

Chapter 4

Recommendations for Expanding LNG Use

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CHAPTER 4

Recommendations for Expanding LNG Use

Expanding LNG demand in Asia necessitates two critical conditions: enhancement of the competitiveness of LNG and sufficient investments in all parts of the LNG supply chain. The following sections explore the required actions to achieve such conditions.

4.1 Enhance the Comprehensive Competitiveness of LNG

LNG should be chosen as the preferred source of energy primarily by consumers as well as policymakers if its market share were to expand in Asia. While it is highly likely that the total energy demand in Asia will continue to grow, it does not necessarily promise a bright future for LNG. In choosing a specific energy option to meet the region's incremental energy demand, consumers (from the power industry to the residential sector) consider multiple factors for each energy option. These include price level, stability of supply, volume flexibility, and carbon intensity. Government policies to promote natural gas use can also add an incentive to consumers to choose natural gas.

What is the competitiveness of LNG then? The simplest definition will be its supply price to final consumers. But, as mentioned above, a consumer chooses energy based not solely on the price but also on various other factors. Government subsidies or taxation can be regarded as part of competitiveness because they affect the supply cost to final consumers. The competitiveness of LNG therefore should be regarded in a more comprehensive manner to reflect the factors considered by consumers. Based on these observations, the definition of the competitiveness of LNG in this paper is the comprehensive consumer benefits based on supply cost, reliability of supply, flexibility of supply, and carbon intensity.

4.1.1 Reduce supply cost

The most straightforward means to enhance competitiveness is to reduce the cost of supply across the supply chain. Because it is the instinct of industry players to reduce costs, every cost reduction possibility has likely been explored and exploited by them. However, given the recent developments in the global LNG industry, new possibilities for further cost reductions are emerging.

Adopting effective cost-reduction means

One of the most commonly employed options in the recent development of LNG receiving facilities is the floating storage and regasification unit (FSRU). The FSRU has traditionally been

viewed as a temporary means to receive LNG until an onshore terminal is completed. However, the role of FSRU may be changing today. Most of the countries that recently started importing LNG, such as Jordan and Pakistan, utilize FSRU as their LNG receiving facilities. In 2015, 20 million tons of LNG, or 8% of the total LNG traded in the world, were received through FSRUs. Several future LNG importers, such as Bangladesh and Myanmar, are also planning to install FSRUs to start their LNG imports. Because an FSRU does not require the procurement of a large land area or the construction on onshore sites, it can significantly shorten the construction period and reduce the construction cost (Table 4-1). This lower level of capital investment requirement can be attractive to smaller importers or new markets whose creditworthiness is untested or questionable. It is also a good option for islands that traditionally utilize diesel engine to generate electricity. Lower upfront cost of FSRUs enable islands to alternate diesel generators with cleaner LNG for power generation. Therefore, although the receiving capacity of FSRUs is limited, FSRUs have certainly lowered the hurdle for countries that are just starting to import LNG. FSRUs will play a crucial role as a ‘starter kit’ to cultivate future LNG markets.

Table 4-1. Comparison between Onshore Terminals and FSRUs

| | Onshore terminal | FSRU |
|---------------------|-------------------------|--|
| Cost | ≈ US\$100 billion | ≈ US\$30 billion (new ship) ≈ US\$8 billion (altered ship) + additional cost for mooring |
| Construction period | ≈ 5–7 years | ≈ 3 years (new ship) ≈ 1 years (altered ship) |
| Other pros and cons | | - Easy to move, diversion - Requires stable marine condition - Lower flexibility of capacity expansion |

FSRU = Floating Storage and Regasification Unit.

Source: Japan Oil, Gas and Metals National Corporation (2013).

In the upstream sector, the modular construction of liquefaction plants is another example of the recent cost reduction efforts by the industry. Construction of the whole plant at the plant site tends to be costlier and needs a longer construction period. The modular approach, which sees the manufacturing of several liquefaction facility modules at different locations, and their assembly at the plant site, can reduce capital expenditures and shorten the construction period. The modular approach has already been a highly effective solution to controlling the overall construction costs of projects in locations where there is severe workforce shortage such as Australia. Modularization, however, could complicate the whole engineering process and ultimately create construction delays due to the complexity of on-site assembly. It should be noted that the modular approach requires advanced project management capabilities to fully

reap the benefits of the process.

Project management skills will also continue to be a key factor that can reduce construction costs. Building an LNG liquefaction plant is a ‘work of art’ that manages the progress of numerous parts of the facility construction while minimizing the construction cost and period as much as possible. Many international oil companies that have developed several LNG plants have accumulated sufficient project management capabilities. Yet to ensure the competitiveness of LNG against other energy sources, the further improvement of project management skills will remain a big task for project developers.

4.1.2 Improve logistic flexibility

Optimizing logistics

As a means to optimize supply logistics, buyer companies have been forming various types of alliances in the last 3 years. The most notable example is JERA, a joint venture for fuel procurement and overseas business founded in 2015 by Tokyo Electric Power Company and Chubu Electric Power Company of Japan. After its foundation, JERA has been actively forming commercial alliances with other buyers such as EGAT of Thailand and EDF Trading of France to enhance flexibilities in their cargo operations. Tokyo Gas has also formed similar alliances with PTT of Thailand and Kogas of Korea to seek further optimization opportunities in its LNG procurement activities. As a growing number of importers with a variety of demand patterns and trading interests are entering the LNG market, more efficiency improvement opportunities through buyers’ alliances will arise. Accumulation of trading expertise among LNG sellers and buyers will also enable the more effective handling of the LNG supply and eventually lead to further supply flexibilities.

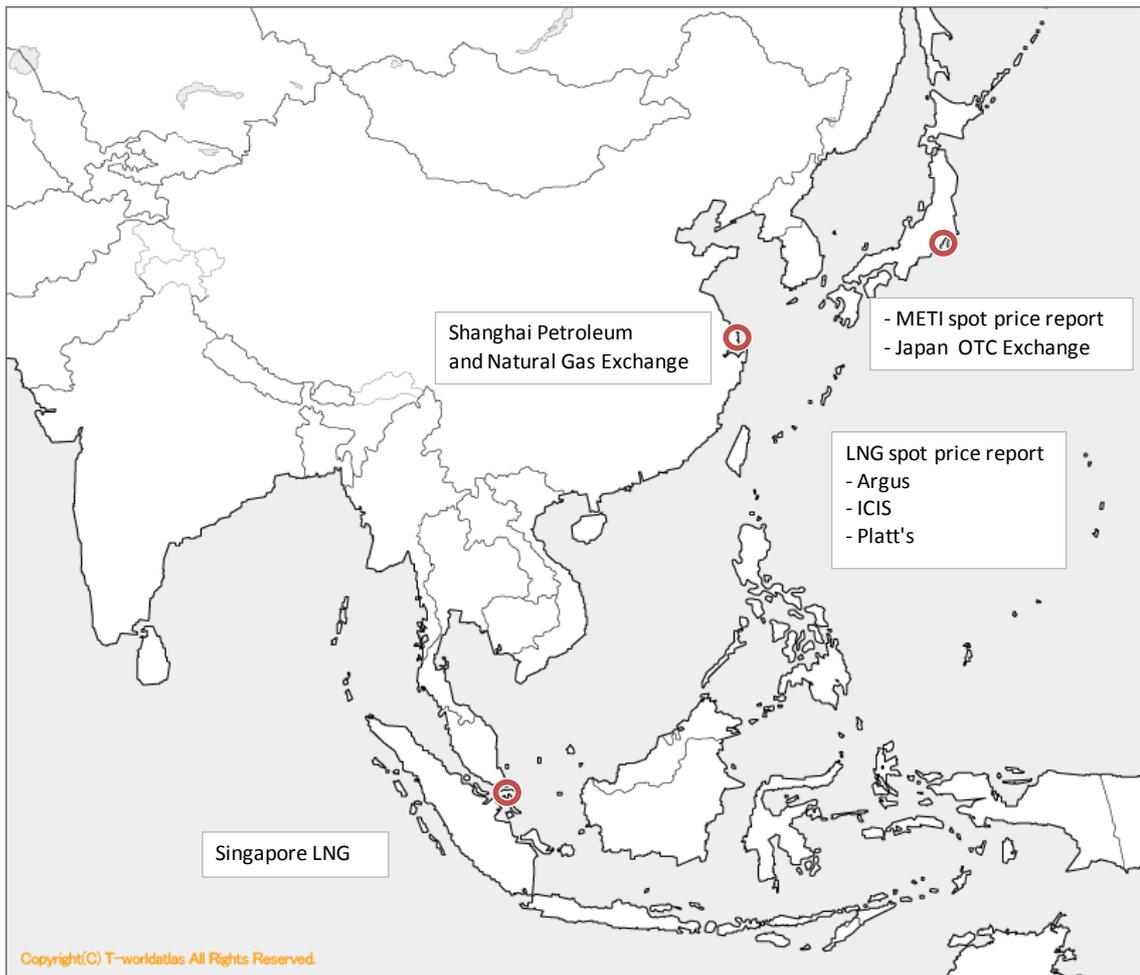
4.1.3 Utilize market mechanism

Creating a reliable price benchmark

Utilizing the market mechanism is another effective means to enhance supply flexibility. In this regard, the creation of a reliable price benchmark is one of the most prioritized tasks because the existence of such a benchmark will enable LNG to be priced in a more transparent and timely manner, and facilitate more active and flexible cargo trading. A reliable benchmark should be based on liquid trading volumes as well as the participation of various market players with different trading interests and risk preferences. The development of Asian LNG hubs, which has been extensively discussed among stakeholders at various occasions, will greatly help the creation of the benchmark. Delinking from crude oil price in the LNG long-term contract should also be pursued along with this effort, as the resurgence of the Asian Premium will likely further deteriorate the future of natural gas in the Asian market.

The reliability of such a benchmark will be fostered and grown primarily by market players, but governments can accelerate the benchmark creation by providing a physical and institutional framework to support the function of such a benchmark and by identifying the possible incompatibilities between destination clauses with competition laws, as done by the European Commission.

Figure 4-1. Attempts to Create an LNG Price Benchmark in Asia



LNG = liquefied natural gas, METI = Ministry of Economy, Trade and Industry, OTC Exchange = over-the-counter exchange.

Source: Author.

Liberalizing the domestic market

Liberalization of the domestic market may be an option to achieve greater efficiency and reduce supply cost in the natural gas market in Asia. In countries where a large state-owned entity dominates the natural gas supply, such market liberalization will create competition among

natural gas suppliers and realize a more competitive and efficient natural gas supply. Liberalization of the market may also encourage natural gas suppliers to innovate ways to reduce supply costs to final consumers. The entry of new suppliers to the market will widen consumers' options and improve supply flexibility. For example, in China, the reform of the domestic natural gas market is expected to reduce pipeline transportation costs. The current supply capacity surplus in the global LNG market might also work favourably for the competitiveness of LNG in a liberalized market. All these effects will enhance the comprehensive competitiveness of LNG.

The market mechanism is a highly effective way to realize an efficient and transparent market system. The framework of the domestic natural gas market should be designed to maximize the benefits of market forces. Yet, liberalization without careful consideration and design may yield unintended consequences by causing distractions and confusion among market players in the regional and domestic natural gas markets. The hasty introduction of market mechanism in countries where the natural gas business is still heavily regulated can cause unstable supply, volatile prices, and deferred investments. Liberalization of the natural gas market should be implemented as part of a comprehensive policy package, as liberalizing the energy market of natural gas alone, while leaving the other energy markets regulated, will likely bring about an unwanted and distorted outcome for the natural gas market. Careful assessment of policy actions is therefore needed in the implementation of natural gas market liberalization to achieve a more competitive natural gas supply. Prioritization and speed of policy implementation, with sophisticated preparation in particular, are extremely important to avoid such unwanted results.

4.1.4 Internalize externalities

LNG has several benefits. Unfortunately, many of these benefits, such as its low-carbon profile, geographical diversity of supply sources, and abundant resource and supply potential, cannot be properly valued by market mechanism. In other words, those benefits of LNG have a nature of externality. Proper reflection of the externalities in the market requires policy arrangements that internalize such externalities.

Providing a policy framework that favours lower carbon energy

An oft-used policy framework to internalize carbon emissions cost, which is one of the most notable types of externalities in the energy market, is carbon pricing. Carbon tax and carbon trading are two of the carbon pricing measures and policies that have been extensively adopted by many countries. While carbon pricing is a straightforward means to internalize carbon externality, there are other types of policies that can achieve a similar effect. The Chinese government's ban on coal consumption in Beijing after 2020, for instance, will make natural gas more extensively used in the power generation sector to replace coal. The Clean Power Plan, which was announced by the United States government in August 2015, is a regulatory action which aims to phase out carbon-intensive coal plants from the nation's mix of power generation assets. This will likely facilitate natural gas demand in the United States of America. The type of selected policies will vary across countries, reflecting each country's prioritized goals or

preferred policy tool. What is important is to ensure that the benefit of natural gas as a lower carbon fuel is properly recognized by consumers.

Table 4-2. Characteristics of Carbon Tax and Carbon Trading

| | Carbon Tax | Carbon Trading |
|------|---|--|
| Pros | <ul style="list-style-type: none"> • Fair for every emitter • Low administration cost • Provide foreseeable investment environment | <ul style="list-style-type: none"> • Easy to control emission amount |
| Cons | <ul style="list-style-type: none"> • Difficult to control emission amount | <ul style="list-style-type: none"> • Allocation of allowance sometimes becomes unfair • High administration cost • Volatile price change sometimes discourages long-term investment |

Source: Author.

In this regard, setting a specific numerical energy mix target is another policy option. In July 2015, the Japanese government publicized its energy mix target as of 2030 to ensure the ‘3E plus S’ policy – energy security, economic efficiency, environment, plus safety. In November 2014, the Chinese government also announced its target share for natural gas utilization at 10% as of 2020. Target setting itself does not guarantee the expanded use of natural gas, but providing a clear direction of a preferred energy mix and combining it with policy arrangements, such as regulations, subsidies, or taxation, will help realize a more diversified and thus secured energy supply.

LNG has numerous benefits. But as long as it is traded only by market mechanism, its use may not grow significantly because some of its benefits are difficult to be quantified. Excessive government intervention of course must be avoided. But governments have a role to play in ensuring that the benefits of LNG are reflected in the market if LNG demand were to expand to desirable levels.

4.2 Ensure Investments

The steady expansion of the LNG market requires sufficient investments in all parts of the supply chain, from upstream, midstream, to downstream. Although the global LNG market is forecast to remain in an over-supply situation for the next few years, it is very important to continue to make sufficient investments in the LNG supply value chain. We should be reminded of the danger of complacency.

More attention tends to be paid to investments in upstream and liquefaction parts of the supply chain. However, infrastructure development at downstream, such as power plants, transmission pipelines, and city gas networks, are equally important for the creation of final demand, especially in emerging countries in Asia. This is because completing an LNG supply chain requires a significant amount of upfront investment, and ensuring profits from such a large investment project is always critical to attracting and maintaining investments for the LNG supply chain.

Conditions for sustainable and sufficient investments can be divided into two categories: the reduction of the total size of investment risks, and the allocation of the residual risks that cannot be reduced by policy or industry efforts such as price fluctuations or demand uncertainties. Reducing the amount of risks will be largely undertaken by the governments of both producing and consuming countries, as well as the well-functioning market. Risk allocation, on the other hand, is primarily conducted among the relevant industry parties, including LNG buyers, LNG sellers and, to some extent, the financial institutions that provide financing.

4.2.1 Reduce the size of risks

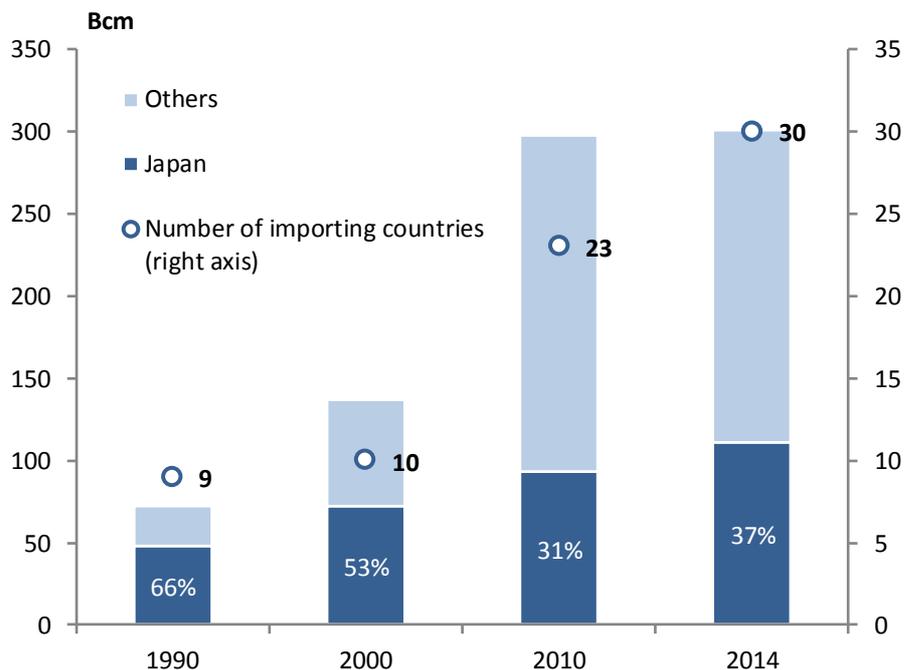
Developing a well-functioning market

Firstly, to promote investment, the total size of investment risks for an LNG supply chain project needs to be reduced. In this regard, creating a well-functioning LNG market will be a major contribution. This is because an LNG market with abundant spot cargo supplies, high liquidity of traded volume, and a variety of players with different backgrounds and trading interests would reduce such volume (or marketing) risks for project investors. In a well-functioning market, the project investors will find buyers for their LNG supply more easily.

The current global LNG market is in a transition stage, thanks to the advent of abundant flexible LNG supply from the United States and the emergence of various buyers from non-OECD⁵ countries that procure LNG mainly on a spot basis. The traditional vertically integrated business model based on long-term contracts has greatly contributed to reducing the volume risks for both producers and consumers. However, given the new market conditions where trading liquidity and flexibility are being enhanced, the traditional risk reduction model should be re-examined, considering the new reality, and a larger portion of volume risk for both buyers and sellers should be managed mostly by market mechanism.

⁵ Organisation for Economic Co-operation and Development.

Figure 4-2. Increasing Number of LNG Buyers



Bcm = billion cubic metre, LNG = liquefied natural gas.
Sources: BP (2016); GIIGNL (2014).

Improving the investment environment

In the upstream sector, governments of natural gas-producing countries need to improve the investment environment to encourage potential investors to engage more in new LNG projects. The transparency and timeliness of decision-making will be critical. The removal of bureaucratic deadlocks in any approval process will greatly help upstream operators to swiftly realize their projects. Transparent contractual terms and conditions in upstream development are desired. Proactive disclosure of information will also encourage upstream development. The Australian Government, for instance, publishes and provides extensive geological data of the prospective areas of the country for exploration to potential investors.

Some of the abovementioned issues regarding the investment environment originate from the nature of governance or type of political structure that is unique to a particular producing country. Thus, they are not easy to address in a short period. But improvement in the investment environment is a critical factor to realize sustained investment in the LNG value chain. Natural gas-producing countries are expected to continue to make consistent efforts in this area.

Encouraging natural gas use by government support

In the downstream sector, consumer governments can play an important role by promoting more natural gas use in their energy mix. Guidance by a consumer government to encourage natural gas use and fiscal support to develop infrastructure will be key in creating more demand

for LNG. This is particularly pertinent to emerging LNG-importing countries because infrastructure development in the downstream supply chain is one of the major hurdles to increase natural gas use in those countries. In countries where natural gas does not have a dominant demand sector and always faces inter-fuel competition, clear government guidance to expand natural gas use will help create a higher and more stable demand, and minimize the future demand uncertainties for LNG project investments.

Supporting upstream investment by public finance

Public financial support for investment will also be an effective means to reduce the size of risks. As repeatedly mentioned, an LNG project requires a significant amount of initial investment and needs a long time to recover the investment. LNG business therefore is inherently long term in nature. Individual LNG buyers, on the other hand, are facing growing demand uncertainties due to inter-fuel competition, market liberalization, and utilization of nuclear power plants, and are driven to pay more attention to shorter-term contracts.

Because there is a mismatch of interest between the inherent long-term nature of LNG business and the preference for short-term trading of market players in the current LNG market, public financial support for investments will help reduce the mismatch. A multilateral financial institution, such as the Asian Development Bank, can provide finances to help a potential LNG project to materialize. Government oil and natural gas agencies, such as the Japan Oil Gas and Metals National Corporation, and government financial institutions, such as the Export-Import Bank of Korea, had provided financial support for upstream development or liquefaction plant construction in the past.

The economic viability of supported projects, in principle, must be carefully examined to avoid slack financing or a crowding-out problem. A project eligible to receive public support may be restricted to a 'frontier' project, namely: a technically challenging project in the arctic or a deepwater gas field development, or a project in a politically sensitive country that merits government-level support. But in the current unpredictable and volatile oil price environment, upstream projects with high strategic importance from the viewpoint of long-term market stability may merit more proactive commitment from consuming country governments, such as in the form of government financing.

4.2.2 Allocate risks

Removing or relaxing the destination clause

The changing environment of the global LNG market merits the consideration of new risk allocation formats. As repeatedly discussed among the stakeholders, the removal and relaxation of the destination clause should be pursued from various standpoints, including one regarding the enhancement of healthy market competition. Traditionally, LNG sellers have taken upstream risks, such as geological and operational risks associated with natural gas field development as well as technical risks associated with the liquefaction process. LNG buyers, on the other hand, have taken downstream risks, such as demand volume and price fluctuation, by committing to a long-term contract. However, as the global LNG market is experiencing several structural changes owing to the shale revolution, greater diversity of suppliers and consumers, and expansion of spot and short-term contract supplies, it is high time to reconsider the traditional way of allocating risks in the LNG business. A more liquid and transparent LNG market and healthy competition through the removal of the destination clause or the adoption of a new benchmark price will be more beneficial than the traditional LNG market format for the sound development of the Asian LNG market.

In this regard, the use of a standardized contract without a destination clause can contribute to more flexible LNG trading. The ASEAN Council of Petroleum (ASCOPE) is currently working to provide a standardized template for long-term LNG sales purchase agreements that allow the reselling of cargoes. The standardized contract will likely be used extensively among ASEAN LNG producers and consumers.

Investing in upstream equity by downstream players

As a means to share upstream risks, equity investment by downstream players is encouraged. The relative dearth of expertise and capabilities to develop and produce natural gas and LNG commonly precludes downstream players from becoming operators of LNG projects. However, the proactive involvement of downstream players through equity investment in upstream and LNG projects, even with a minor share, will help finance the project and reduce the level of risks undertaken by each stakeholder. The equity investment in upstream or LNG projects can also provide downstream players the benefit of natural hedges against LNG price fluctuations as well as access to a physical supply source. While several electric utility companies have obtained such equity in the past, their exposure had been at a modest level. More proactive participation in the project by downstream players will help realize a potential LNG project.

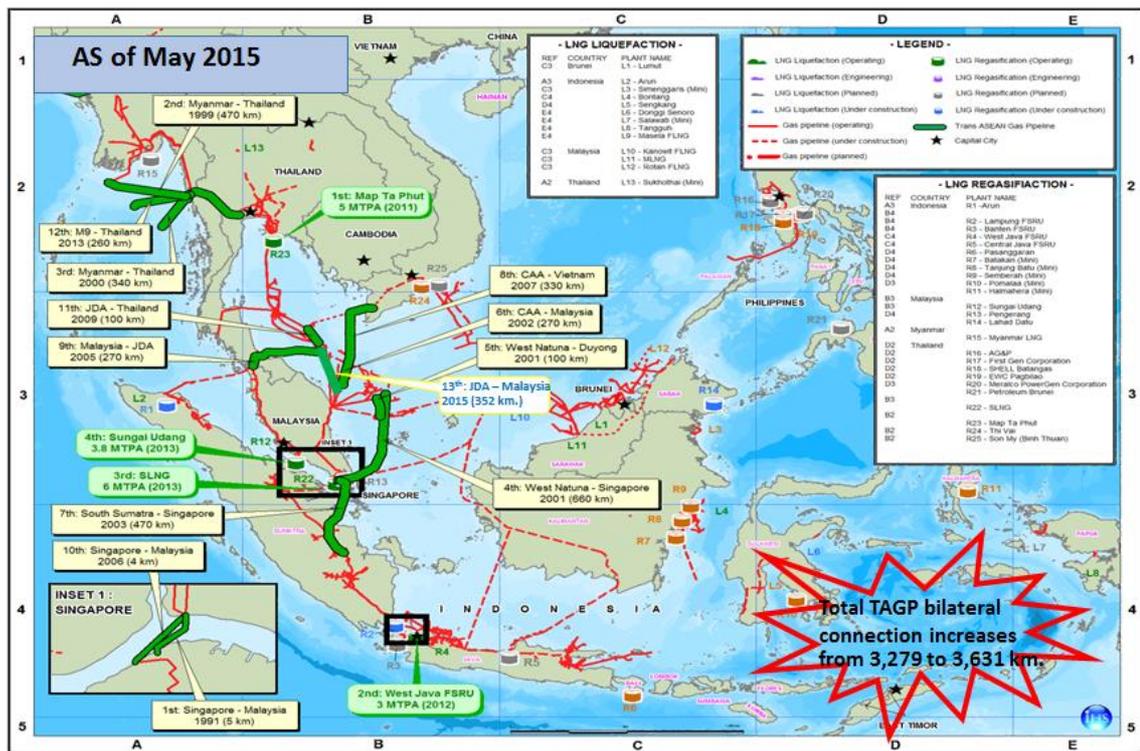
Optimizing the supply infrastructure

Although it is not directly related to risk reduction or allocation, optimizing the use of existing and new infrastructure reduces the need for additional investments, enabling the saved financial

resources to be used for other projects. Some traditional LNG exporting countries have liquefaction facilities that cannot be fully utilized due to economic or technical reasons. Developing infrastructure to supply feed gas at a reasonable cost and utilizing idle facilities may be a more economically rational investment rather than building a new liquefaction facility from scratch. In the downstream sector, building an extensive transmission pipeline network can reduce the number of receiving terminals by allowing the receiving capacity to be concentrated at select locations. Such optimization of receiving logistics will enjoy the benefits of economies of scale as well as reduce the required budget for infrastructure development.

In the case of ASEAN countries whose initial LNG demand will not be large enough to warrant building a full-scale receiving facility, a cross-border pipeline network can reduce the investment requirement for receiving facilities and optimize the total cost for fuel procurement as a region. The Trans ASEAN Gas Pipeline (TAGP) project perfectly fits this concept. The TAGP project is a blueprint to promote cross-border interconnection of gas supply infrastructure. The initiative can ensure necessary downstream investment in an optimal way.

Figure 4-3. Trans ASEAN Gas Pipeline Project



ASEAN = Association of Southeast Asian Nations, CAA = commercial agreement area, JDA = joint development area, M9 = offshore gas block M9 in Myanmar, MTPA = million tonne per annum, TAGP = Trans ASEAN Gas Pipeline.

Source: Web site of ASEAN Council on Petroleum.

As this arrangement can be seen to undermine the energy security interest of each receiving country, mutual trust and consent among relevant countries are needed on the overall design of such receiving infrastructure. In addition, such receiving infrastructure requires the development of an international/regional legal framework, such as the Energy Charter or a bilateral arrangement, to ensure the security of LNG supplies. Energy supply security through cross-border infrastructure must be a mutually beneficial one, and one country's energy supply security should not come at the expense of another country's supply security.

4.3 Summary of Policy Recommendations

The recommendations to expand LNG demand in Asia discussed in sections 4.1 and 4.2 above can be summarized in the table below. Comprehensive policy actions, together with efforts in industry in both producing and consuming countries, are required. The major requisites to promote LNG demand in Asia are: clear support of policy and development of well-functioning market, hence reliable price benchmark.

Table 4-3. Summary of Policy Recommendations

| | Industry | Government |
|-------------------|--|---|
| Producing country | <ul style="list-style-type: none"> • Adopt effective cost-reduction measures • Remove or relax the destination clause • Create a reliable price benchmark • Develop a well-functioning market • Optimize the supply infrastructure | <ul style="list-style-type: none"> • Develop a well-functioning market • Improve the investment environment • Optimize the supply infrastructure • Support investment through public finance |
| Consuming country | <ul style="list-style-type: none"> • Adopt effective cost-reduction measures • Remove or relax the destination clause and optimize logistics • Create a reliable price benchmark • Develop a well-functioning market • Optimize the supply infrastructure • Invest in upstream by downstream players | <ul style="list-style-type: none"> • Create a reliable price benchmark • Liberalize the domestic market • Provide a low-carbon policy • Develop a well-functioning market • Encourage natural gas use by government • Optimize the supply infrastructure • Support investment through public finance |

Source: Author.