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East Asia's Gas Market Transition: Hub Indexation, Inter-Hub Competition and Flexible Contracts

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SYNOPSIS

This policy brief examines the impact of pricing benchmark changes, inter-hub competition and transition to more flexible contracts in the East Asian region. It has direct relevance to policy debates as the East Asian gas importers are working towards liberalising gas markets, building gas trading hubs and changing the terms of gas import contracts. The analysis is based on simulations of scenarios generated from a world gas trade model. The results suggest that East Asian importers benefit from changes in the market and should collaborate to facilitate the changes in price benchmarks and supply contract terms in the anticipated over-supplied gas market. However, the changes require cooperation between the suppliers and importers.

KEY POINTS

- Simulations of scenarios imply that the transition of piped gas and liquefied natural gas (LNG) price benchmarks from oil-indexation to regional hub prices will benefit East Asian importers and the world in the form of lower procurement costs.
- Gas exporters are unevenly affected by hub prices. Pipeline gas exports are cost competitive compared to LNG, with African and North American LNG exporters being the worst-off in such a scenario in Asia. Hub pricing also incentivises domestic production and increases supply security for China.
- In a geographically-close regional market, the choice of hub prices will not make significant differences in trade patterns and regional prices. This also means that different hubs can co-exist in East Asia.
- The removal of destination restrictions for Asian LNG contracts is a positive development due to the overall lower cost of procurement globally.
- In a situation of both "no destination clause" and "spot price benchmark", the effect on total cost reduction for the former far outweighs the latter. This means that the removal of the destination clause has a greater impact on cost in comparison to changes in the price benchmark.
- The effect of destination restrictions as the main reason for an "Asian Premium" is not supported. This is due to lower than observed price changes in markets with and without destination clauses for LNG contracts.

INTRODUCTION

In this brief, the oil-indexed gas, which is the dominant pricing mechanism prevailing in East Asia (China, Japan, South Korea and Chinese Taipei), faces many criticisms. Relaxation of destination (DES) restrictions and take-or-pay (TOP) obligations are also undergoing debate in East Asia. It is in East Asia's interest to diversify away from oil-indexed gas pricing as such a move would entail the creation of East Asia's own regional gas trading hubs. This can in turn generate more transparent prices reflecting the region's own market fundamentals, and the signing of contracts with more flexible supply options. Given the significance of East Asia in the global LNG market, examination of the impact of East Asia's contract changes is important. Natural gas is a key energy source for East Asia, a region which plays a critical

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role in the global LNG market. Thus, a better understanding of the impact from the changes is fundamental for the formulation of sound East Asian national policies.

The current oil-indexed pricing mechanism for LNG in Asia is heavily criticised because oil prices do not reflect the region's gas market fundamentals. Although gas prices derived from the European and North American hubs have been used in East Asia, they likewise do not reflect Asia's market fundamentals. Without a local competitive spot market for natural gas, there is little incentive to change the current commercial practices, especially from the suppliers' side.

Following in the steps of Europe, East Asia has started to create its own regional gas pricing benchmark through the establishment of gas trading hubs that can generate competitive prices reflecting the region's own supply and demand fundamentals. Currently, Singapore, Japan and China are leading the hub initiatives in East Asia.

While it is generally believed that Asian hubs could bring benefits such as enhanced flexibility and transparency for the gas markets, these benefits can vary among countries. Therefore, it is important for national policy-makers to understand the impacts of changes to the price benchmarks. In addition, a related key question is whether multiple gas trading hubs can be compatible with each other instead of being at odds.

Another issue relates to the destination clause which is a norm in existing contracts. Whether the destination clause should be kept is closely related to the hub issue and is being debated because the DES clause has both positive and negative effects. Long-term contracts with DES restrictions provide a robust framework for safeguarding the interests of both upstream and downstream parties; however, they also limit competition and market liquidity. From an economic point of view, these restrictions impede the efficiency of the gas market.

The following analysis was carried out using simulations of scenarios generated from a world gas trade model. The Nexant World Gas Model (WGM) includes every country that produces or consumes gas. It optimises all of the trade flows based on global least cost, subject to contractual and infrastructural constraints. In the hub price scenarios, we indexed gas and LNG contracts to the Shanghai hub prices, instead of oil prices, with and without destination clauses. We also indexed hub prices to the Tokyo hub to study the effects of different benchmark prices in the region.

ANALYSIS

Impact of Scenario 1: Shanghai Hub Price

The emergence of regional hub-based pricing in East Asia will have an impact on the trade and prices of natural gas. The spot price in the East Asian markets and China declines due to gas-on-gas competition leading to lower competing prices; meanwhile supply is in abundance due to increased production from Africa, Australia and North America, resulting in a less tight buyers' market. Domestic gas production in China is incentivised due to higher spot prices. The cost competitiveness of piped gas in China means it displaces LNG demand in China at the margin. Japan, Korea and Chinese Taipei are therefore able to take advantage of cheaper LNG in this over-supplied "buyers" market. Gas from Australia and the Middle East is able to maintain competitive advantage in the region, while African and United States exporters lose out in market share. The higher domestic production marginally reduces LNG imports while marginally higher pipeline imports increase China's supply security.

Table 1: Overall Cost of Procurement
(% Change vs Base Case)
2015-35 in Billions (USD) - 2012 Prices

Scenario	World	China	Japan
Base	22,294	6,772	2,263
Shanghai Hub	21,770 (-2.3%)	6,208 (-8.3%)	2,097 (-7.3%)
Tokyo Hub	21,635 (-2.9%)	6,017 (-11%)	2,065 (-8.7%)
Shanghai Hub: No DES	21,360 (-4.1%)	5,973 (-12%)	1,913 (-15%)
Oil: No DES	21,547 (-3.3%)	6,356 (-6.1%)	1,915 (-15%)
Source: World Gas Model Results			

The combination of reduced spot prices and only marginal reorganisation of trade flows with constant consumption make the regional and other international importers better off in terms of gas procurement costs (see Table 1). The overall benefits of reduced world supply costs imply that hub pricing is advantageous.

Scenario 2: Tokyo Hub: The Impact of Alternate Hub Price Benchmarks and the Question of Hub Competition

Changes in regional indexation to the Tokyo hub price (regional hub competitor) have no significant impact on either regional or world production, or on consumption or trade flow patterns as compared to the Shanghai Hub price scenario. The results suggest that in a geographically-close regional market in equilibrium, the choice of hub prices will not cause significant differences in trade patterns and regional prices. It also means that different hubs can co-exist in East Asia.

Scenario 3: Shanghai Hub No DES, Removal of Destination Clauses

The results from simulating the removal of DES scenarios in a hub-priced model in East Asia show that spot prices in the region decline. The increased supply to East Asia coming from the displaced LNG owing to increased Chinese production is the cause of the reduced regional spot prices. However, Chinese spot prices increased immediately following the transition period due to the increased costs of domestic production, and then dropped in line with increased supply options. Domestic production in China is also incentivised by higher gas prices. LNG imports to China declined during the same period and pipeline imports increased, thus balancing the decline in LNG imports. The small price premium of the two scenarios with and without DES clauses indicate that the "Asian Premium", which refers to the higher than expected difference in Asian and Atlantic basin gas prices by the pure freight arbitrage argument, is not wholly due to destination clauses, and that hub prices could be higher than oil-indexed prices in a seller's market.

Scenario 4: Oil-indexation No DES, Effect of Benchmark

In the oil-indexed scenario with destination restrictions removed, spot prices show similar patterns to the hub-priced destination-free scenario. The removal of destination restrictions has far greater impact on procurement costs than do changes in the price benchmark.

The magnitude of reductions in spot prices from the destination-free scenario when compared to the base case in Japan and Korea is marginal. This suggests that the price difference, or the "Asia Premium", may not be caused by the destination restriction.

The removal of the destination clauses will bring down the global total procurement costs. Contract flexibility gives the consumers the choice of procuring gas from the lowest cost producers and delivering it to where it is most needed, while the downside could be the propensity for increased competition for the gas which might lead to volatility in spot prices. It is also observed that when destination clauses are removed, a price benchmark will not make much of a difference.

Cost of Procurement

In all the above described scenarios, total procurement costs for the world are seen to be lower, by 3.2 per cent on average in comparison to the baseline (see Table 1). Therefore, it could be said that both hub indexation and removal of destination clauses are beneficial as they will bring down the global total procurement costs. The hub prices will incentivise domestic production and also direct the gas to markets that generate the most benefits.

Hub indexation leads to uniformly lower procurement costs for all East Asian importers. The slight difference in procurement costs over the Shanghai and Tokyo hub scenarios is due to a marginal change in spot prices relating to our assumptions about shipping costs and the price of competing fuels at each hub.

Among the four scenarios, the removal of the destination clauses in 2020 brought lower procurement costs than the hub indexation scenarios (Shanghai and Tokyo hubs, respectively). Cost reductions are due to LNG and pipeline imports at lower spot prices on average and allocation of the lowest cost LNG cargo to the region; this is due to the removal of destination restrictions with the same

consumption. The reduction in procurement costs is more significant for the four East Asian importers than for the world average.

Momentum for Cooperation

Transition to hub indexation is beneficial to East Asian importers. They should cooperate in working reaching a hub indexation pricing formula for the region's gas contracts because the countries share common interests in doing so and have limited conflicting interests. At the moment, a liberalised market such as this has not been seen in East Asia and will take time and effort. The East Asian importers should cooperate in the establishment of trading hubs as liquidity generation and market liberalisation are common challenges.

However, the suppliers' interests should be balanced; as such changes would never happen without their cooperation. The results of hub indexation suggest that the world would benefit from lower procurement costs and thus cooperation among various stakeholders is possible. The concern about competition among hubs is not supported by the simulation results as we observed the effect of hub price change (Shanghai hub vs Tokyo hub scenarios) on total trade flows, prices, and procurement costs to be minimal.

As the removal of the destination clause price mechanisms results in lower prices than hub indexation scenarios, we conclude that the relaxation of the destination clauses can result in additional cost savings for LNG importers than a change in price benchmarks.

The removal of destination clauses should be given higher priority than indexation change for two reasons. Firstly, once destination clauses are removed, procurement costs for East Asian importers other than China will not change with or without utilisation of hub indexation due to a lack of domestic production supply. Once the LNG contracts are flexible, these countries can minimise costs through arbitrary or other commercial options that change price indexation. By contrast, China imports more pipeline gas than LNG and the removal of the destination clause is applied only to LNG. Hence removal of the destination clause and changing the price indexation has similar positive impacts in China. Secondly, the removal of the destination clause does not need domestic market liberalisation and thus is easier to implement compared to spot price indexation. However, for China, given the significant benefits of spot pricing, changing the price benchmarks and removing the destination clauses should be given equal consideration.

The expectation that gas hub initiatives will reduce the "Asian Premium" will unlikely be met as hub prices could demonstrate that Asia's market fundamentals will generate higher gas prices than that in the United States and Europe.

WHAT TO LOOK OUT FOR

- Gas market liberalisation efforts in China, Japan and Korea will be indicators of their national gas policies.
- Efforts towards ASEAN gas market integration will be relevant. The rationale for closer cooperation for ASEAN gas market is further enhanced with market liberalisation efforts in member countries.

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