Issues surrounding planned and proposed LNG procurement from the United States

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1. Introduction

Thanks to shale resource development in recent years, natural gas production has increased significantly and rapidly in the United States, to the point where the country is expected to shift from an importer to an exporter of LNG, with numerous LNG export projects emerging. While Japanese LNG buyers are hopeful that LNG imports from the United States could bring about supply source diversification, enhanced flexibility and more competitive procurement prices, there remain issues to clarify, including potential risks accompanied with different transaction models than traditional LNG supply sources, and issues of marine transportation and gas quality. This paper looks back past developments surrounding LNG projects in the United States and discusses ongoing challenges and their implications.

2. The paradigm shift in natural gas and LNG business in the United States in recent years

Up until 2008, natural gas production was not expected to grow significantly in the United States and the resulting supply gap was expected to be filled by LNG imports. Although unconventional gas resources - including shale gas - were recognized for many years and were expected to substitute decreasing conventional gas production, production levels used to be low as its productivity and profitability lagged those of conventional resources.

Rapid advances of technology including hydro-fracturing and horizontal drilling, however, drove much faster development of shale gas and consequent massive increase of gas production in later years of the 2000s. According to the Energy Information Administration of the United States (EIA), technically recoverable shale gas resources in the country have grown to 665 trillion cubic feet (18.82 trillion cubic metres) from 50 tcf (1.415 tcm) in 2004.

The share of shale gas in the total dry gas production in the United States had grown to 50% by the end of 2014 and the absolute volume of production of shale gas in the

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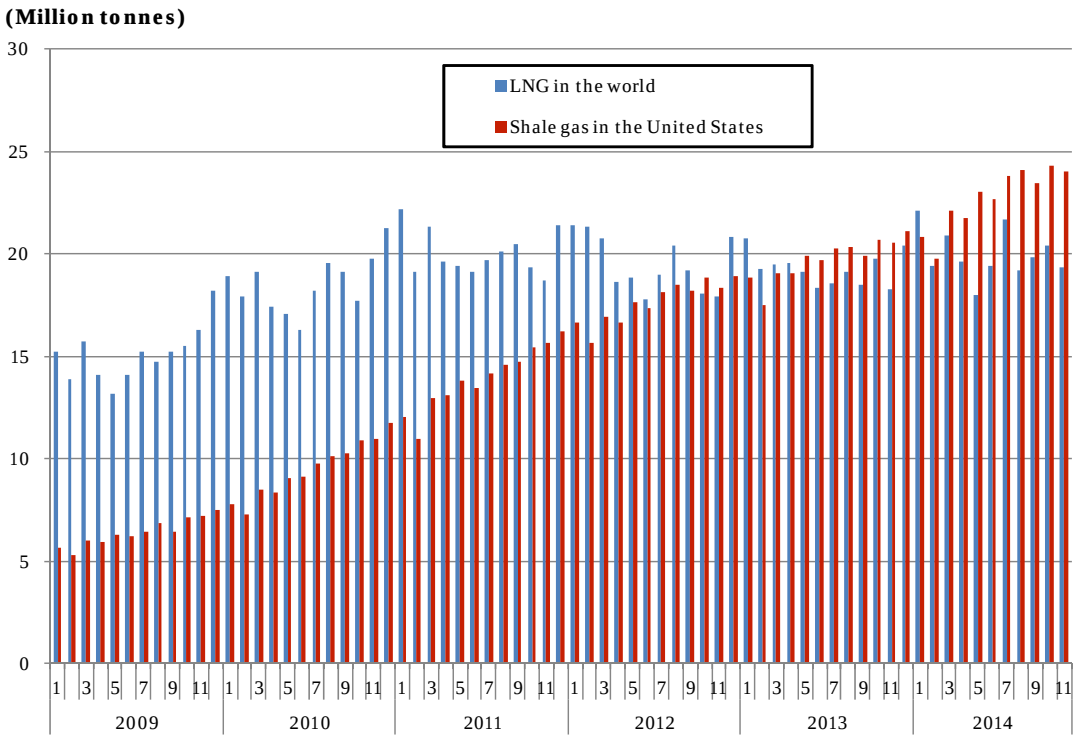
country is now larger than that of global LNG production. As a result, the increasing gas supply is expected to turn the country into a net natural gas exporter by 2018[1].

Figure 1 Production of shale gas in the United States and LNG in the world



(Source) Compiled by the authors based on data from EIA Natural Gas Weekly and customs statistics

As some of LNG export projects take advantage of existing LNG import infrastructure, they are less capital expensive and are expected to be more competitive than projects in other countries. Among the eleven existing LNG import terminals in the United States, eight have plans to convert to or add export capabilities. As they would be able to utilise existing facilities including LNG tanks, jetties, and connecting pipelines to gas transportation networks, their capital needs are expected to be smaller. As some of the projects would be bi-directional with both export and import capabilities, they would enhance flexibility of the system with some receiving terminals already performing re-exporting functions.

Portfolio players including BG and GDF Suez have further strengthen their positions in the LNG market by quickly taking advantage of LNG to be produced in the United States. They are expected to market decent volumes of LNG procured from the

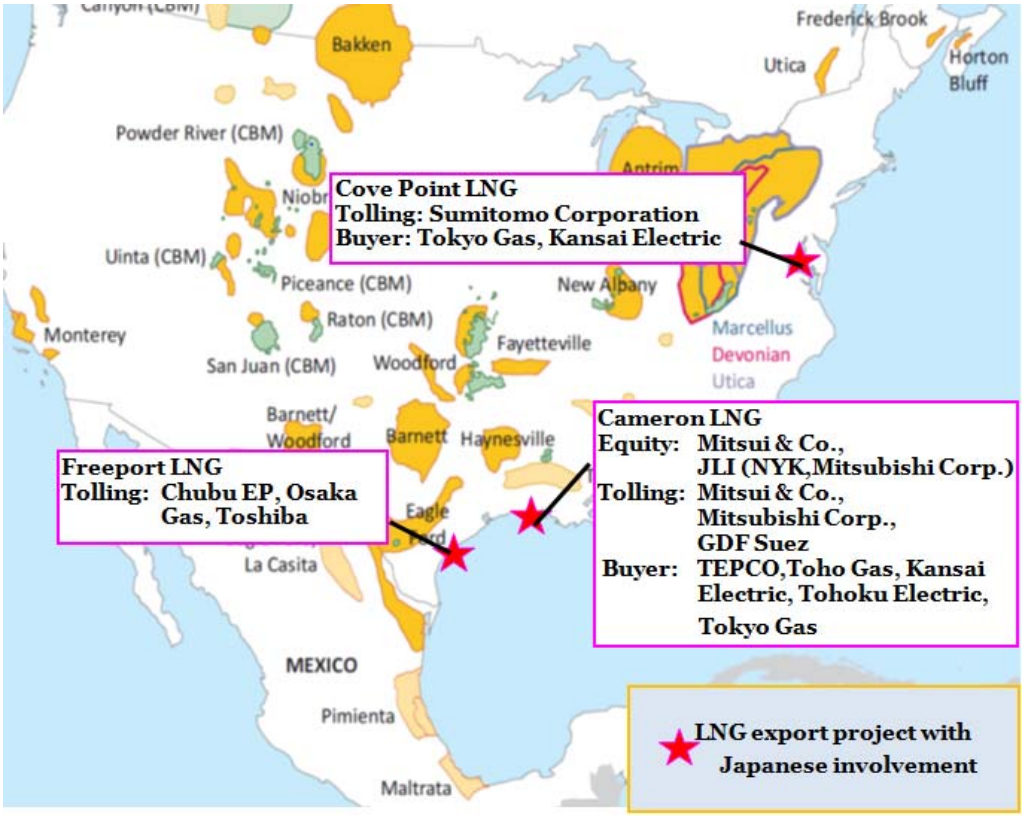
[1] MT-24, "EIA Annual Energy Outlook 2014"

United States into their sales outlets in Asia, which is expected to continue being the core of the global LNG market for many years.

3. LNG projects in the United States involving Japanese companies

Japanese companies are involved in three relatively advanced LNG export projects in the United States - Cameron, Freeport, and Cove Point.

Figure 2 LNG projects in the United States involving Japanese companies



(Source) Compiled by the authors

In order to export LNG to those countries that do not have a free-trade agreement (FTA) with the United States, including Japan, the LNG project sponsors have to obtain approvals from the federal Department of Energy (DOE). After two year hiatus of the DOE process since the Sabine Pass received its non-FTA export approval in May 2011, the Freeport LNG project which involves Chubu Electric Power and Osaka Gas was granted its non-FTA approval in May 2013 as the first LNG export project in the United States with significant Japanese involvement. It was followed by the Cove Point project involving Sumitomo Corporation and Tokyo Gas in September of the year and the Cameron LNG project involving Mitsui and Company, and Mitsubishi Corporation / Nippon Yusen Kaisha

(NYK) in February 2014.

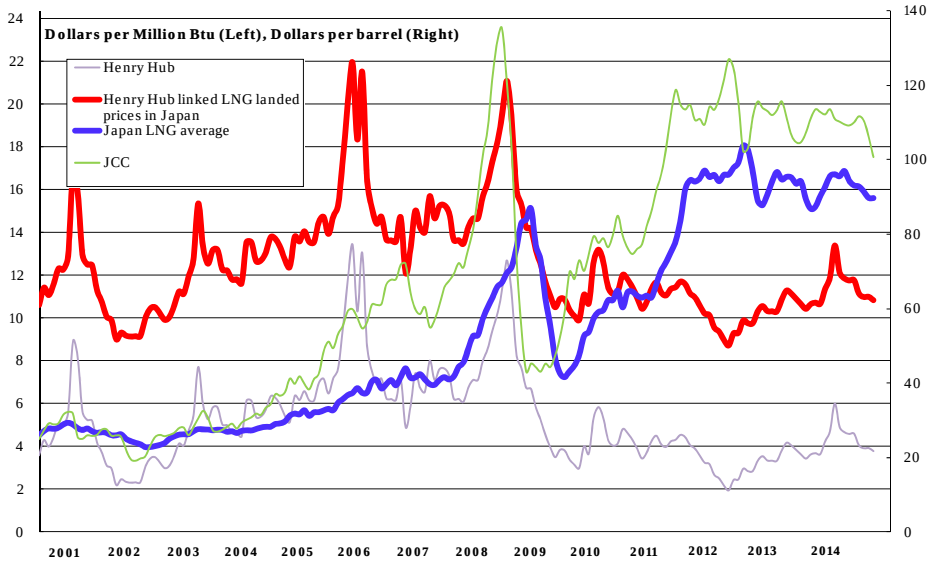
Projects also have to be granted approvals from the Federal Energy Regulatory Commission (FERC) to construct and operate such LNG export plants. As all the above-mentioned three projects were granted FERC approvals in 2014, those projects are expected to start sending LNG cargoes to Japan regularly in 2018.

4. Expectations of lower prices and enhanced flexibility

Pricing arrangements for a vast majority of traditional LNG projects supplying Japan are linked with crude oil prices, which are not always directly connected with demand and supply of gas markets. These typically have "aX +b" - style pricing formulae consisting of a crude-linked element (aX) and a fixed element (b). On the other hand deals concluded at export projects in the United States have "HH x 115% + b" pricing formulae including the Henry Hub element (HH) and a fixed cost for liquefaction (b)[2]. The Henry Hub price is a natural gas wholesale price at a major point of pipeline aggregation and reflects market conditions in the United States in a timely manner.

Figure 3 compares Japan's LNG import prices and hypothetical Henry Hub linked LNG landed prices in Japan based on prevailing Henry Hub prices of each month.

Figure 3 Comparison of LNG prices in Japan and hypothetical Henry Hub linked LNG prices landing in Japan



(Source) Calculated by the authors based on data from EIA and customs statistics

[2] Cheniere Energy IR Management, June 2013

The two prices come closer to each other in 2009 and Japan's LNG import prices are mostly premium to hypothetical HH linked LNG landed prices after 2011, compared to the discount before 2008. There are possibilities of HH linked prices may be premium to oil-linked prices as they were before 2009, assuming lower crude oil prices such as seen during the recent rapid drops. As such, HH linked prices have their own risks as they are not directly related to demand and supply situations in the Asian natural gas markets and are exposed to price fluctuations in the United States.

Despite the price risks, the HH linked pricing will certainly contribute to diversification in LNG pricing away from the oil linked system. In addition, LNG projects in the United States may stimulate increasing resale activities by buyers from FOB (free-on-board) deals, enhance liquidity in the LNG markets with relaxed or abolished take-or-pay and destination restrictions, and result in better bargaining positions of buyers against other counterparties - in negotiations of contract renewals and new procurement deals from different sources.

In arranging LNG procurement deals from the United States, different expertises would be required depending on terms and conditions of the deals, such as gas-trading skills and speciality if they procure gas from the open market and risk management in upstream investment if they need to acquire direct stakes of gas fields. Japanese players would be exposed to new types of risks of prices fluctuations and impairment of assets accompanied with unconventional resource development which they have not experienced much in the past.

5. Export approval process in the United States

As natural gas trades in the United States are governed under the Natural Gas Act 1938, would-be exporters and importers are required to obtain approvals from the Department of Energy to export or import natural gas or LNG. Although exports to countries with a free-trade agreement (FTA) with the United States are effectively automatically granted approvals, exports to countries without an FTA with the country (including Japan) should be granted approvals only after individual scrutiny and public hearings. As the DOE's review processes used to follow the order of applications to grant conditional approvals and go through the FERC's reviews under the National Environmental Policy Act (NEPA)[3], projects used to need years to be finally approved only if they are deemed to be of public interest.

In order to shorten the time of reviews, the process was streamlined in August 2014

[3] Depending on the extent of impacts on the environment, different levels of review are required, such as an environmental impact statement (EIS) or an environmental assessment (EA).

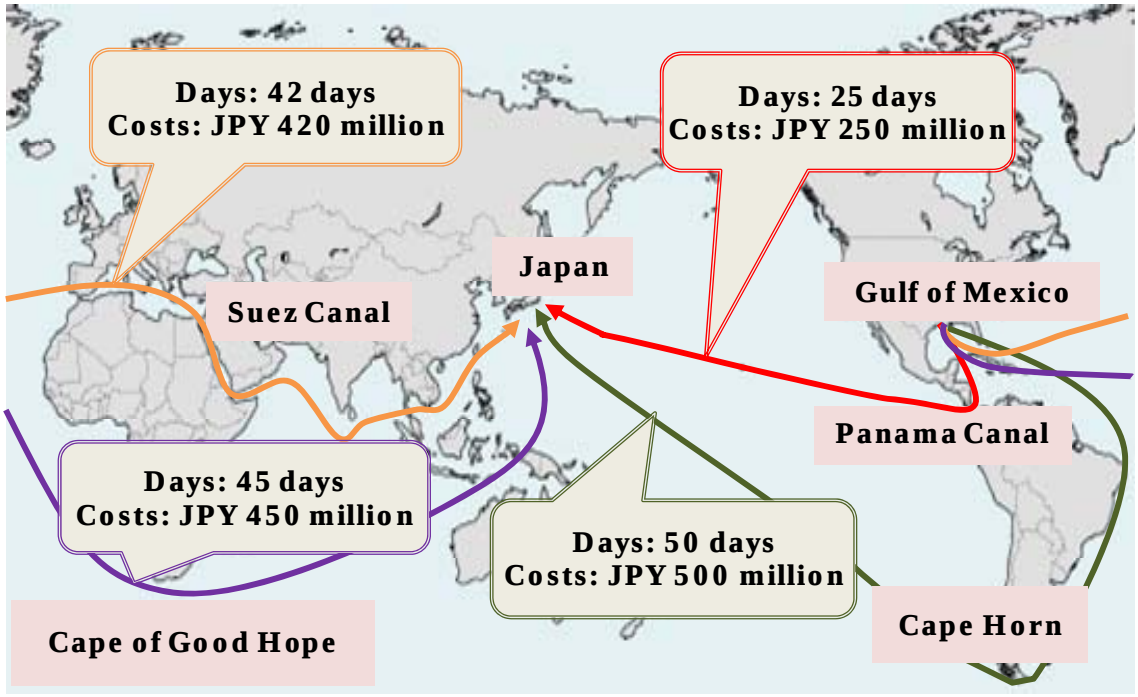
so that the DOE's non-FTA export review should be conducted only after a LNG export project is granted a construction approval from the FERC. The DOE will no longer issue a conditional approval of LNG exports to countries without an FTA with the United States.

Although the review process has been modified, the above-mentioned three projects involving Japanese companies are not affected as they have already been granted effective approvals from the DOE. However, future projects are expected to be beneficiaries to those changes which are to streamline and expedite the review process significantly.

6. Issues surrounding transportation and gas quality

Days and costs of transportation of LNG from the eastern side of the United States to Japan could be minimized by taking a route transiting the Panama Canal, only requiring about 25 days for a one-way voyage compared to about 50 days for the Cape Horn route around the southernmost tip of South America and 45 days for the Cape of Good Hope route around the southernmost tip of Africa.

Figure 4 Comparison of days and costs of transportation by route



(Note) A voyage speed of 15 knots and operating costs (fuel and charter) of 10 million yen per day are assumed, based on the Ministry of Land, Infrastructure and Transport's (MLIT) estimates.

(Source) Compiled by the authors based on "Initiatives to procure energy by Japan", the Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

The Panama Canal Authority initiated an expansion project in 2006 as it had faced challenges of increasing traffic and sizes of transiting vessels. As the expanded canal is expected to start services in early 2016 to accept vessels with an up to 49 meter beam, new Panamax LNG carrier vessels with a 170,000 m^3 cargo capacity are under construction.

Prospective users of the expanded canal prefer to see transparency and stability of transiting tolls, as the canal authority almost doubled tolls for container ships from 2005 to 2011. The authority has recently unveiled draft tolls for the expanded canal which includes a new category for LNG carriers. The calculation of tolls is now based on cargo capacity, eliminating differences by cargo containment system. Further clarification would be helpful on the number of ships that can be daily accommodated and procedures to arrange transit.

Another important issue is quality of gas, especially its heat content. LNG from the United States will be leaner than LNG from traditional producers in the Asia Pacific region with lower heating contents and lighter in gravity, less ethane and propane, mostly comprising of methane. While a vast majority of Japan's city gas has a standard heating value of 45 - 46 mega joules (MJ) / cubic meter (m^3), natural gas distributed in the United States has only 37.3 - 40.1 MJ/m^3[4]on average.

As natural gas in the United States is expected to continue being lean in the future, Japanese users will need to take care of differences in gas quality when introducing LNG from the United States into the same terminals where they still continue receiving LNG from their existing supply sources, by for example mixing the leaner LNG with richer one in the same tanks or setting up separates tanks by gas quality.

Efficiency in power generation would be also improved by having dedicated facilities.

While the Japanese city gas supply has been integrated into high heating value under the "IGF21" initiative launched in 1990, city gas providers would have to enrich lower-heat-content LNG by adding LPG. Alternative solutions include widening or the lowering heat-content allowances, which would in turn require adjustment of end-use appliances at the city-gas customer sites. City gas providers would have to either expand capabilities to enrich gas streams at LNG receiving terminals or expand heating value allowance of city gas supply.

7. Conclusion

The world is expected to have steadily greater natural gas demand into the future.

[4] The figures are calculated by the authors based on "Heat Content of Natural Gas Consumed" Energy Information Administration (http://www.eia.gov/dnav/ng/ng_cons_heat_a_EPG0_VGTH_btucf_a.htm).

As the LNG export projects in the United States have significant global impacts, tougher competition in the LNG export markets may be on the horizon. Amid the expected structural changes of demand and supply in the global market, LNG importing countries including Japan may have greater opportunities to make their LNG import prices more palatable to them. At the same time they would need to take care of commercial risks that they have not previously experienced.

They also have issues related to transportation and gas quality. Initiatives to procure LNG from the United States represent a core of Japan's strategy to procure stable and competitive energy supply. Japan needs to steadily take care of issues to realise them.

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