



JAPAN: A HIGH-VALUE MARKET FOR CANADIAN LNG.



OCTOBER 2014

Asia Pacific
Foundation
of Canada

Fondation Asie
Pacifique du
Canada



TABLE OF CONTENTS

Executive Summary.....	2
Introduction.....	4
LNG Demand in Japan.....	5
Effect of Reduced Nuclear Power Generation on LNG Demand.....	5
Outlook for LNG Demand in Japan.....	8
Challenges for LNG Procurement in Japan.....	10
Canada’s Strengths and Weaknesses as a Potential LNG Exporter to Japan	13
Canadian Natural Gas Resources and Proposed LNG Export Projects.....	13
Canada’s Strengths as a Potential LNG Exporter to Japan.....	13
Canada’s Weaknesses as a Potential LNG Exporter to Japan.....	15
Conclusion.....	17
References.....	18

Author: Ken Koyama, Managing Director and Chief Economist, The Institute of Energy Economics, Japan

Acknowledgements

The Asia Pacific Foundation of Canada would like to thank Cenovus Energy, Husky Energy, Nexen, the Province of British Columbia, Shell Canada and Spectra Energy for their generous support of the Canada-Asia Energy Futures Project. We would also like to thank the participants of the Asia Pacific Foundation of Canada’s “Canada’s LNG Opportunity in Asia” workshop for their input into this paper.

The views expressed here are those of the author, and do not necessarily represent the views of the Asia Pacific Foundation of Canada or The Institute of Energy Economics, Japan.

EXECUTIVE SUMMARY

Japan is highly dependent on fossil fuel imports to meet its energy needs. In 2012, Japan consumed 116.7 billion cubic metres (bcm) of natural gas, which accounted for 22% of its primary energy demand.¹ However, as the country has very limited natural gas production and no pipeline connections to the mainland, approximately 97% of this gas had to be imported as liquefied natural gas (LNG).²

Although the percentage of natural gas in Japan's energy mix has been increasing for decades, the Fukushima Daiichi nuclear accident in March 2011 and the subsequent shut-down of all of Japan's nuclear power plants greatly increased the importance of natural gas, and therefore LNG, to the power supply. Between Fiscal Years (FY)³ 2010 and 2012, the share of gas in power generation increased from 31% to 47%⁴ and LNG imports increased 23% to a record 87 million tonnes in FY 2012.⁵

While future demand for LNG in Japan will depend on a number of factors, the most important will be the role of nuclear energy in power generation. The Japanese government recently approved a new Basic Energy Plan, the strategy that guides long-term government energy policy. While the plan indicates that nuclear power should be positioned as "an important base-load power supply source," it does not contain numerical targets for the share of nuclear power in total power generation.⁶ Analysis suggests that LNG demand in Japan in 2030 could be 70 million tonnes if nuclear energy contributes 20%–25% of the country's power generation, and over 90 million tonnes if the nuclear share of power generation is 10%–15%.

The post-Fukushima increase in natural gas imports has created a number of policy challenges for Japan, most notably a greater dependence on the Middle East for fossil fuels, and the creation of a trade deficit of 13.8 trillion yen in FY 2013, compared to a trade surplus of 5.4 trillion yen in FY 2010.⁷ These factors have made the securing of LNG from a diverse array of countries at a competitive price a major policy objective for Japan.

Canada is one of a number of countries, including the US, Russia, Australia, and Mozambique, that is developing new LNG export facilities or expanding existing capacity. Canada has at least 23 LNG export facilities under consideration on its east and west coasts, some of which involve investment from Japanese companies. JAPEX, for example, owns a 10% stake in Petronas/Progress' Pacific Northwest LNG project in British Columbia. However, no Canadian project has yet received a final investment decision (FID).

¹ BP, BP Statistical Review of World Energy 2013 (London: BP, 2013).

² Institute of Energy Economics Japan (IEEJ), EDMC Handbook of Energy and Economic Statistics in Japan 2014 (Tokyo: IEEJ, 2014), 16-17.

³ The Japanese government's fiscal year begins April 1 and ends March 31.

⁴ Institute of Energy Economics Japan (IEEJ), Short-term Energy Supply-Demand Outlook for Japan (Tokyo: IEEJ, December 2013).

⁵ Ministry of Finance, Trade Statistics in Japan, http://www.customs.go.jp/toukei/info/index_e.htm

⁶ Ministry of Economy, Trade and Industry (METI), Basic Energy Plan 2014 (Tokyo: METI, 2014).

⁷ Ministry of Finance, Trade Statistics: Value of Exports and Imports (May 2014), accessed August 2014. http://www.customs.go.jp/toukei/shinbun/trade-st_e/2013/2013_216e.pdf

The following are important issues that Canadian investors, project proponents, and governments should bear in mind regarding Canada's prospective LNG exports to Japan:

- Canadian projects must be able to supply LNG at a competitive price if they are to succeed in the Japanese market. The author estimates that the price of US-sourced LNG delivered to Japan in 2020 will be around \$11-\$12 per million British thermal units (MMBtu) if the US natural gas price at Henry Hub is \$4/MMBtu.
- Although Japan values stability of supply, it is not willing or able to pay a "premium" for it. Sellers of LNG will need to provide stable supplies at competitive prices.
- Canada's strengths as a potential exporter of LNG to Japan include the following:
 - Reliability: Canada has sufficient natural gas reserves to feed planned projects; rule of law, which ensures that contracts are honoured; and political stability, which decreases the risk that supply will be interrupted by conflicts.
 - Government encouragement of LNG industry: The governments of Canada and Japan have agreed to promote LNG cooperation and enhance minister-level dialogue on energy. Furthermore, the Province of British Columbia is providing support for the industry by enhancing relevant skills training opportunities and lowering transaction costs for businesses that invest in resource development, amongst other measures.
 - Transportation times and routes: Shipping time from projects on Canada's west coast to Japan is 10 days, shorter than from Australia, the US Gulf Coast, and the Middle East. Tankers coming from Canada would not need to pass through major choke points such as the Strait of Hormuz or the Panama Canal.
- Canada's weaknesses as a potential LNG supplier to Japan include the following:
 - Greenfield projects: Most of Canada's proposed projects are greenfield, meaning that they are not utilizing existing facilities. These projects require significantly higher upfront investment than brownfield sites in the US and elsewhere, potentially reducing Canada's ability to offer a competitive LNG price.
 - Timing and speed of development: LNG from approved Canadian projects will be entering the market in the latter part of this decade, when the LNG supply available to Asia is projected to exceed demand. This supply-demand dynamic will likely place downward pressure on LNG prices and could result in more flexible contract terms.

INTRODUCTION

Japan is highly dependent on fossil fuel imports to meet its energy needs. In 2012, Japan consumed 116.7 billion cubic metres (bcm) of natural gas, which accounted for 22% of its primary energy demand,⁸ and made Japan the fifth-largest gas consumer in the world, after the US, Russia, Iran, and China.⁹ However, since Japan has very limited domestic natural gas resources and no pipeline connections to the mainland, almost all demand for natural gas is met by imports in the form of liquefied natural gas (LNG). In FY 2012, for example, domestic natural gas production accounted for just 3% of total gas supply in Japan, while the remaining 97% was supplied by LNG imports.¹⁰ As a result, Japan is the leading LNG importer and consumer in the world. Its LNG imports in 2012 were 118.8 bcm, accounting for 36% of global LNG imports.¹¹

In order to obtain LNG at lower prices and increase its energy security, Japan has been attempting to diversify the locations from which it sources LNG. This paper will examine the LNG market opportunity in Japan for Canada, which currently has at least 23 LNG export facilities under consideration on its east and west coasts.¹² The paper will evaluate the current status and future outlook of LNG demand in Japan and will then examine the challenges the country faces with respect to LNG procurement. The second section of the paper will describe Canada's strengths and weaknesses as a potential LNG exporter to Japan.

⁸ "Primary energy demand" is the total requirement for all uses of energy, including energy used by the final consumer, intermediate uses of energy in transforming one energy form to another, and energy used by suppliers in providing energy to the market. From National Energy Board (NEB), Canada's Energy Future 2013 - Energy Supply and Demand Projections to 2035 (NEB, November 2013), p. 83.

⁹ BP, BP Statistical Review of World Energy 2013 (London: BP, 2013), 23.

¹⁰ Institute of Energy Economics Japan (IEEJ), EDMC Handbook of Energy and Economic Statistics in Japan 2014 (Tokyo: IEEJ, 2014).

¹¹ BP, BP Statistical Review of World Energy 2013 (London: BP, 2013), 28.

¹² For a list of proposed LNG export facilities in BC, see "FACTSHEET: LNG project proposals in British Columbia" <http://www.newsroom.gov.bc.ca/ministries/natural-gas-development/factsheets/factsheet-lng-project-proposals-in-british-columbia.html>. There are three proposed LNG export projects in Nova Scotia: Goldboro LNG, Bear Head LNG and a project proposed by India's H-Energy. Repsol SA is considering converting its Canaport LNG import facility in Saint John, New Brunswick into an export facility. Husky Energy is also considering a project.

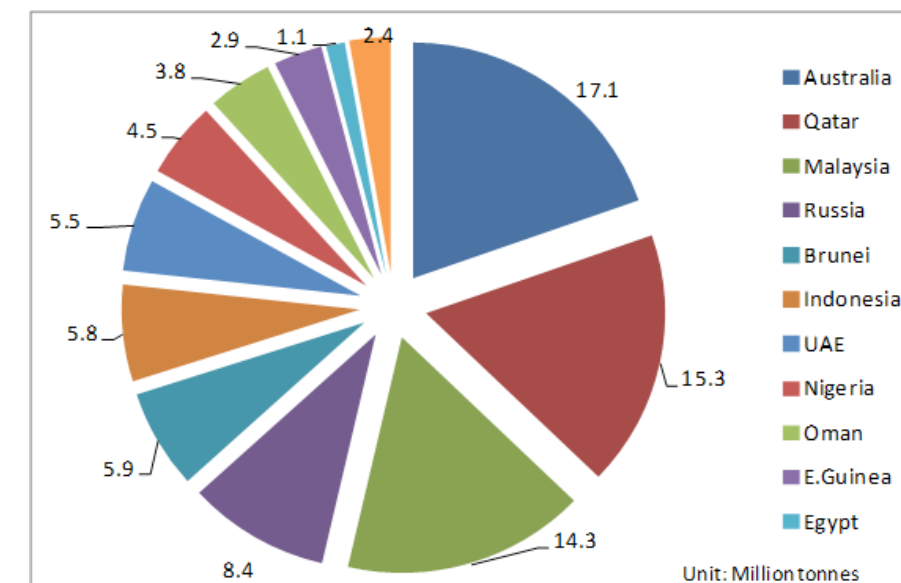
LNG DEMAND IN JAPAN

1.1 EFFECTS OF REDUCED NUCLEAR POWER GENERATION ON LNG DEMAND

In March 2011, a tsunami and earthquake caused the partial meltdown of three reactors at the Fukushima Daiichi nuclear facility on Japan's east coast. While natural gas use had been increasing in Japan before 2011, the Fukushima nuclear accident greatly increased the importance of gas, and therefore LNG, to Japan's power supply and overall energy security. As nuclear power plants across the country were shut down for inspection and maintenance, nuclear power generation fell from 31% of total power generation in FY 2010 to just 2% in FY 2012.¹³ In order to compensate for that lost power supply, Japan implemented large-scale power conservation and fossil fuel (especially gas-fired) power generation. As a result, the share of LNG in power generation rose from 31% in FY 2010 to 47% in FY 2012.¹⁴

To meet the growing demand for gas-fired power generation, Japan increased its imports of LNG by 23% between FY 2010 and FY 2012, from 71 million tonnes to 87 million tonnes.¹⁵ As of FY 2012, the largest LNG supplier to Japan was Australia (17 million tonnes, or 20%), followed by Qatar (15 million tonnes, or 18%), and Malaysia (14 million tonnes, or 16%).¹⁶

Figure 1. Japan's LNG imports by country (FY 2012)



Source: Ministry of Finance, Japan, Trade Statistics

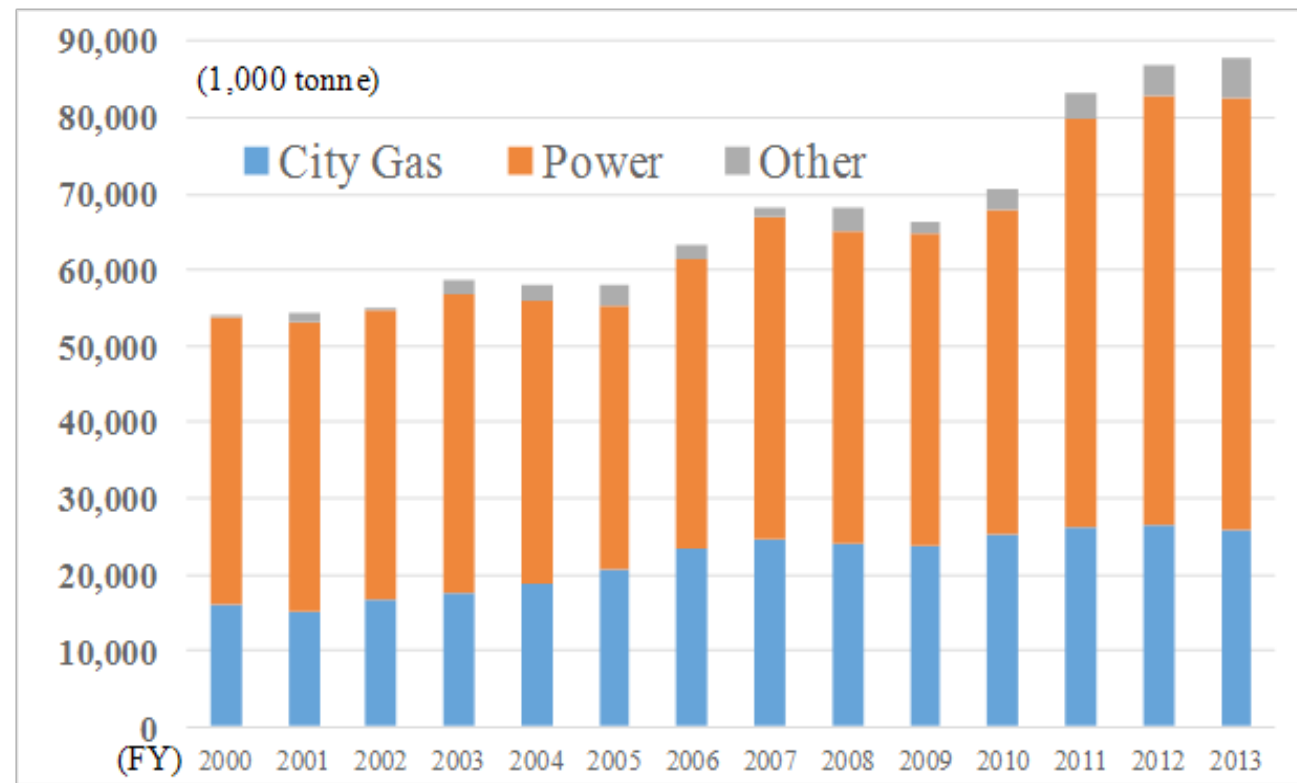
¹³ Institute of Energy Economics Japan (IEEJ), Short-term Energy Supply-Demand Outlook for Japan (Tokyo: IEEJ, December 2013).

¹⁴ Ibid.

¹⁵ Ministry of Finance, Trade Statistics in Japan. http://www.customs.go.jp/toukei/info/index_e.htm.

¹⁶ Ibid.

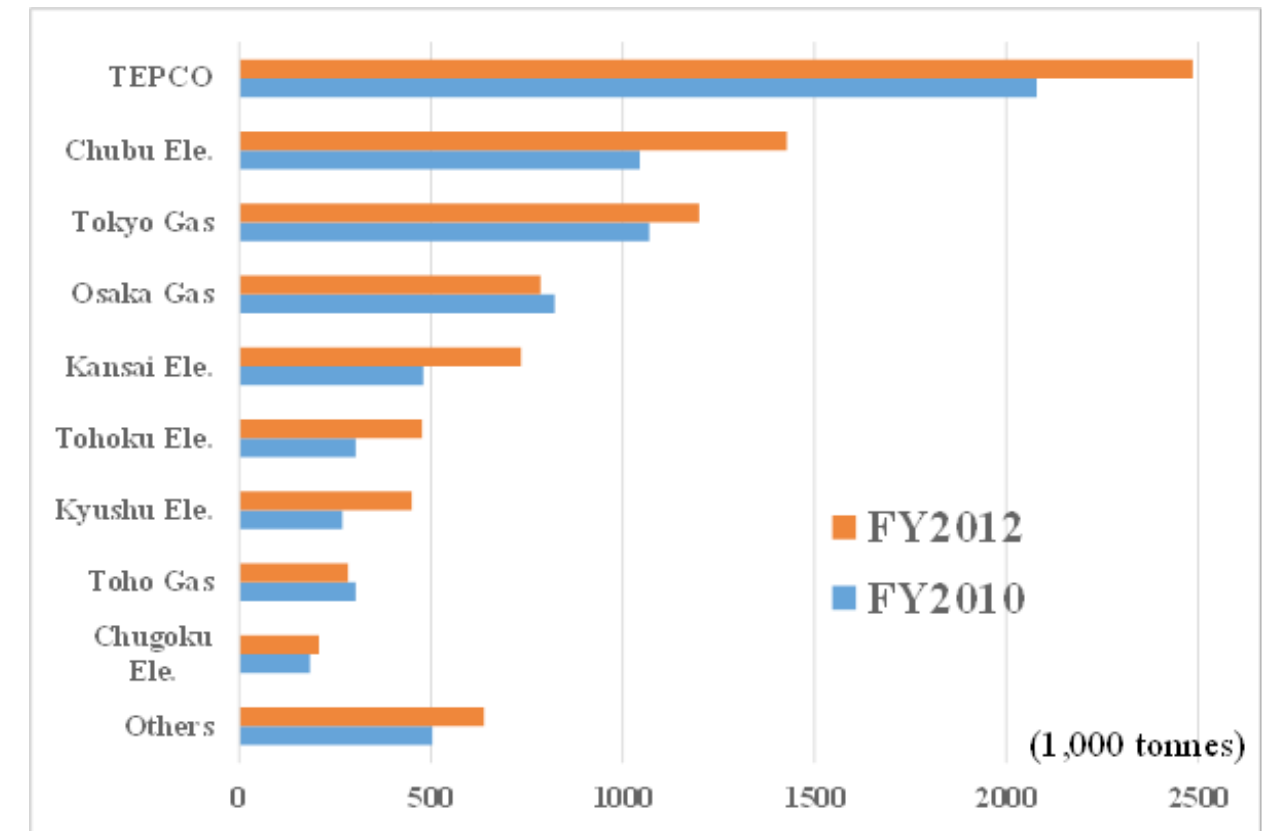
Figure 2. Japan's LNG consumption (FY 2000-2013)



Source: Ministry of Economy, Trade and Industry, and Ministry of Finance, Japan

The dominant consumer of LNG in Japan is the power sector, which used 56.4 million tonnes in FY 2012, while the city-gas sector used 22.3 million tonnes (Figure 2). Within the city-gas category, industry is the largest consumer, at 52%, followed by the household segment (27%) and the commercial segment (12%). Among companies, the largest importer of LNG is Tokyo Electric Power Company (TEPCO), followed by Chubu Electric, Tokyo Gas, Osaka Gas, and Kansai Electric (Figure 3).

Figure 3. Japan's LNG imports by company



Source: Prepared by author

Since LNG is the main source of natural gas imports to Japan, LNG receiving terminals are an important element in gas supply logistics in the country. As of August 2014, 32 LNG receiving terminals were in operation; they are owned and operated mainly by electric power companies and city-gas companies. Currently, eight new LNG receiving terminals are planned or under construction. Japan has regional gas pipeline systems, which were established to meet the needs of local markets, in particular the main economic and industrial areas in Japan, such as Kanto (Tokyo), Kansai (Osaka), and Chubu (Nagoya). However, there is no national trunk pipeline system for natural gas, and thus pipeline connections between major areas in Japan are weak or non-existent.

The substantial increase in imports of LNG (and other fossil fuels) has created challenges for Japan's ability to achieve the "3Es" (Energy Security, Environmental Protection, Economic Efficiency), which are major goals of Japanese energy policy. With respect to energy security after Fukushima, increases in fossil fuel imports lowered Japan's energy self-sufficiency. Furthermore, Japan became more reliant on the Middle East for fossil fuels. Out of the 16 million tonnes in increased gas imports between FY 2010 and 2012, LNG from Qatar accounted for almost half (7.5 million tonnes). Japanese policy makers are concerned that political

developments in the region could interrupt supply, as could any blockades of maritime choke points, such as the Strait of Hormuz.

With respect to environmental protection, increased reliance on fossil fuels has resulted in higher CO₂ emissions. In November 2013, the Japanese government revised Japan's targets for reducing greenhouse gas (GHG) emissions by 2020. Whereas the previous target committed Japan to a 25% reduction from 1990 levels, the new target is equivalent to a 3% increase.¹⁷

Finally, increased fossil fuel imports have caused macro-economic problems in Japan. Japan spent 27.1 trillion yen on fossil fuels in FY 2013, up from 18.1 trillion yen in FY 2010.¹⁸ Furthermore, Japan suffered from a trade deficit of 13.8 trillion yen in FY 2013, as compared to a 5.4 trillion yen surplus in FY 2010.¹⁹ Japan's high spending on fossil fuels is exacerbated by the high price of LNG in the Asia-Pacific region (a phenomenon that will be discussed in more detail below). All of the above challenges have made the procuring of LNG at a competitive price an important policy objective for Japan.

1.2 OUTLOOK FOR LNG DEMAND IN JAPAN

Although LNG consumption is at an all-time high in Japan, there is uncertainty about future demand. Demand is influenced by many factors, including GDP growth, summer and winter temperatures, industry activity, and inter-fuel competition. However, the strongest determinants of future demand will be the timing and degree of nuclear power re-starts in the short term and the role played by nuclear power in Japan's energy portfolio in the long term.

As of October 2014, Japan had no nuclear power plants in operation; however, power companies in Japan have submitted applications to restart 20 nuclear power plants at 13 sites. The Nuclear Regulation Authority (NRA), an external organization of the Ministry of Environment, is responsible for conducting technical reviews and approving the restart of nuclear power plants. The NRA issued a draft approval for the restart of the Sendai nuclear power plant (of Kyushu Electric) in July 2014 and a final safety approval in September 2014. The plant could restart in late 2014 or early 2015 if it receives approval from local authorities and passes onsite operational inspections.

After the Fukushima disaster, the Japanese government instituted a review of the Basic Energy Plan, the strategy that guides long-term government energy policy and that was last updated in June 2010. After

¹⁷ This target is based on the assumption that nuclear does not contribute to the energy mix. See L. Jeffery et al., *Japan: from frontrunner to laggard*, Climate Action Tracker: Policy Brief (2013). <http://www.ecofys.com/files/files/ca-ecofys-2013-cat-policy-brief-japan.pdf>.

¹⁸ Institute of Energy Economics Japan (IEEJ), Short-term Energy Supply-Demand Outlook for Japan (Tokyo: IEEJ, December 2013).

¹⁹ Ministry of Finance, Trade Statistics: Value of Exports and Imports (May 2014), accessed August 2014. http://www.customs.go.jp/toukei/shinbun/trade-st_e/2013/2013_216e.pdf

taking more than three years for extensive domestic debates, Cabinet approved the new plan, which clearly states that nuclear power should be positioned as “an important base-load power supply source”²⁰ for Japan, but that dependence on nuclear power will be minimized as much as possible.

Whereas the previous basic energy plan stated that nuclear power should account for more than 50% of total power generation in 2030, the current plan does not have a numerical target. That is mainly because issues related to nuclear power are still politically and socially sensitive in Japan. The Japanese government is taking a very cautious approach to deciding on targets in the energy portfolio. Without a numerical estimate of the long-term contribution of nuclear energy (and of coal and renewable energy, which compete with natural gas as energy sources) to the energy mix, it is very difficult to estimate the long-term demand for LNG in Japan.

Figure 4 shows the demand outlook for LNG in Japan up to 2040, as calculated by the Institute of Energy Economics, Japan (IEEJ). LNG demand in the future varies greatly, depending on “scenarios” for technology development and the role of nuclear power in the energy mix. The reference case, which assumes that current trends in energy supply-demand and in energy policy and technology development continue, suggests that LNG demand in 2030 will be about 120 bcm (89 million tonnes).²¹ In the reference case, nuclear power is assumed to account for about 15% of total power generation.

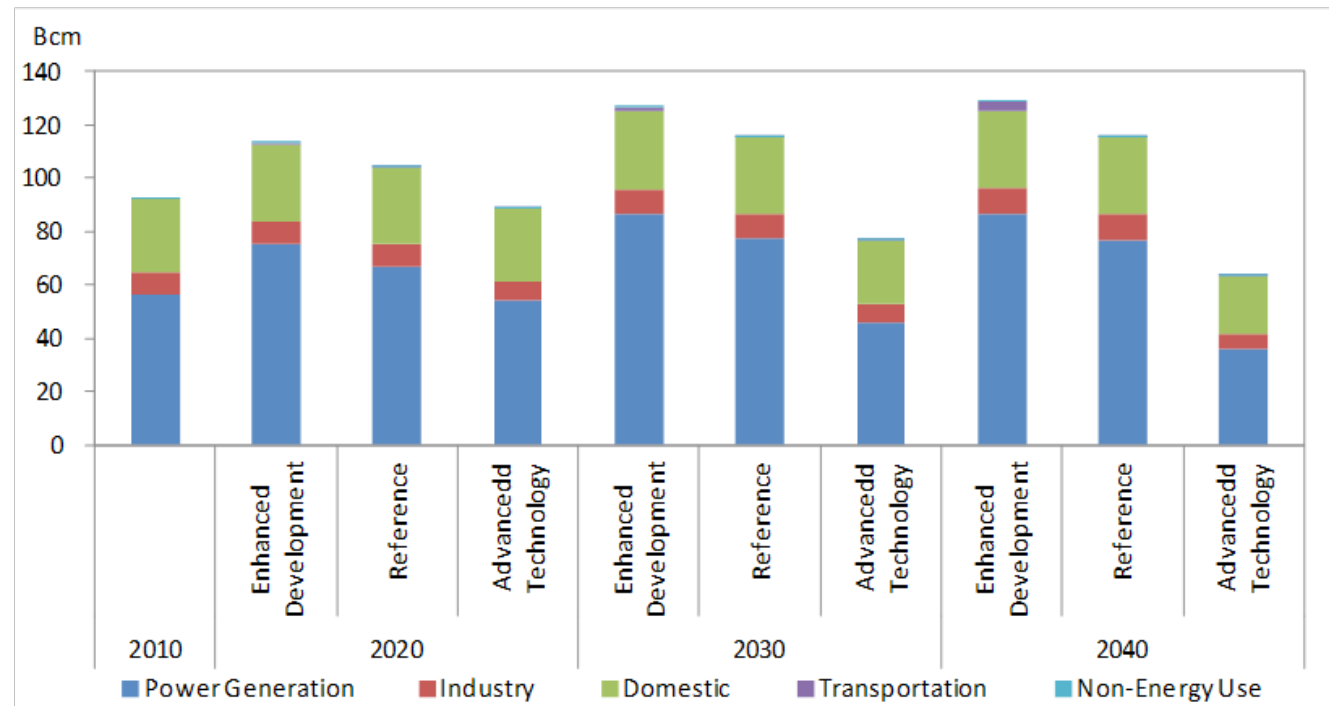
For the purpose of comparative analysis, IEEJ prepared the following two alternative cases: the advanced technology case and the enhanced (unconventional resource) development case. The former assumes that Japan, and the world as a whole, implements stronger environmental and energy efficiency policies than those in the reference case and further promotes the use of non-fossil fuel energy sources, including renewable energy and nuclear power. The latter case assumes that substantially enhanced unconventional oil and gas resource development, excluding methane hydrate, will occur globally relative to the reference case. This development will result in lower gas prices, which in turn will promote gas consumption.

The IEEJ reference case above assumes that the energy efficiency improvement trend that Japan has experienced since the oil crisis in the 1970s will continue in the long term. This may be overly optimistic. Utilizing a more conservative projection of energy efficiency improvements, the author estimates that LNG demand in Japan in 2030 may be 70 million tonnes if the nuclear share of total power generation is 20%–25%, and over 90 million tonnes if the nuclear share is 10%–15%. LNG demand in 2030 is expected to exceed 100 million tonnes if the nuclear contribution to power generation is zero. In general, LNG is expected to play an increasingly important role in Japan's energy portfolio as a clean, stable, and practical energy source. However, how great the demand for LNG will actually be is uncertain.

²⁰ Ministry of Economy, Trade and Industry (METI), Basic Energy Plan 2014 (Tokyo: METI, 2014). Online. http://www.enecho.meti.go.jp/category/others/basic_plan/pdf/140411.pdf

²¹ The Institute of Energy Economics Japan (IEEJ), Asia/World Energy Outlook 2013 (Tokyo: IEEJ, 2013). Online. <https://eneken.ieej.or.jp/data/5331.pdf>

Figure 4. Japan's LNG demand outlook



Source: Institute of Energy Economics, Japan, "Asia/World Energy Outlook" (October 2013)

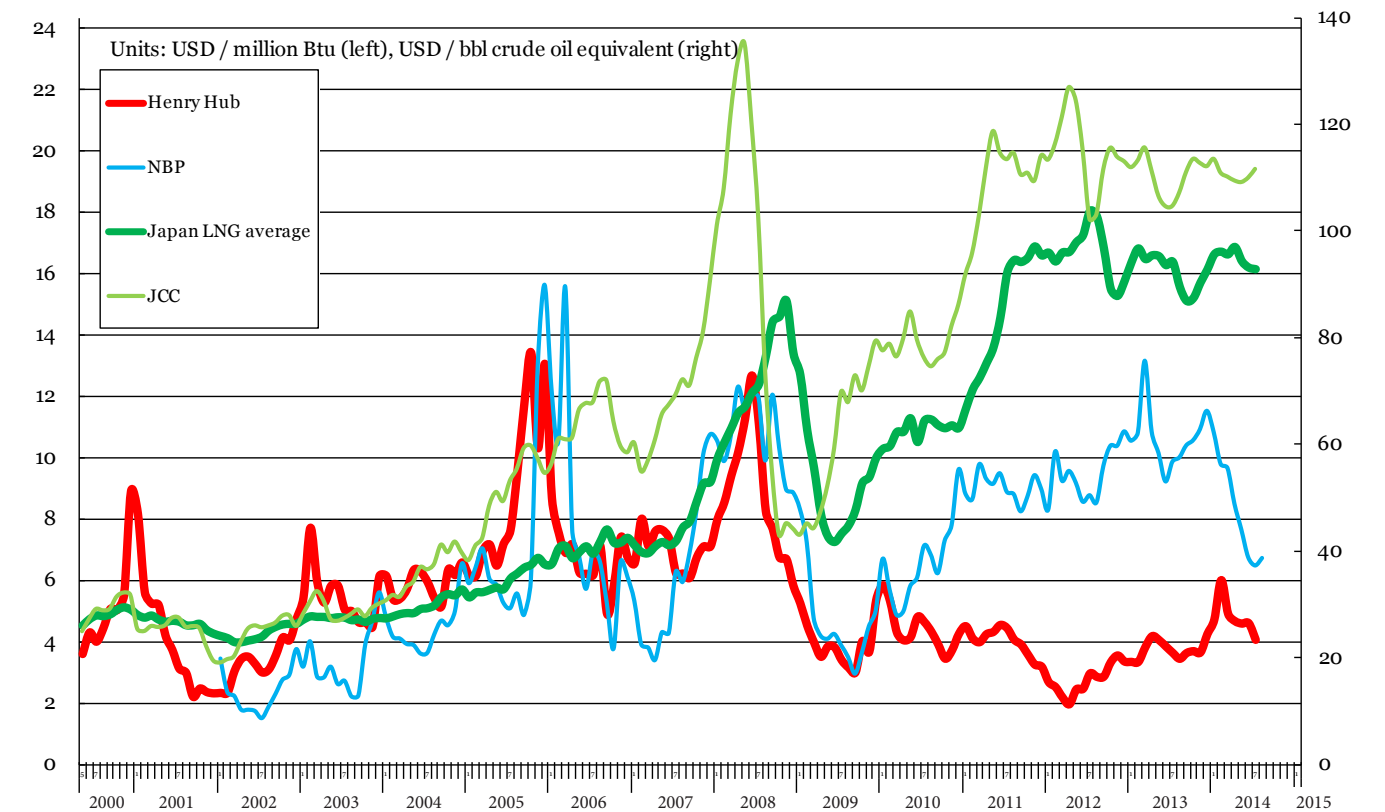
1.3 CHALLENGES FOR LNG PROCUREMENT IN JAPAN

The Japanese government is now aiming to tackle LNG security of supply, because of the economic problems caused by the high cost of imported LNG and the importance that LNG is expected to play in Japan's future energy mix.

It is crucial for Japan to secure LNG from diversified sources, such as the US, Canada, Russia, and East Africa, so as to avoid the so-called 'Asian premium' on the price of LNG. The Asian premium is a market phenomenon that makes the price of LNG in Asia (indexed to the price of crude oil) much higher than the prices of LNG and natural gas in the Atlantic market. For example, in 2013, the price that Japan paid for imported LNG was around \$15–\$16/MMBtu, whereas the US price for natural gas at Henry Hub²² was about \$3–\$5/MMBtu (Figure 5).

²² Henry Hub refers to the pricing point for natural gas futures contracts traded on the New York Mercantile Exchange.

Figure 5. World gas prices by region



Source: Institute of Energy Economics, Japan

This gap is due to differences by region in the pricing mechanisms by which natural gas and LNG are bought and sold. Long-term contracts that supply LNG to Japan and other Asian countries are indexed to the price of crude oil. More specifically, Japanese (and Asian) LNG prices are determined by a fixed price formula, negotiated and agreed upon by LNG suppliers and buyers as part of a contract. The average price that Japan pays for imported crude oil (the so-called Japan crude cocktail, or JCC) is used as a benchmark with some other factors to reflect market conditions. Therefore, Japan's LNG import prices are directly influenced by Japan's crude oil import prices, which rose above US\$100/barrel after 2011 because of tensions in the Middle East and other market conditions. In the US and Europe (in particular, the UK), however, gas and LNG trade on a hub, thereby reflecting gas supply-and-demand fundamentals. Furthermore, in the US, gas prices have been particularly low because of the abundance of shale gas.

The Asian premium now attracts a great deal of attention in Japanese government, industry, and media because high LNG prices are regarded as contributing to Japan's economic disadvantages, such as the national wealth outflow, trade deficits, and higher energy bills for consumers. A national discussion is now taking place about how to improve the bargaining power of Japanese buyers in LNG procurement. Tokyo Electric Power Company (TEPCO), for example, stated in its Revised Comprehensive Special Business Plan, published

in December 2013, that it aims to reduce its fuel-related costs by 650 billion yen per year by, among other measures, forming a strategic and comprehensive alliance to purchase LNG in concert with other Japanese utilities.

The electric power companies, which are the main LNG importers in Japan, are pursuing LNG procurement at more competitive prices because of the financial losses they have suffered owing to the nuclear shutdown and strong pressure from the government to reduce procurement costs. Power companies and city-gas companies will soon come under further pressure to lower costs because of the scheduled liberalization of the retail electricity and gas markets. Currently, LNG and fuel procurement are the highest costs for electric and gas companies in Japan. As liberalization increases competition, companies will be under pressure to improve their cost structures. Furthermore, utility companies will no longer be able to simply pass on the cost of fuel to the consumer.

In order to enhance energy security, Japan is promoting the expansion of the supply of LNG and natural gas in the market; seeking to diversify its sources of LNG and natural gas; enhancing its relations with the countries or other entities that supply it with LNG; promoting cooperation among LNG- and natural gas-consuming countries;²³ and exploring a more competitive and rational pricing mechanism that can better reflect market fundamentals. The efforts to diversify its energy mix and to promote the efficient use of natural gas are also considered to be critical.

Japan's increased concern about the price of LNG has implications for LNG sellers. Because of the changing market environment explained above, LNG security of supply is no longer the only priority for the Japanese government or for Japanese LNG buyers. Rather, they are now equally concerned with obtaining LNG at a competitive price. As a result, price will be the key factor in determining whether an LNG seller will succeed in the Japanese market.

²³ To promote dialogue between LNG producers and consumers, the Japanese government hosted the first LNG Producer Consumer Conference in Tokyo in September 2012, and a second such conference one year later.

CANADA'S STRENGTHS AND WEAKNESSES AS A POTENTIAL LNG EXPORTER TO JAPAN

2.1 CANADIAN NATURAL GAS RESOURCES AND PROPOSED LNG EXPORT PROJECTS

Canada is the world's fifth-largest natural gas producer (157 bcm in 2012), with a total recoverable proven reserve of natural gas of 2 tcm (70 tcf) as of 2012.²⁴ To date, the only country to which Canada has exported natural gas is the US, and most of these exports have been by pipeline. However, over the last decade, the shale gas revolution has resulted in expanded gas production in the US and, consequently, in a decrease in natural gas exports from Canada to the US.

At the same time, the demand for natural gas and LNG in Asia (including Japan, China, Korea, Taiwan, and even the ASEAN countries) is growing substantially, and is expected to continue to grow. Canada now has at least 23 LNG export projects under consideration, many of which target Asian markets. In some cases, existing infrastructure is available, but most projects are greenfield.²⁵ As for industry stakeholders, there is wide range of participants, including Canadian companies, international majors, and national oil companies (NOCs). A number of these industry stakeholders are from Asia, including Japan (Mitsubishi, INPEX, JAPEX, and Idemitsu), China (CNOOC and PetroChina), Korea (KOGAS) and Malaysia (PETRONAS). Serious discussions and preparatory work are underway to reach final investment decisions on these projects. However, it is unlikely that even the earliest projects to receive final investment decisions will be delivering gas much before the end of this decade.

2.2 CANADA'S STRENGTHS AS A POTENTIAL LNG EXPORTER TO JAPAN

From the perspective of Japanese buyers, Canada has the following strengths as a potential source of LNG:

Large resource potential

Canada has large scale natural gas resources to be developed and exported to Asia. There is virtually no concern over availability of feed gas for LNG projects.

Internal political stability

Canada is an OECD member and G7 country with an established democratic political regime and rule of law. Since LNG projects require billions of dollars in investment and involve long-term contractual relationships, domestic political stability makes Canada an attractive source of LNG for Japan. LNG contracts with suppliers in Canada are likely to be honoured, and domestic political instability is unlikely to disrupt supply.

²⁴ BP, BP Statistical Review of World Energy 2013 (London: BP, 2013).

²⁵ A greenfield project requires investment in building new facilities, whereas a brownfield project involves expanding or altering previously existing capacity.

Regional stability

Canada has stable geopolitical surroundings, removing another element that could disrupt supply of LNG to Japan. The recent conflicts in the Middle East and Eurasia highlight Canada's advantage in this regard relative to some of its potential competitors.

While security of LNG supply is important to Japanese buyers, so is purchasing LNG at a competitive price. Thus, Canadian suppliers cannot assume that Japanese buyers will be willing to pay a premium for the security of supply provided by Canada's political stability. Political stability could give Canadian projects an advantage when other conditions are equal.

Transportation economics

The shipping of LNG from BC to Yokohama, Japan is estimated to take about 10 days. This is considerably less than 22 days from the Middle East (Dubai), 20 days from the US Gulf Coast, and 15 days from Australia. The resulting lower transportation costs and supply flexibility give Canadian projects a substantial advantage over many competitors. However, transportation time from Sakhalin in Russia is shorter than from Canada.²⁶ Canadian LNG projects also benefit from the fact that tankers from Canada's west coast will not pass through transportation choke points such as the Strait of Hormuz, the Strait of Malacca, and the Panama Canal.

Government support

LNG projects face many challenges in getting off the ground. Government support, including government-private sector coordination and financial and policy support, can help the industry overcome some of these challenges. Canadian governments, both federal and provincial, are supporting LNG export projects. In particular, BC has committed to increasing the availability of LNG industry-relevant skills training and to lowering the transaction costs for businesses that invest in resource development.²⁷ Furthermore, government-to-government dialogue between buyer and seller countries can enhance the prospects for LNG trade. The Japanese government has been promoting cooperation with Canada in a bid to enhance Japan's energy security. In 2013, Prime Minister of Japan Shinzo Abe and Prime Minister of Canada Stephen Harper announced an agreement to promote LNG cooperation between their two countries and enhance minister-level dialogue on energy. Thus, the basic framework for government-to-government cooperation between Canada and Japan on LNG has been established.

²⁶ From interview with industry sources.

²⁷ James Waterman, "BC government commits to LNG", *Pipeline News North*, October 28, 2011, accessed June 10, 2014. <http://www.pipelinenewsnorth.ca/news/industry-news/bc-government-commits-to-lng-1.1122387>

2.3 CANADA'S WEAKNESSES AS A POTENTIAL LNG EXPORTER TO JAPAN

A number of factors make Canadian LNG less attractive to Japanese buyers.

High initial investment requirement

As mentioned above, most Canadian LNG projects are classified as greenfield projects, which require more initial investment, in some cases, over US\$10 billion,²⁸ and longer lead times than brownfield projects.

In contrast, many of the US LNG projects that have received an export permit from the US Department of Energy are classified as brownfield projects, which have the advantage of using existing infrastructure and related facilities. Based on information from industry sources and International Energy Agency's World Energy Outlook, the landed US LNG price to Japan in 2020 can be calculated to be \$11–\$12/MMBtu, assuming that 1) the US Henry Hub price is US\$4/MMBtu; 2) there is a co-efficient factor in the Henry Hub price for cost calculations (just as there is an estimated co-efficient of 1.15 in the case of Sabine Pass LNG); and 3) the liquefaction and transportation cost of LNG is US\$6–\$7/MMBtu.

Concerns over cost run-up

In recent years, there has been an escalation globally in the costs of building and operating LNG liquefaction and export facilities. This has been caused by a combination of factors, including higher equipment costs and insufficient supply of skilled labour. As a number of LNG projects will likely develop concurrently around the world, there could be a further tightening of the availability of necessary inputs, resulting in increased costs for Canadian LNG projects.

Slow pace of project development

Canadian LNG projects have attracted much attention in Japan and in other parts of Asia, particularly since the beginning of this decade. However, project development in Canada has been slow relative to many competitors, and as a result some Canadian projects may not proceed.

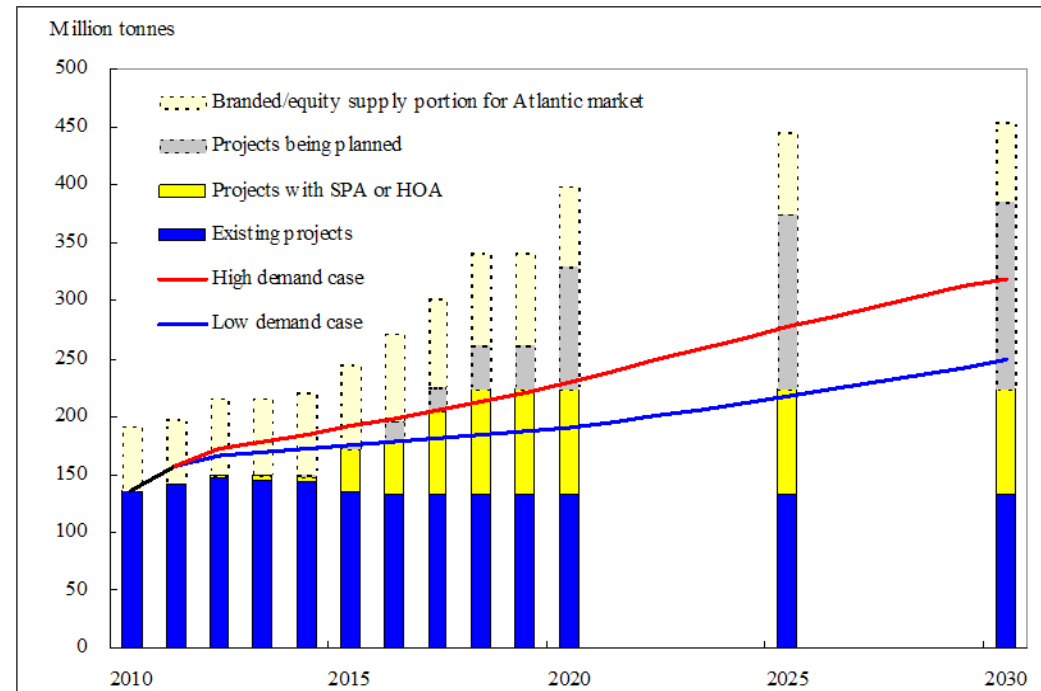
Overall project economics

Due to the weaknesses outlined above, Canadian LNG exports may not be cost-competitive with those of other projects that are targeting the Asian market. This is especially problematic because Canadian projects are likely to face strong competition from other LNG suppliers. Figure 6, which illustrates the outlook for LNG supply and demand for Asia, shows that total potential LNG supply²⁹ may outstrip expected demand by 2020. Although LNG demand in Asia is expected to continue to grow, LNG demand in Japan, the largest LNG consumer in the world, may be reduced depending on the status of nuclear power in total power generation up to 2020 and beyond.

²⁸ Based on information obtained from interviews with industry sources.

²⁹ Calculations include capacity of: existing projects, projects with sales purchase agreements or heads of agreement, and projects being planned or under consideration, as well as potentially divertible supply from the Atlantic market.

Figure 6. LNG supply and demand outlook for Asia



Source: Institute of Energy Economics, Japan

HOA stands for Heads of Agreement; SOA stands for Sales Purchase Agreements.

CONCLUSION

LNG is expected to continue to play a very important role in the energy portfolio in Japan. As a result, security of LNG supply is of critical importance to the country. In order to achieve this security, Japan is seeking to diversify its source countries for LNG and to push for the adoption of a rational LNG pricing mechanism.

If its projects materialize, Canada could become a significant supplier of LNG to Japan. Canada has a number of strengths as a potential supplier, such as large resource potential, political stability, favourable transportation economics, and government support for LNG projects. At the same time, Canadian projects have substantial weaknesses, including the need for a large initial investment, the possibility of cost run-ups, the slow pace of project development, and overall project economics. It is essential for Canadian LNG exporters to recognize that 1) LNG supply-demand in Asia is expected to soften around 2020 and beyond because of the increase in supply, including from the US; and 2) Japanese and other Asian LNG buyers are seriously pursuing LNG procurement at very competitive prices. Therefore, it is not realistic for suppliers to expect that Japanese buyers will pay a premium for security of supply.

REFERENCES

BP. BP Statistical Review of World Energy 2013 (London: BP, 2013).

Institute of Energy Economics Japan (IEEJ). EDMC Handbook of Energy and Economic Statistics in Japan 2014 (Tokyo: IEEJ, 2014).

Institute of Energy Economics Japan (IEEJ). Asia/World Energy Outlook 2013. Online, 2013. <https://eneken.ieej.or.jp/data/5331.pdf>

Institute of Energy Economics Japan (IEEJ). Short-term Energy Supply-Demand Outlook for Japan (Tokyo: IEEJ, December 2013).

L. Jeffery et al. Japan: from frontrunner to laggard, Climate Action Tracker: Policy Brief (2013) <http://www.ecofys.com/files/files/ca-ecofys-2013-cat-policy-brief-japan.pdf>

Ministry of Economy, Trade and Industry (METI)/ Basic Energy Plan 2014 (Tokyo: METI, 2014).

Ministry of Finance. Trade Statistics: Value of Exports and Imports (May 2014) Accessed August 2014. http://www.customs.go.jp/toukei/shinbun/trade-st_e/2013/2013_216e.pdf

US Energy Information Administration (EIA). Japan Country Profile. Accessed August 2014. <http://www.eia.gov/countries/cab.cfm?fips=ja>

James Waterman. "BC government commits to LNG", Pipeline News North, October 28, 2011. Accessed June 10, 2014. <http://www.pipelinenewsnorth.ca/news/industry-news/bc-government-commits-to-lng-1.1122387>