

Chapter 4

Flexibility in the International Gas Trade

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CHAPTER 4

Flexibility in the International Gas Trade

International gas trade is usually characterised by large volume, long-term, and rigid contractual terms. These characteristics have been justified by high investment risks associated with upstream natural gas developments, particularly in the case of LNG. However, it is also true that importers have started to demand more flexibility in gas trade, especially in recent years. This chapter identifies the origin and rationale of trade inflexibility, at least in the past, and then argues for the possibility and advantages of flexibility for both importers/consumers and exporters/producers.

4.1. The Source of Inflexibility

It is perhaps worth examining where the inflexibility of international gas trade stems from before discussing the flexibility. It is possible or it can be argued that the source of inflexibility resulted from the following three elements.

Firstly, and the most important is the characteristics of natural gas as a commodity. Natural gas mainly consists of methane, although various other components like ethane, propane, butane, carbon dioxide, nitrogen, and others are included. Natural gas has low volumetric energy density. While crude oil has a heating value of 37 megajoule (MJ)/litre, natural gas has only 0.04 MJ/litre, and 22 MJ/litre even when liquefied. Therefore, natural gas is inferior to oil when it comes to transportation and storage efficiency. Although LNG enables the long-distance marine transport of natural gas, LNG tanks, which are installed at liquefaction and regasification facilities, as well as LNG tankers, are 4–9 times more costly than oil tankers. This is mainly because of expensive aluminium alloy and nickel stainless that are used in LNG tanks to keep them at extremely low temperature.

Secondly, the high cost of natural gas transport and storage results in the capital-intensive nature of natural gas developments. In the previous chapter, it was mentioned that an LNG project would often cost billions of dollars. This capital-intensive characteristic leads to considerable investment risk.

Thirdly, while the two characteristics of natural gas—its being a commodity and being capital intensive when it comes to natural gas development—require very rigid sales

arrangements, these same features also inhibit the liquidity of international gas trade. Certainly, these features also apply in the EAS region. For instance, until recently, there was very little spot LNG trade in Asia. The rigidity of LNG trade will be explored further in the next section.

4.2. Inflexibility of International Gas Trade

4.2.1. Quasi-vertical Integration

Vertical integration is a concept that is contrary to a market that features an arm's length transaction by a number of players. While pure vertical integration would involve only a single player, international gas trade features a small number of players with tight trading arrangements underpinned by a long-term contract—quasi-vertical integration, in other words. This is in turn the reflection or legacy of the lack of market function in international gas trade. Without any trade flow, or market—as was the case in the EAS region until mid-1960s—quasi integration was probably the only way to control the investment risk and realise trade flow itself. In such arrangements, natural gas flows only in a particular value chain, which results in higher market concentration, higher barrier for entry, and information asymmetry between those involved inside the value chain and those not involved.

Quasi-vertical integration has been traditionally adopted for gas exports for Europe and Asia, and the extent and forms of which is diversified mainly because of market liberalisation in importing countries, infrastructure developments, and emergence of market liquidity in international gas trade.

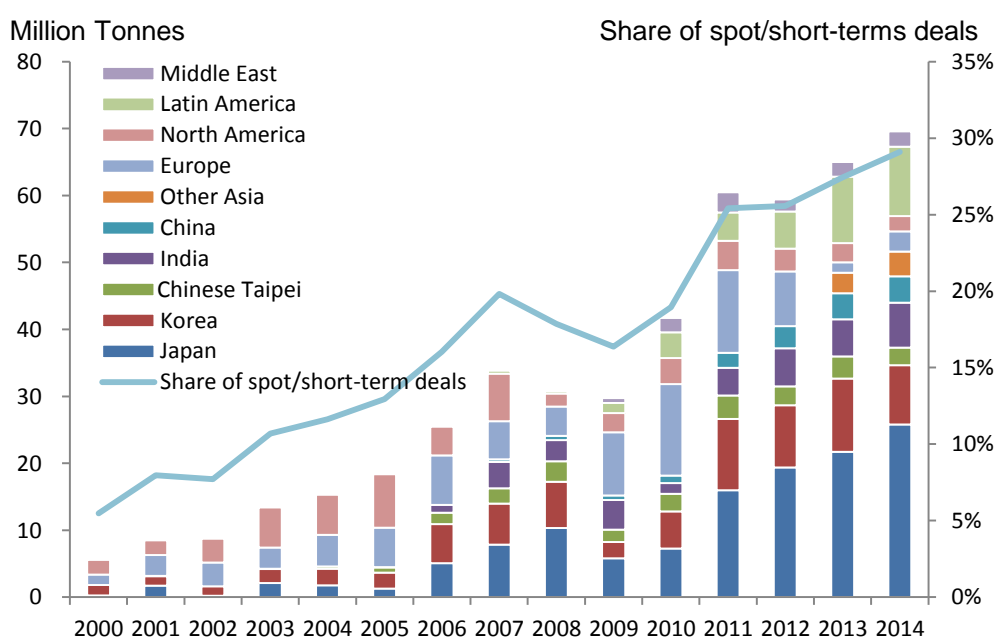
In Europe, for instance, energy market liberalisation, particularly the unbundling of vertically integrated electricity and gas utilities, changed the gas import arrangements. Separation of transport and commercial activities—or vertical disintegration—is one of the requirements to create a wholesale gas market (or a gas hub) that features arm's length transactions. Indeed, since the break-up of the former vertical integration entities, gas hubs started to emerge in the region. These hubs primarily form a domestic gas prices, but import gas prices are increasingly linked to those hub prices. Meanwhile in Asia, Japan and Singapore are the only gas-importing countries that have liberalised their domestic energy markets to date. Nevertheless, the liberalisation has already affected Japanese gas

importers in terms of reluctance of signing long-term contracts for fear of experiencing demand loss in their own market.

As far as infrastructure is concerned, adequate infrastructure capacity has been developed for the existing value chain, such as traditional LNG projects in Southeast Asia for the demand in Northeast Asia. However, this is not the case with other importing countries in the EAS region, such as China, India, and Southeast Asian countries. A number of EAS countries need to invest on greenfield projects in terms of exploration, production, liquefaction, pipeline, storage, regasification, and distribution. Thus, there is no generalisation in terms of market development in the EAS region, and traditional vertical integration business model could still be valid.

Despite the characteristics of natural gas as a commodity and the capital intensiveness of a gas development project, there emerges liquidity in international gas trade in the EAS region. In the years before 2000, most LNG cargoes were traded under long-term contracts. However, the share of spot and short-term deals has expanded significantly from 5 percent in 2000 to 29 percent in 2014. The share of pure spot trade on cargo-by-cargo basis could be around 8 percent of the total LNG trade in 2014. Several LNG traders without any liquefaction or regasification assets that specialised on spot/short-term deals entered the market. Therefore, it can be said that liquidity in LNG trade has increased steadily in recent years, and vertical control over the value chain has been weakened accordingly although long-term contract is still a valid instrument for large-scale, greenfield, new projects.

Figure 4.1: Spot/Short-Term Deals in Liquefied Natural Gas Trade



Note: Short-term is defined as a contract that has a duration of four years or less.

Source: GIIGNL (International Group of Liquefied Natural Gas Importers).

4.2.2. Contractual Terms

Traditional natural gas supply contracts for Western Europe and Asia feature certain terms to reduce upstream investment risks and secure operation in a quasi-vertically integrated manner.

First, products are typically sold under long-term contracts that often span more than 20 years. This is still largely the same with new projects, either LNG or pipeline gas. Nevertheless, there have been significant changes in terms of contractual parties. Traditionally, sellers are (inter)national oil companies, and buyers are power and/or gas utilities. However, since 2000s, it is often the case that international oil companies take the LNG and market it to the highest-valued destination at any given time. A series of Qatar's mega train projects (Qatargas 2, 3, 4, RasGas 3) are the typical examples. International oil companies like ExxonMobil, Shell, Total, and ConocoPhillips are responsible for marketing the products. Another new contractual arrangement is found in LNG projects in the United States (US). Unlike traditional projects where sellers own and operate liquefaction plants, most operators of liquefaction plants there will not own the commodity but only sell their liquefaction and loading services to sellers or buyers.

Second, term contracts of international gas supply usually include the so-called 'take-or-pay' clause where a buyer is required to pay for the cargoes even if it cannot take

them for whatever reasons, although 5–10 percent upward or downward quantity allowance is typically embedded in the contract.

In most international gas contracts for Asia, products are only shipped to specific geographical point(s) or country under the ‘destination clause’. This clause was originally intended to enhance the security of supply for buyers and of demand for sellers. With the destination clause, even in the case of a free on board (FOB) contract, a buyer is not allowed to resell a cargo to another buyer without a seller’s consent.

4.2.3. Price Formation

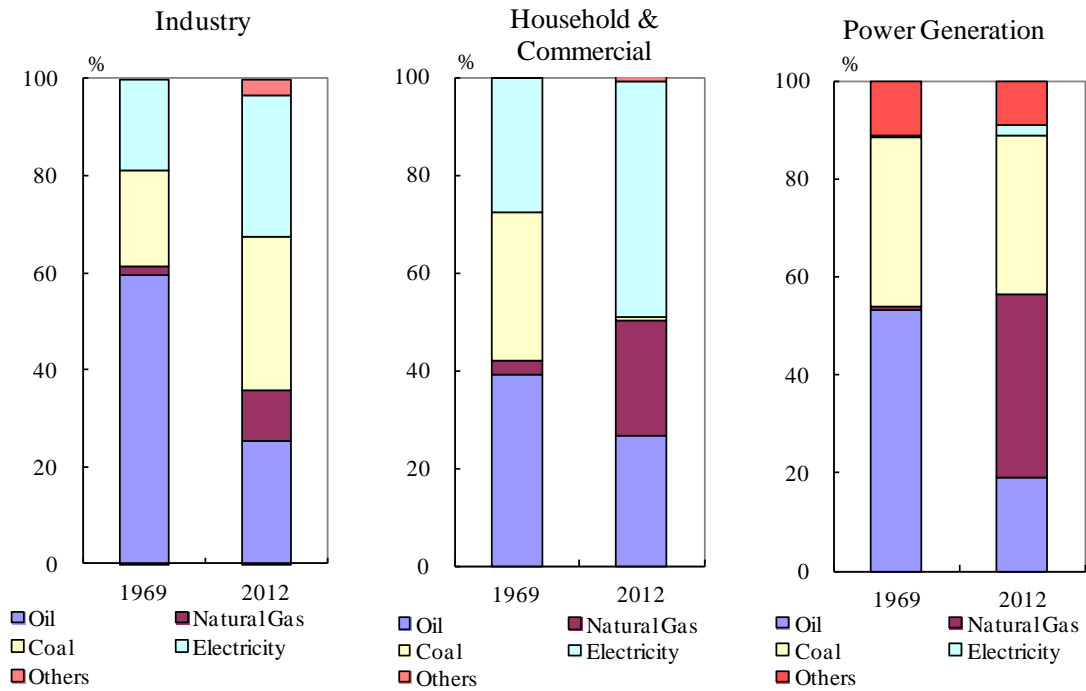
Perhaps the most controversial element in traditional gas supply contract for Asia is how price is determined. It is well known that natural gas has traditionally been priced in relation to crude oil price—typically Japan’s average crude import price or Japan’s customs-cleared crude (JCC) in the EAS region. Oil indexation is not only an issue for price formation but also for flexibility because, due to the structure of price formula, oil indexation prices cannot always follow flexibly market fundamentals.

Oil indexation originates from Europe where the majority of imported gas was priced by formula so that natural gas can compete with alternative fuel (mainly fuel oil and gas oil) in the market of importing countries. Although gas-on-gas pricing has been increasing rapidly in Europe, oil indexation is the dominant price formation in international gas trade in the EAS region.

In recent years, many importers and observers started to question the rationality of oil indexation as a price formation process in gas supply contracts for Europe and Asia. For instance, Stern (2007) argues that oil indexation in Europe is not reasonable because natural gas has already replaced oil products to a significant extent and, thus, there is no competition between natural gas and oil.¹ The same can be said in Asia. Data in Figure 4-2 represent the energy mix changes in major LNG-importing countries in Asia, comparing the year when those countries first imported LNG in 2012.

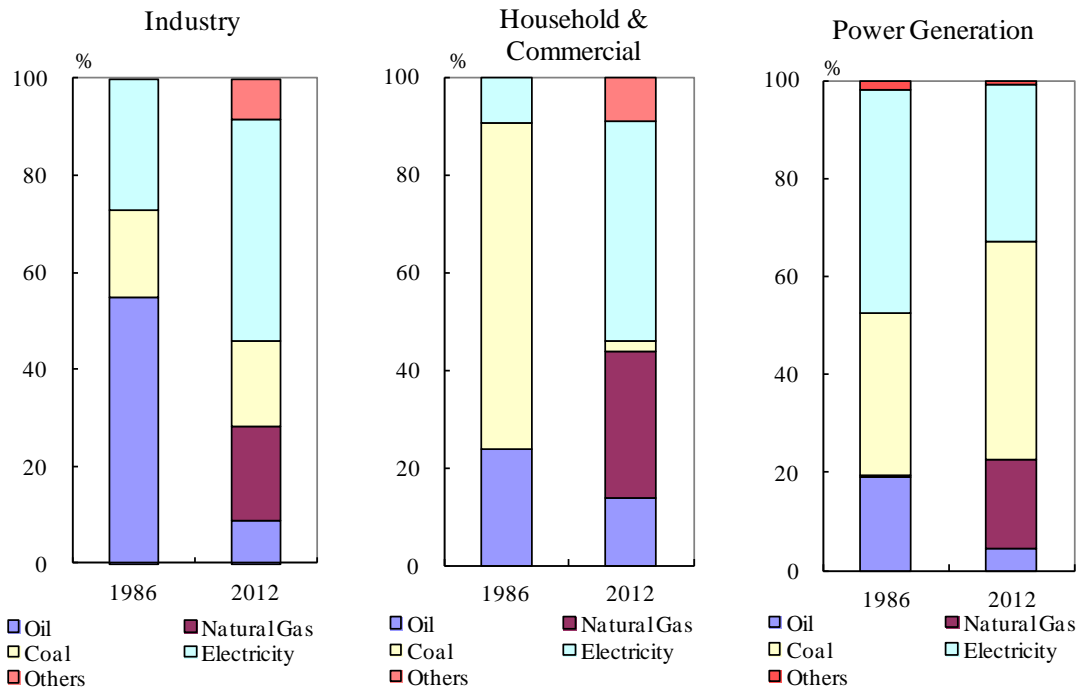
¹ Jonathan Stern (2007), ‘Is There A Rationale for the Continuing Link to Oil Product Prices in Continental European Long-Term Gas Contracts?’ Oxford Institute for Energy Studies. <http://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG19-IsThereARationaleFortheContinuingLinkToOilProductPricesinContinentalEuropeanLongTermGasContracts-JonathanStern-2007.pdf>

Figure 4.2: Energy Mix by Demand Sector in Japan (%)



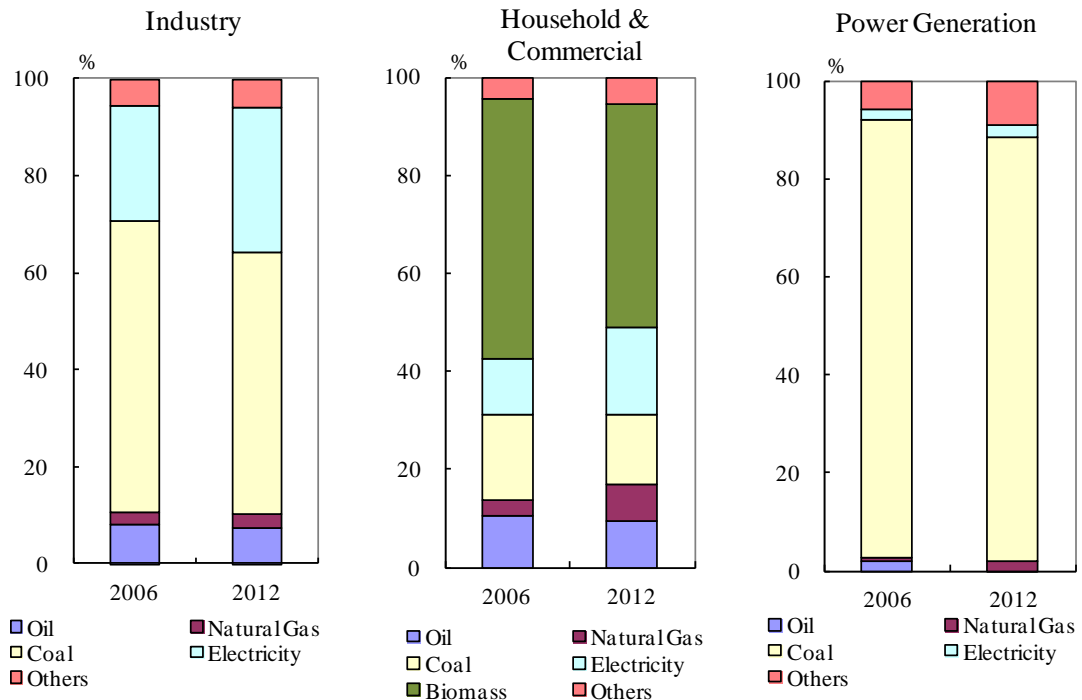
Source: International Energy Agency (IEA).

Figure 4.3: Energy Mix by Demand Sector in South Korea (%)



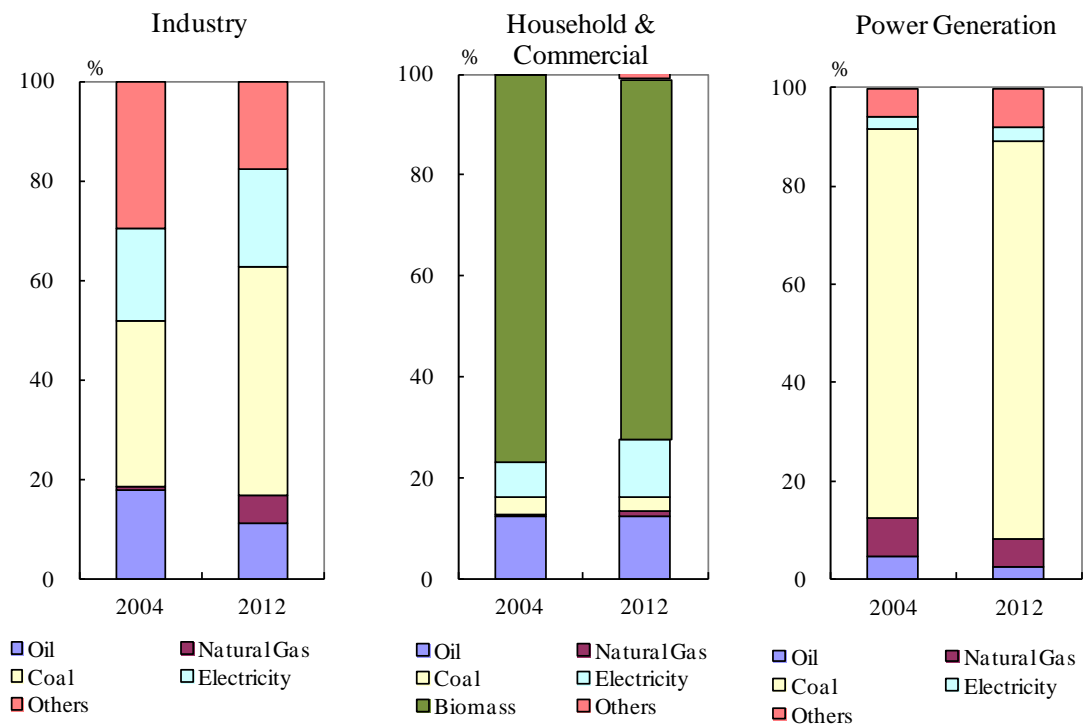
Source: International Energy Agency (IEA).

Figure 4.4: Energy Mix by Demand Sector in China (%)



Source: International Energy Agency (IEA).

Figure 4.5: Energy Mix by Demand Sector in India (%)



Source: International Energy Agency (IEA).

Among traditional LNG importers like Japan and South Korea, the share of oil has decreased over the years, and it is assumed that natural gas has replaced oil to a certain extent. For China and India, the dominant fuel is coal for power generation and industry sectors, and biomass for household and commercial sectors. Therefore, competition between oil and natural gas has either significantly ended, especially for power generation in Japan and South Korea, or such competition did not exist much in China and India. In other words, one can argue that oil indexation, much like natural gas pricing for Asian importers, is irrational.

4.3. Flexibility of International Gas Trade in the EAS Region

4.3.1. Division of Roles: Flexibility and Inflexibility

The previous section explained where the inflexibility came from and what actual inflexibility is in terms of contractual terms, including price formation. With more players entering the international gas trade—especially LNG, in and for the EAS region—it is increasingly obvious that demand/supply adjustment and price formation are inevitably left to market mechanisms because no single player, or even limited number of players, can operate each supply chain in a vertically integrated manner.

Nevertheless, this is not to deny the role of traditional, inflexible vertically integrated operation, especially pipeline gas projects for the developing countries in Asia, considering the inadequacy of infrastructure and the need and scale of investment required throughout the value chain for the EAS region. A large-scale, remote, and greenfield project, such as the Russia–China pipeline, naturally necessitates investment and operation in an inflexible vertically integrated manner simply because there is no market at all.

Hence, it is important to differentiate when and where flexibility should be pursued, then let the market forces play a greater role when and where appropriate—like the LNG trade in the EAS region. Indeed, with over 40 years of history, the LNG market has expanded in terms of quantity, geographical area, and the number of players. Increasing flexibility in the market will not only contribute to efficiency but also to security of supply and demand as long as the right price is signalled. When a market is tight and if the price duly reflects the tightness, the market adjusts itself by a demand decrease and/or supply increase, at least theoretically. When a market is weak and if the price is rightly signalled, the increase

in reserve is supposed to happen. It is arguable that this simple but powerful market force should play a greater role in the LNG trade for the EAS region.

4.3.2. Destination Clause

The destination clause is the most important contractual inflexibility in the international gas trade when considering the EAS region. It does not allow free gas flow, inhibits market liquidity from increasing, and prevents a more rational LNG pricing in the region.

It is well known that the destination clause was illegal in the European Union (EU). The legal point is that a destination clause violates Articles 101 and 102 in the Treaty on the Functioning of the European Union, in terms of free flow of natural gas. Although the negotiation between the EU and exporting companies like the Gazprom of Russia and Sonatrach of Algeria lasted for years, it is understood that the destination clause in most gas supply contracts was removed for Western Europe. Together with domestic gas market liberalisation in the EU countries, it can be said that removing the destination clause contributed to a more liquid gas market in Europe.

The same procedure cannot be applied to the Asian countries mainly because of the absence of super national organisation like the EU. Nevertheless, whilst LNG buyers pursue flexibility to accommodate their demand fluctuations, sellers also need flexibility to optimise their supply portfolio. As a result, so-called portfolio contracts that offer flexible supply sources and weaker destination restriction are increasingly common in recent years. Additionally, it is possible for importing countries to jointly negotiate the rationality of the destination clause so that the LNG market can be more transparent and liquid, and that both exporters and importers can benefit from such transparency and liquidity.

4.3.3. Price Formation

Although oil indexation is problematic in terms of rationality, it should be noted that there are a lot of oil indexation contracts that often span over 20 years. New remote greenfield projects, such as the TAPI pipeline, are likely to adopt traditional oil-indexation pricing, and there is nothing wrong with that. Many buyers are surely inclined towards oil indexation with the recent low oil prices. Hence, it is not realistic to consider that oil indexation will disappear any time soon.

Nevertheless, the dominance of oil indexation does not mean that rational pricing should not be pursued. On the contrary, many Asian LNG buyers are seeking alternative pricing in recent years. Table 4-1 represents pricing options and their advantages and disadvantages. These pricings can largely be categorised into gas-on-gas competition and indexation. The former includes domestic and foreign hubs, or wholesale prices, and spot LNG that is international price. The latter includes oil indexation, as well as indexation with electricity and coal, especially natural gas, which is considered for power generation.

Table 4.1: Pricing Options of Internationally Traded Natural Gas for the EAS Region

	Gas on gas competition pricing			Indexation	
	Domestic Hubs in Asia	Henry Hub, NBP	Spot LNG	Oil	Other fuels (Electricity, Coal)
Advantages	<ul style="list-style-type: none"> • Possible to reflect regional market balance 	<ul style="list-style-type: none"> • Already available • Lower prices (for now) 	<ul style="list-style-type: none"> • Already available 	<ul style="list-style-type: none"> • Possibly the quickest solution 	<ul style="list-style-type: none"> • Rational for power generation
Disadvantages	<ul style="list-style-type: none"> • Not yet available • Higher volatility 	<ul style="list-style-type: none"> • Higher volatility • Asia market balance not reflected 	<ul style="list-style-type: none"> • Higher volatility • Limited liquidity (so far) 	<ul style="list-style-type: none"> • Gas market balance not reflected 	<ul style="list-style-type: none"> • Lack of power market liquidity

Source: The Institute of Energy Economics, Japan (IEEJ).

With all the advantages and disadvantages, it is clear that the price of internationally traded natural gas for the EAS region should reflect market fundamentals in an accurate and timely manner. In this sense, domestic hubs in Asia and (Asia) spot LNG pricings are the most rationale. However, domestic hubs require substantial domestic gas market liberalisation, especially unbundling of transmission lines and strict Third Party Access regime, which many developed importing countries in the EAS region are not ready. Rather, spot LNG pricing seems to satisfy both in terms of rationality and feasibility, especially since spot trade has expanded substantially. This comes back to the issue on the destination clause. It is important to at least relax, and if possible abolish the destination clause, also for the sake of rational LNG pricing in the EAS region.