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Natural gas in Asia: Trade, markets and regional institutions

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HIGHLIGHTS

- Sub-optimal natural gas market outcomes in Asia since 2010.
- Asian buyers have challenged oil-indexation in the region.
- Concrete evidence of Japan-led buyer cooperation since 2013.
- Pricing will only partially shift from oil-indexation by 2020.
- Security of supply remains a top policy priority.

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ABSTRACT

Natural gas trade in Asia has been dominated by long-established market structures, under which liquefied natural gas (LNG) has remained indexed based on the price of crude oil. High transaction costs in the region in recent years imply that the regional market is sub-optimally organized. Since 2010, the continued prevalence of oil-indexation has had the most adverse effect on Japan, the world's largest LNG importer. In response, Japan implemented several strategies to challenge traditional LNG pricing mechanisms in the region and ultimately reduce transaction costs. Japan's efforts include an increase in the share of spot and short-term purchases, sourcing new supplies from the United States under alternative pricing arrangements and driving regional buyer cooperation. This paper evaluates the potential effect of Japan's LNG strategy on regional pricing in the broader institutional context, arguing that LNG pricing in the region will only partially shift away from oil-indexation by the end of the decade. While recent cooperation among regional LNG importers indicates that there may be scope for change in the regional institutional setting, the degree of cooperation is insufficient to have a profound effect on regional pricing.

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1. Introduction

Global trade in liquefied natural gas (LNG) has undergone significant change over the past decade with proliferation of new market entrants on both the producer and consumer side. Yet, despite significant change in the global marketplace, and the growing importance of natural gas as a relatively clean energy source, natural gas prices in Asia have remained linked to crude oil prices and do not reflect regional supply/demand fundamentals. Historically, satisfied with secure supplies, Asian importers have not pursued a policy to abandon oil-indexation. For as long as they were willing and able to afford LNG under long-term contracts and pass the costs on to customers, oil-linked pricing remained unchallenged. With energy security prerogatives high on the agenda, long-term contracts also guaranteed secure supply of LNG for 15–25 years, without unforeseen price and supply volatility that has characterized the oil market. However, LNG market developments in recent years have changed this perspective. Given that the international LNG market is regionally fragmented, there is a significant price differential among the three major basins (Fig. 1). Most importantly for Asian importers, since 2010, the price in Asia has been considerably higher than in North America or Europe.

Globally, the price of LNG is benchmarked against competing fuels, mainly pipeline gas, coal and fuel-oil. There are three separate and relatively independent regional markets. In the US, LNG competes with pipeline natural gas and is benchmarked against the Henry Hub (HH) price for domestic spot and short-term transactions. In Europe,

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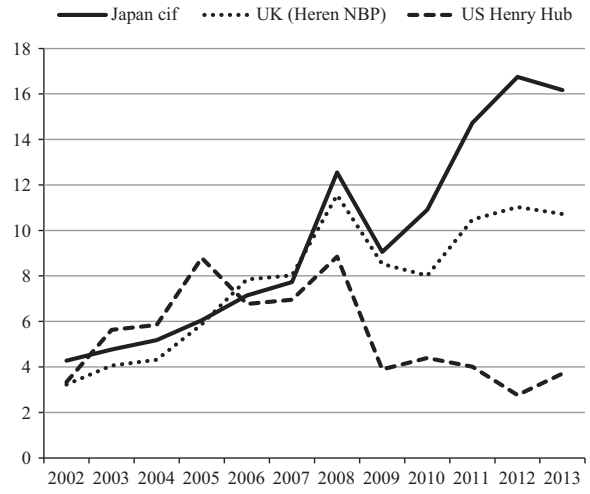

Fig. 1. LNG price in the three basins (US$ per million Btu; 2002–2013). *Source*: BP, 2014.

the LNG price is benchmarked against fuel oil and natural gas spot prices. LNG price in Asia is benchmarked against the average monthly price of crude oil imported in to Japan. This benchmark is known as Japan Crude Cocktail (JCC). As evident in Fig. 1, since 2010, Asian importers have been paying a large premium on LNG prices in other regional markets.

Crude oil parity provides for LNG prices that are linked to cost-insurance-freight (cif) crude oil prices on the calorific value equivalent basis (Langton, 1994). In other words, the JCC price is an indicator of when the price of LNG price is in parity with the price of crude oil on the energy equivalent basis (Miyamoto et al., 2009). The pricing of long-term LNG contracts in Asia generally reflects the fact that one million British thermal units (MMBtu) of natural gas contains one-sixth (16.67%) of the energy content of an oil barrel, a relationship which is referred to as oil parity. This linkage of LNG to oil prices is also referred to as oil-indexation. In simplified terms, the pricing formula for the cost of Asian LNG imports is (JCC × price slope)+a negotiated premium. The slope defines the relationship between oil and LNG prices, and when the energy-equivalent parity is used, the slope is 16.67%. However, slopes can be lower or higher than 16.67%, depending on whether the buyer agrees to pay a premium over the energy-equivalent oil price. A negotiating premium is the constant, or an element of the price that is independent of movement in oil prices. Most LNG contracts include a premium that corresponds to average costs of shipping (EY, 2013). For example, a crude basket price of $100/barrel with a 15% slope and $2.00/MMBtu premium would yield an LNG import price of $17.00/MMBtu.[2]

Oil-indexation for long-term LNG contracts has remained the industry standard in the region because initial contract arrangements, signed between Japan and various exporters during the 1970s and 1980s, have used the price of crude oil, the most widely traded global energy commodity, as a benchmark (Standard & Poor's, 2012). In 1977, Japan commenced LNG imports from Abu Dhabi and Indonesia. Initially, while fixed price was used for Abu Dhabi LNG, a formula that linked LNG to crude oil prices was used for Japan's LNG imports from Indonesia. In 1979, the price of Abu Dhabi LNG was linked to Japan's crude oil import prices, which was also reflected in OPEC's policy after the Second Oil Crisis. In 1983, Japan commenced LNG imports from Malaysia and a new Indonesian project based on an oil price-linked formula (Flower, 2008; Miyamoto et al., 2009). By the time that South Korea (1986) and Taiwan (1990) joined Japan as LNG importers, this pricing principle was well established and suppliers were reluctant to accept other mechanisms.

Since 2010, the continued prevalence of this pricing structure has had severe consequences for Asian importers. The adverse effect has been most noticeable in Japan, the world's largest LNG importer, particularly following the nuclear shutdown after the March 2011 Fukushima disaster. According to data from Japan's Ministry of Finance, the average cost per unit of imported LNG increased by 84% between 2009 and 2013, with increases recorded in every year (MoF (Ministry of Finance, Government of Japan), 2014). As a consequence of the Fukushima disaster and the necessity to replace 25–30% of electricity supply provided by nuclear power, Japan's LNG imports increased from 70.87 million tons (mt) in 2010 to 87.98 mt in 2013 (GIIGNL (International Group of Liquefied Natural Gas Exporters), 2011, 2014). At the same time, Japan's LNG import bill doubled from ¥3.5 trillion ($39.9 billion) in 2010 to ¥7.0 trillion ($71.8 billion) in 2013 (MoF (Ministry of Finance, Government of Japan), 2014).[3] Due to the unresolved status regarding the future of nuclear power, the rapid increase in Japan's LNG demand has led to higher prices under newly entered long-term contracts (Miyamoto et al., 2012). Given that oil-indexation has imposed a significant additional cost for Japan and other regional LNG importers since 2010, establishing a more flexible pricing system that at least partially reflects the regional supply/demand balance has become an energy policy prerogative.

High transaction costs in the region in recent years imply that the Asian LNG market is sub-optimally organized. The challenge is that major regional importers have historically been unable to move away from competitive institutional structures, which favor unilateral pursuit of supply security. Historically, regional energy trade has been dominated by statist approaches and energy has been "securitized" (Phillips, 2013; Hancock and Vivoda, 2014). The main assumption is that, if transaction costs for regional LNG trade are to be reduced and oil-indexation challenged, it is necessary for key regional buyers transform their energy policy approaches away from historically dominant state-centered structures and toward a market-based approach.

Against this backdrop, the paper analyzes change and continuity in the regional approach to LNG markets since 2010. The paper adopts a case study approach by focusing on Japan, the world's largest LNG importer. Japan's approach to LNG markets is evaluated in the context of its interaction with other formal institutional actors and is couched within the broader regional institutional setting, which includes agent organizations and informal institutions that affect regional LNG markets. The paper is organized as follows. Section 2 describes the institutional setting for natural gas trade in Asia, outlines the paper's contribution to the literature and provides justification for case selection. Section 3 documents recent developments in Japan's LNG policy and summarizes its activities in the LNG market since 2010. Japan's main objective has been to challenge oil-indexation in the region. Its recent efforts have included a greater emphasis on LNG

[2] To further add complexity, some contracts will have varying slope percentages used at different oil price levels. Broadly speaking, there can be four basic forms: the simplest is a straight-line constant slope that exposes both the buyer and seller to adverse price movements. A second type is the so-called "S-curve," which will have a flatter slope at low oil prices to protect sellers and a flatter slope at high oil prices to protect buyers. The other two types are variations on the S-curve, where either only the seller has some protection (an oil-linked contract with a floor) or only the buyer has protection (an oil-linked contract with a ceiling) (EY, 2013).

[3] The effects have not been isolated to Japan. South Korea is the world's second largest LNG importer. Although not affected by a nuclear disaster, the cost of LNG procurement has increased from US$13.9 billion in 2009 to US$30.6 billion in 2013, with the average cost per unit increasing by 43% during the same period (Korea Customs Service, 2014).

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