjunction with expansions of traded volumes and the number of players in recent years, significant shifts in market structures and evolutions in transactions have been underway - including increasing numbers of short-term and spot transactions and re-exporting activities in which players take advantage of regional price differences (which apparently have been decreasing for some time) and accommodate fluctuations of demand and supply. While multiple LNG production projects mainly in the United States and Australia are expected to provide sufficient supply capacity through 2020, the global LNG market is surrounded by uncertain factors with regard to the ensuing next generation of LNG production projects and development of end-user demand. This paper looks at those changes in the market environment and players' responses to the evolving LNG market.

2. The global LNG market: expansion in volumes

The global LNG market celebrated its 50th anniversary in October 2014 - the first commercial export of LNG was delivered from Algeria to the United Kingdom in 1964, followed by LNG imports into Japan by Tokyo Gas and Tokyo Electric Power Companies from Alaska's Kenai project in 1969. Along with the expansion of demand for natural gas around the world with its advantages of the greatest environmental friendliness amongst

fossil fuels and wider geographical distribution of resources than crude oil, those countries without easy access to international pipelines such as Japan have expanded use of gas through imports of LNG.

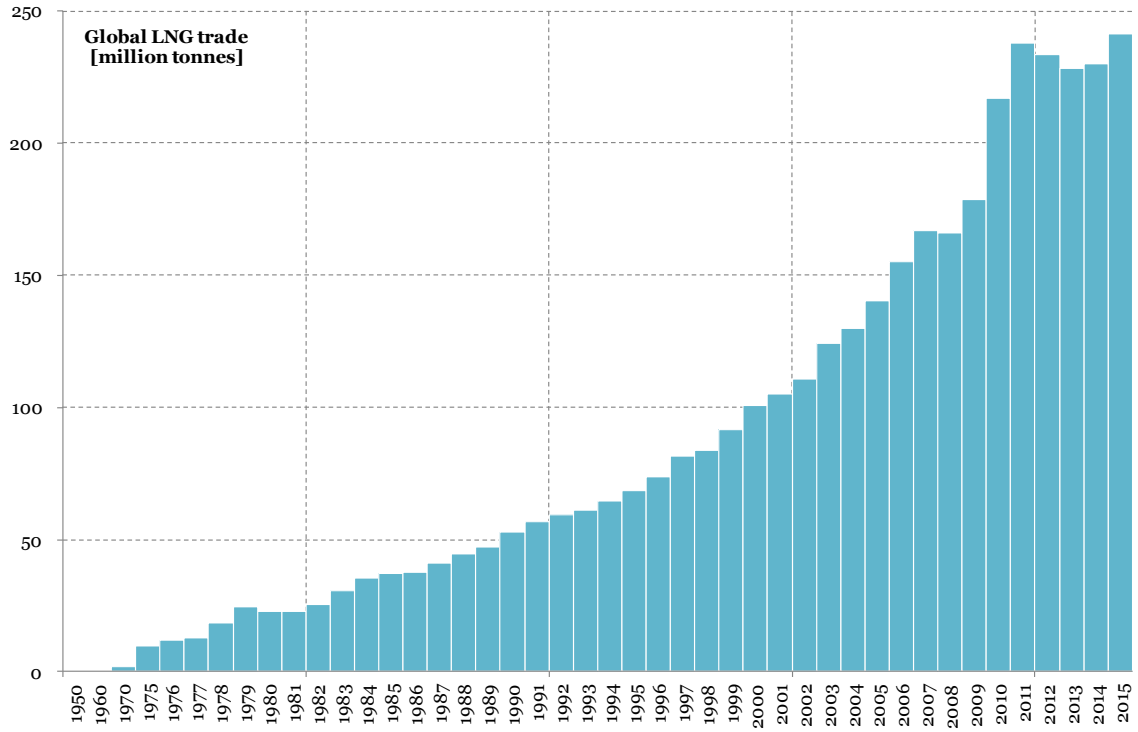

Figure 1: Global LNG Trade [1)]

According to Cedigaz, the global LNG trade doubled its size every 10 years from 72.1 billion cubic metres (bcm) (53 million tonnes of LNG equivalent), representing 23.5% of the total international gas trade, in 1990, to 137.2 bcm (100 million tonnes) in 2000, and again doubling to 295.5 bcm (217 million tonnes) in 2010. In 2014 among the total of 1 trillion cubic metres of gas (739 million tonnes of LNG equivalent) internationally traded around the world, LNG represented 313.7 bcm (231 million tonnes), or 31.2%. During the 24-year period from 1990 to 2014, international natural gas trade grew by 5.1% per year on average, whereas international LNG trade grew by much greater 6.3% per year. The numbers of LNG importing and exporting countries have also grown steadily from nine importing and eight exporting countries in 1990 to 34 importing and 19 exporting countries in 2015. The year 2015 saw Egypt, Pakistan, Jordan, and Poland start importing LNG. The Philippines, Vietnam, Myanmar, and Bangladesh and so on, are expected to introduce LNG, too, in the near future.

3. Increasing liquidity: a change in the LNG market

Due to relatively lower density of heating value of natural gas, it has been more expensive to transport and store natural gas than oil on heating value basis and hence international markets for natural gas have been slower to evolve compared to those for oil.

International markets for gas have historically and largely divided into three major consuming regions - North America, Europe, and Asia - and pricing mechanisms in each region have had features specific to respective market conditions.

North America is the largest consuming region of natural gas in the world and has been one of the major producing regions of natural gas since the inception of the global gas industry. While the United States has imported LNG since the 1970s, it is expected to be a net exporter of natural gas around 2018 thanks to surging unconventional gas production under the shale gas revolution. The United States did not have vertically integrated natural gas operators even before the industry liberalisation in 1985, but has had numerous gas producers, transporting and distributing companies, and retailing companies. This has helped promote liquidity in the gas market and develop active wholesale marketplaces to establish price indices represented by the Henry Hub prices.

Europe has had imports of natural gas via pipelines from Russia and North Africa and in the form of LNG from Africa, the Middle East, and South America, as well as major regional gas productions in the Netherlands, Norway, and the United Kingdom. Northwest Europe has established natural gas pricing hubs at NBP in the United Kingdom and TTF in the Netherlands, while other countries on the continent have mixtures of gas pricing of oil indexation and gas-on-gas market pricing.

In North Asia, Japan, Korea, and Chinese Taipei have imported LNG as a means to meet increasing energy demand backed by economic growth and at the same time to reduce dependence on oil and mitigate pollution problems. LNG was initially bought at fixed prices when it was introduced into Japan in 1969. After the oil crisis and ensuing higher prices of oil, new LNG pricing with linkage to the GSPs (government selling prices) was introduced. More recently after that, pricing linked with the average CIF price of crude imported into Japan (JCC: Japan Crude Cocktail) became more common. Traditional long-term LNG sale contracts (into North Asia or Europe) often have had 20 or more years of contract durations in order to mitigate investment risks and ensure stable procurement. Those contracts often have included rigid contract clauses - a take-or-pay clause where a buyer is obligated to pay certain amounts even if the buyer cannot take delivery of LNG and a destination restriction clause where the cargo destination is specifically limited to a certain country or certain receiving terminals. Therefore until the early 2000s, the global LNG trade did not have much liquidity and the Atlantic and Pacific LNG markets were separated.

However, in recent years, against the background of surging shale gas production in the United States and rapidly changing demand and supply balances caused by lost nuclear power and greater operating hours of LNG-fired power generation, as well as resulting regional price differences, different forms of contracts and diversified trading routes have emerged to enable more liquid and flexible LNG trades - spot cargo transactions, portfolio contracts (with looser designation of supply sources) and re-exports of cargoes from primary receiving terminals.

According to GIIGNL (International Group of Liquefied Natural Gas Importers) volumes traded under short-term (four years or less) contracts and spot transactions in

2004 were 11% of the total trade or 15.1 million tonnes, one-third of which was imported into the United States. Qatar, then the third largest LNG exporter after Malaysia and Algeria, embarked on a major expansion program of its LNG production capacity targeting the United States where gas demand was expected to grow proliferously, to start operations of a total capacity of 31.2 million tonnes per year from 2009 to 2011.

However, as shale gas production grew rapidly in the United States in the latter half of 2000s and the country no longer needed new LNG supply, Qatar now has a lot of spare LNG capacity. In addition those countries who had in the past exported pipeline gas or LNG to the United States, such as Canada, Nigeria and Trinidad and Tobago, found themselves having to develop new alternative outlets. As a result existing projects in Nigeria and Trinidad allocated spare supply capacity to the Asian market.

At the same time, Japan suffered from the East Japan Great Earthquake in March 2011 and soon after lost nuclear power, resulting in higher operating hours of gas-fired power generation and surging LNG imports.

As majority of Japan's LNG procurement had been based on long-term contracts and Japanese importers had 59 million tonnes under such contracts as of the fiscal year 2011, the difference of 24 million tonnes with the actual total imports of the year was supposed to be supplemented with UQTs (Upward Quantity Tolerances: A typical LNG long-term contract is said to allow the buyer to increase nominations by 5% - 10% against the annual contract quantity) and spot procurement. The global short-term and spot traded volumes expanded to 61.2 million tonnes in the calendar year 2011, driven by such imports into Northeast Asia, notably Japan and Korea.

Since 2014 relaxed demand and supply balance in the global LNG market has been obvious, due to slowdown in the global demand and new LNG production projects starting up in Papua New Guinea and Australia. The lower balance widened the gaps between spot prices and long-term contract prices until early 2015, resulting in an accelerating shift to spot and short-term contract procurement by buyers. In 2014 short-term and spot transactions represented 30% of the global LNG market, or an all-time high of 69.6 million tonnes. However, in 2015 this portion of the market slightly held back to 28% and 68 million tonnes, hampered by narrower gaps of regional prices and interruptions at some LNG production plants.

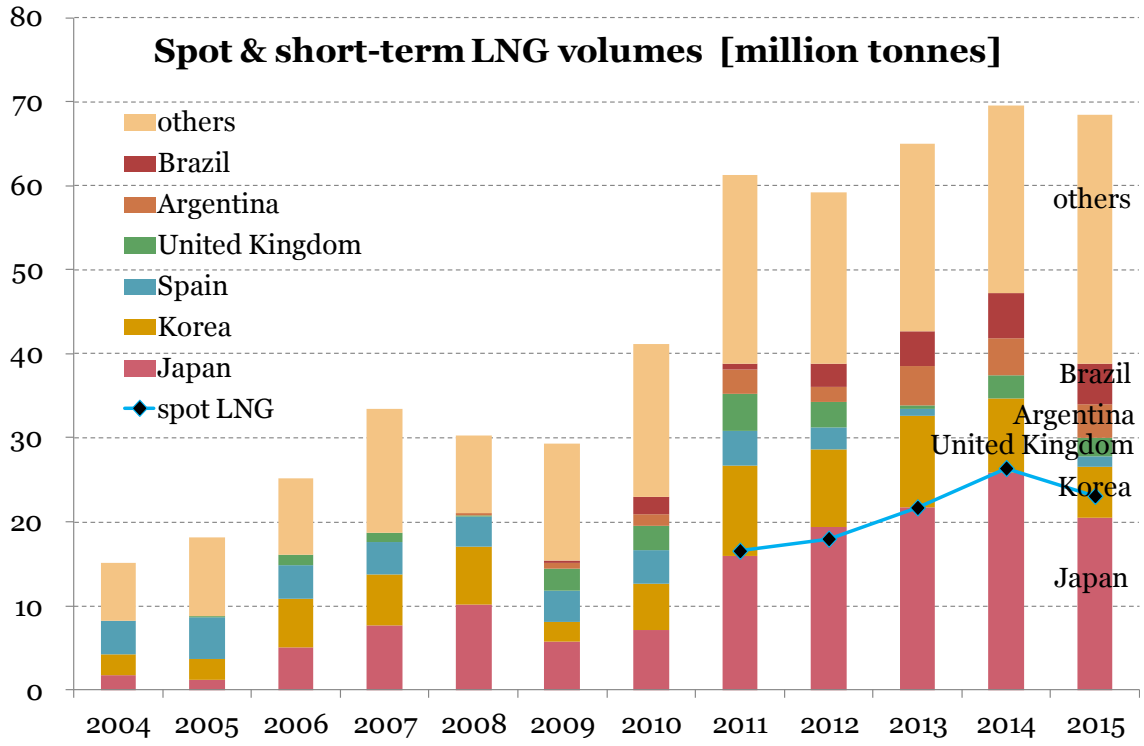

Figure 2 Short-term and spot transactions [2)3)]

Re-exports of LNG, mainly from Europe to Asia, South America and the Middle East are more common these days. Europe continued decreasing natural gas demand between 2010 and 2014, as economic activities were depressed after the Lehman crisis in 2008 and Greek crisis in 2010 and natural gas lost price competitiveness due to government policies to prioritise renewable energy sources and less expensive coal flowing from the United States. Natural gas consumption in the EU 28 members decreased by more than 20% from 2010 to 2014, before recovering a little in 2015 to 426 bcm, still nearly 100 bcm short of the level in 2010. Reduction in LNG imports has been notable, as such imports decreased by half from 2010 to 2014 at 26 million tonnes, only to recovering to 32 million tonnes in 2015. European gas buyers have managed to reduce long-term contract prices through renegotiations and resell those LNG cargoes that are procured in the Atlantic basin at relatively inexpensive prices to buyers in Asia, South America and in the Middle East through cargo diversions and re-exports. Since the first re-export cargo in Europe was shipped out from the Zeebrugge terminal in Belgium in 2008, by 2015 approximately 330 cargoes have been shipped out of receiving terminals in Europe, including Spain and France.

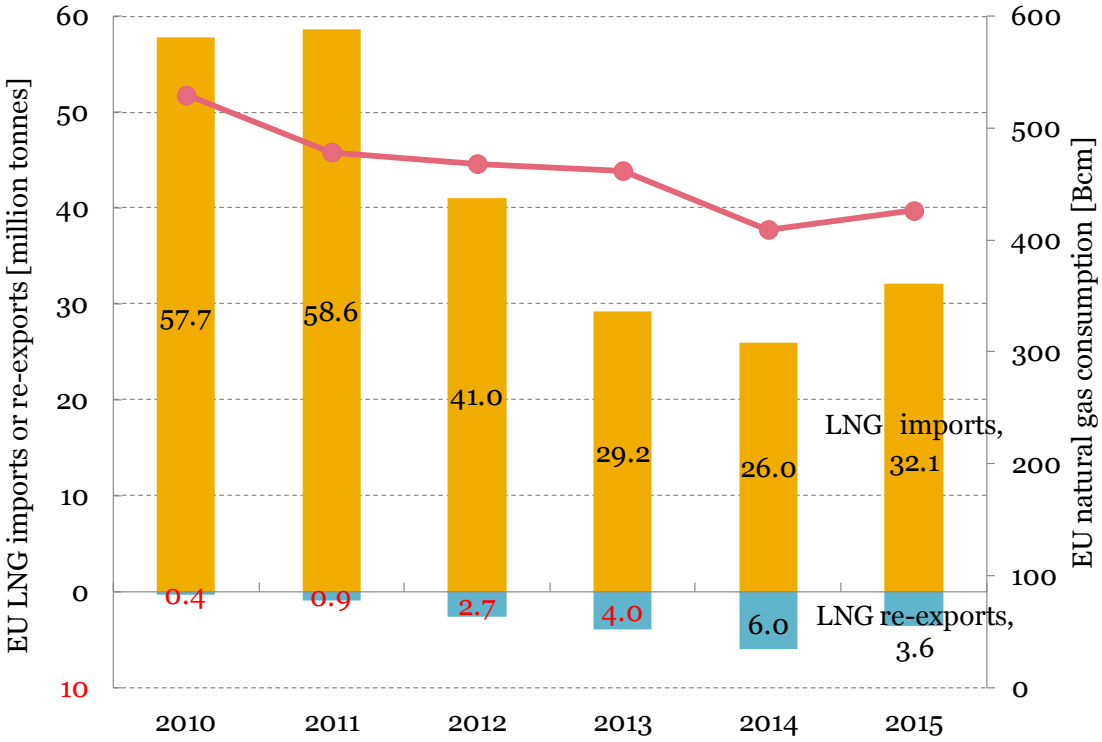

Figure 3 LNG imports and re-exports of LNG in Europe [4)5)6)]

In addition, those portfolio players who have multiple options in both upstream and downstream segments of the LNG value chain are increasing their roles.

BG took a lead in the early 2000s by securing capacity rights at the Lake Charles and Elba Island terminals in the United States, as well as supply portfolios with destination flexibility procured mainly from Trinidad and Tobago and Egypt, to expand its LNG marketing activities in both the Atlantic and Pacific regions. Later the company executed a long-term offtake contracts at the Sabine Pass export plant in the United States and developed the QCLNG project while moving LNG volumes in different markets. Shell, who had the largest LNG production capacity as a private-sector company even before its acquisition of BG Group, has equity stakes in LNG projects in Southeast Asia, Australia, and Sakhalin in Russia, as well as capacity rights at LNG receiving terminals in different countries, establishing a framework where the company can select optimum procurement and marketing channels depending on production and pricing situations.

Such a portfolio player has a favourable position in the LNG business by being able to buy and sell LNG at different geographical locations, depending on pricing developments, by having equity stakes in LNG production projects in different producing countries and capacity rights or marketing outlets in multiple consuming countries.

Countermeasures against fluctuation of demand and supply balance and regional price gaps have led to an active spot market and re-export activities, resulting in liquidity and flexibility in the market.

Although regional price gaps have narrowed down thanks to declining crude oil

prices since the second half of 2014, the potential problem of the Asian premium still persists with probability of re-emerging regional price gaps with potential rise of crude oil prices. Those price gaps have certainly helped promote re-export activities and portfolio players, while Asian buyers should improve their positions so as not to buy LNG at higher prices than others. Eliminating such rigid provisions as a destination restriction clause is equally crucial in pursuing better pricing mechanisms.

4. The outlook of the future market: uncertainty and expectation of further greater flexibility

Institute of Energy Economics, Japan (IEEJ) expects the global LNG demand will be 300 - 390 million tonnes in 2020 and 410 - 570 million tonnes in 2030. While such factors as Japan's nuclear restarts and China's slower economic growth may reduce future LNG demand, recovery of LNG consumption in Europe due to lower gas production in the region and inflow of LNG from the United States and further introduction of LNG to such emerging economies as Vietnam and the Philippines are also expected thanks to lower LNG prices that could improve economics of LNG in those countries.

On the other hand the world has nominal LNG production capacity of around 300 million tonnes per year as of the end of 2015, excluding those plants in Libya, Egypt and Angola that were halting operations at that time, sufficient to meet the global demand. After taking into account of those projects currently under construction, the global LNG production capacity is expected to reach 400 million tonnes per year by 2020. In addition to the United States and Australia, major LNG production projects are proposed in East Africa and Canada. Planned and proposed projects could push up the global production capacity to 650 million tonnes per year by 2025 and 780 million tonnes per year by 2030, making it much greater than expected LNG demand.

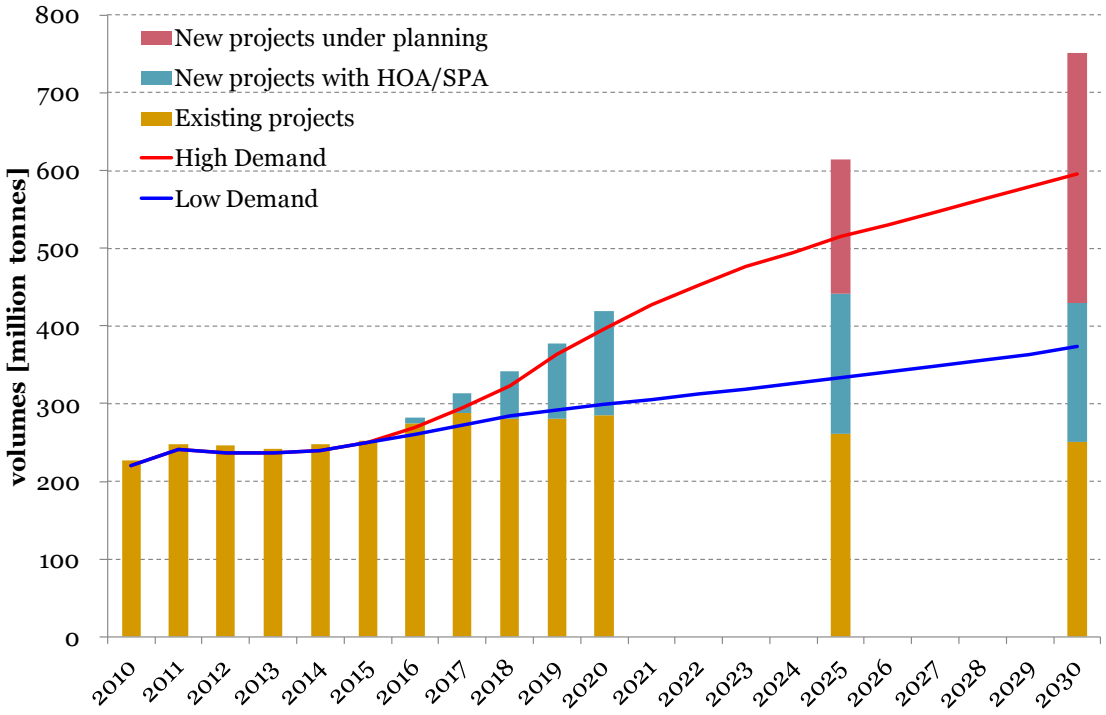

Figure 4: The global LNG demand outlook 7)

As an LNG project requires huge investment in development of gas fields, pipelines, and liquefaction facilities, a final investment decision (FID) on the project is made only after majority of the production capacity is placed under long-term sale and purchase commitments with buyers and sufficient cash-flows are secured. At this moment as the industry is expected to have greater LNG production capacity than expected demand until around 2020, prospects for project realisation are mostly uncertain except for those projects already under construction or with SPAs and/or HOAs. As some companies with LNG projects have weaker balance sheets affected by the collapse of oil prices since the latter half of 2014 and are struggling to reduce costs of labour and materials amid proliferation of new project proposals, some projects have already pushed back the schedules or shelved the plans indefinitely.

Among the numerous grassroots LNG projects, those projects in the United States to convert existing LNG receiving terminals into LNG export plants have definitive advantage in terms of investment. The five projects currently under construction - Sabine Pass, Cove Point, Freeport, Cameron, and Corpus Christi - are expected to add 62 million tonnes per year of production capacity by 2019. As major Asian LNG buyers have secured 24 million tonnes per year under term purchasing contracts that include pricing formulae linked to the Henry Hub index, they are expected to realise pricing diversification from the traditional oil-linked pricing. As more FOB (free on board) transactions, where the cargo title transfers to the buyer at the loading point making resale to a third party easier, are becoming more common, market liquidity is also expected to increase through buyers'

resale activities.

There may be some concern over incorporating the Henry hub index into LNG pricing as the index has little to do with the Asian gas market and buyers may become hostages of fluctuations of gas prices in the United States. Moreover landed prices of LNG from the United States to Asia may not always be less expensive than LNG with oil-linked pricing. However, diversification of pricing and contracts brought about by LNG from the United States offers significant advantages to buyers in negotiations of contract extensions with existing sellers and pricing arrangements with new supply sources from different regions.

Projects	Sellers	buyers	million tonnes	contract period
Sabine Pass LNG	Cheniere Energy	KOGAS	3.5	2017～2037
		GAIL	3.5	2016～2036
Cameron LNG	Mitsui & Co., Ltd.	Tokyo Electric Power	0.4	2017～2037
		Toho Gas	0.3	2017～2037
		Kansai Electric Power	0.4	2017～2037
		Tokyo Gas	0.52	2020～2040
	Mitsubishi Corporation	Tokyo Electric Power	0.8	2017～2037
		IOC	0.7	2018～2038
		Toho Gas	0.2	2018～2038
		Tokyo Gas	0.2	2020～2039
		Tohoku Electric Power	0.3	2022～2038
	ENGIE	CPC	0.8	2018～2038
		Tohoku Electric Power	0.27	2018/2019～2038/2039
Cove Point LNG	ST Cove Point	Tokyo Gas	1.4	2017～2037
	Sumitomo Corporation	Kansai Electric Power	0.8	2017～2037
Corpus Christi LNG	Cheniere Energy	Pertamina	0.76	2018～2038
		Pertamina	0.76	2019～2039
Freeport LNG	Osaka Gas		2.2	2018～2038
	Chubu Electric Power		2.2	2018～2038
	Toshiba		2.2	2019～2039
	SK E&S		2.2	2019～2039
		Total	24	

Table 1: Asian buyers' contracted LNG volumes from the United States

Newly developed LNG transportation routes are expected to offer savings on shorter shipping distances and time.

The Panama Canal is undertaking a major expansion project to accommodate more traffic and larger ships to be completed in July 2016. The expanded canal should shorten the travel time from the Gulf Coast of the United States to Japan to 25 days, compared to 45 - 50 days of alternative routes.

Likewise the Northern Sea Route, albeit only in summer time, could reduce travel time from Europe to Asia to 30 days, compared to 40 days through the Suez Canal. Cargoes

are expected to be shipped to Asia via the Northern Sea Route from the Yamal LNG project that is scheduled to be online in 2018. The Suez Canal was also expanded in August 2015 to allow separated passing of ships in opposite directions.

5. Responses by LNG players (buyers)

Favourable market conditions to buyers are expected to last for several years as many LNG production projects are expected to be operational leading to available supply greater than expected demand through 2020. However, with steady increases in natural gas demand in China, India, and emerging economies in Southeast Asia and South America, competition between buyers may be intensified in the future.

As commodity traders such as Trafigura and Vitol are now trading LNG cargoes, and some portfolio players and international and national oil companies - traditionally dedicated to upstream and liquefaction activities - are entering downstream end of the value-chain, including regasification and gas marketing activities, competition may no longer limited only to among LNG buyers (or importing countries). Some buyers are embarking upon initiatives to ensure sustainable LNG procurement at equitable costs along with steady development of incremental LNG demand.

(1) Alliance between buyers

Buyers' alliances are intended to enhance bargaining powers, diversification of procurement sources by exchanging positions, and flexibility in delivery points and windows. Some companies also intend to enhance trading and reselling capabilities, as well as optimizing shipping operations by swapping cargos or positions.

(2) Participation in upstream and liquefaction business

Japanese electric power and city gas companies, as well as Korean and European LNG buyers have increased equity participation in upstream and liquefaction business since the early 2000s. The move was originally designed to diversify LNG supply sources, to enhance energy supply security, and to mitigate impacts of fluctuations of prices.

More recently some such equity holders resell cargoes to smaller end-use buyers and into the spot market, which is to develop new demand or to resell spare cargoes rather than to make additional profits as a seller. Banks led by the Japan Bank for International Corporation and big commercial banks provide project financings to support such moves by compatriot LNG buyers to develop new LNG projects, including Cameron LNG, Freeport LNG, Donggi-Senoro LNG, and Ichthys LNG (equity portion of Kansai Electric Power) in 2014.

(3) Participation in downstream gas and electricity business in different countries

Japan has been the largest LNG importer in the world for many years and is expected to be so for years to come. However, it will not be easy for an individual LNG buyer to increase natural gas demand in its home market due to expected restart of nuclear reactors, declining population, and planned opening up of the domestic gas market. Against this background some Japanese major energy companies have embarked on expansion into energy markets in different countries.

One example has been Tokyo Gas, who established its Asian regional headquarters in Singapore in December 2014 to develop cogeneration and other energy business to take advantage of vibrant economic activities in the region. Thereafter the company established offices in Vietnam, Indonesia and Thailand in September 2015.

While first movers in investment have advantages in emerging markets, prices are not the only factor of success. Since a proposal of energy system is required to incorporate added values of energy saving ideas etc. and to be adjusted to the local market which has different natures from the Japanese market, an alliance with a local company can be of great value. Tokyo gas signed a memorandum of understanding (MoU) with PetroVietnam Gas to conduct a feasibility study on energy solution business in Vietnam in December 2014.

Osaka Gas established a company that will provide fuel conversion energy services to industrial customers in Thailand, through a joint investment with PTT. The new company targets both non-Japanese and Japanese companies in Thailand to expand energy service business.

(4) Elimination or relaxation of destination restriction

Traditional natural gas sale and purchase agreements often include a destination clause where destinations of the commodity are restricted to certain countries or terminals. The clause has been designed to ensure certainty of delivery and receipt for both the buyer and seller. Even if the transaction is an FOB basis and transportation is arranged by the buyer, this clause does not allow delivery to a different destination that is not specified in the contract nor resale to a third party without consent by the original seller. While a destination clause is deemed illegal in contracts to supply LNG to Europe and has been eliminated from them, many contracts in Asia still have it.

Although such a rigid contract condition is commonly viewed by Asian buyers as a cause of regional price differences and hindrance to more competitive international marketplace for natural gas and LNG, it is difficult for Asian buyers to take similar measures to achieve better conditions as the EU has done without a similar multi-national framework as the EU.

However, as statements from governments and major LNG buyers have been made at the LNG Producer-Consumer Conference and other international LNG events calling for improvements to such rigid contract conditions and listened to by suppliers, significant LNG volumes without such restrictions are imminent from the United States and some buyers have formed alliances to pursue better trading conditions, there seem to be better chances that such rigid conditions are gradually revised.

While many new LNG production projects have been proposed and planned in different regions around the world, the declining oil prices since the latter half of 2014 have posed significant challenges to prospects of those projects and profitability of upstream players. In addition to measures to reduce development costs, such as modularization of liquefaction plant construction and floating liquefaction (FLNG), corporate restructuring through mergers and acquisitions are also on the card to streamline redundant

organisations and replenish upstream reserves.

Royal Dutch Shell acquired BG Group in early 2016, creating a giant LNG seller with a 17% share in the global market. It is quite natural to assume the combined company will be selective in future LNG development in such countries as the United States and Canada, where the two companies before the merger have had separate project proposals.

As industry restructuring progresses in the upstream sector and asset sales continue, LNG buyers may find opportunities to firm in upstream development. As business models diversify and both upstream and downstream players mutually enter into each other's areas, traditional border lines between buyers and sellers are becoming lower and more alliances and joint ventures may be on horizon.

6. Concluding thoughts

As the global LNG business has doubled its size every ten years since 1990, it is expected to have 400 million tonne per year capacity by 2020. As an LNG production project requires huge upfront investment, LNG trades have often been done under long-term contracts with rigid contract conditions.

However, in recent years, in parallel with volumetric expansion numbers of producing and consuming countries, as well as market players, have increased. At the same time wider fluctuations of demand and supply balances and more acute regional price differences have created both needs and opportunities of more active spot transactions and re-exporting business, leading to enhanced liquidity and flexibility in the LNG market.

As differences in regional LNG pricing persist under an imperfect global gas market, Asian LNG buyers should still pursue better procurement conditions. It is also essential to continue calling for more flexibility through relaxation and elimination of restrictive contract conditions.

The expected wave of new LNG production projects in the United States, Australia and East Africa are expected to contribute to buyers' diversification of LNG sources and contract conditions, as well as further liquidity in the market. On the demand side, the mixture of recovery in the European market and steady growth of emerging markets in Asia and South America, Japan's nuclear development and uncertainty over economic growth in China and India, will continue increasing needs of liquidity and flexibility in the market.

While the market environment evolves with uncertainty, in order to achieve sustainable LNG demand growth and stable LNG procurement at reasonable and equitable prices, LNG players continue pursuing partnerships and alliances as well as expansion into new business areas.

References

1) Natural Gas in the World, Cedigaz (November 2015)
2) The LNG Industry 2016 Edition, GIIGNL (March 2016)
3) ICIS Heren LNG Global Markets
4) The LNG Industry 2016 Edition, GIIGNL (March 2016)

5) Database, Energy Statistics, Eurostat
6) Gas Trade Flows in Europe, IEA
7) BP Statistical Review of World Energy
8) Asia World Energy Outlook 2015, IEEJ
9) Expansion and evolution of the Asia Pacific LNG markets, IEEJ (April 2012)
10) LNG Supply and Demand After the Great East Japan Earthquake, IEEJ (July 2012)
11) IEEJ e-NEWSLETTER No. 61, IEEJ (May 2015)
12) The LNG market and developments to enhance liquidity, JOGMEC (March 2015)
13) Prospect of new LNG projects (in Australia, the United States and others), JOGMEC (June 2015)
14) The Northern Sea Route becoming reality, NHK (13 August 2014) . http://www.nhk.or.jp/kaisetsu-blog/400/195160.html (Last accessed on 9 May 2016)
15) Shell's proposed acquisition of the BG Group - a major corporate deal to strengthen growing business areas and diversify portfolio, Mizuho Bank (April 2015)