Development of Asian LNG Trading Hubs – Spokes in the Wheel

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JKM is now accepted as a key indicator for short term LNG pricing

Significant increase in traded volumes

JKM remains illiquid beyond the short-term

Source: ICE, CME, Reuters, Japanese and Korean customs data (Open Interest data from February 2019)
The road to liquid traded hubs can be a bumpy ride

Development of TTF index took over ten years and was ultimately facilitated by the disconnect between spot TTF and long-term oil linked contracts.

Source: OIES, IEA, Gas Strategies, European Commission
Sellers’ motivation to sell on JKM may be muted, and likely to be influenced by buy-side demand pull.

*Factors influencing seller’s willingness*

- Buyer demands (LNG market price)
- Economic rationale – fundamental belief in strength of JKM
- Current lack of true liquidity
- Basis risk
- Conservatism
- Long term financing concerns
Subdued North Asian buyer willingness could stunt the predicted rapid growth of JKM

<table>
<thead>
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<th>Factor</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>Purchasing patterns</td>
<td>Japan – dominated by long term contracts&lt;br&gt;Korea – LTCs with active spot buyer during winter peaks&lt;br&gt;Focus on security of supply</td>
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| Buyer behaviour / culture | Typically more passive and risk-averse (‘utility mindset’)  
Limited commodity trading and risk management capabilities compared to European utilities |
| Liberalisation            | Trending towards liberalisation but path not certain                                                                                      |
Other potential challenges exist in moving rapidly towards JKM as a liquid Asian hub

- China’s emergence as another disruptor?
  - Different market fundamentals
- TTF overtook NBP –
  - Could this repeat in LNG?
  - Would the China/JKM story be more alike to Germany/TTF?

Source: GIIGNL, Gas Strategies
Commoditisation in the LNG market won’t reverse

Momentum through the commoditisation process

Pathway uncertain, but direction assured

Illiquid
Condensates

Semi Liquid
LNG

Liquid
Oil Products

Near Perfect
Crude

Thermal
Coal

Natural Gas
(Europe, USA)

No previous examples of reversal of commoditisation process
Uncertain pathway – recognition and transition of capability is the business challenge

JKM in 10 years
- Illiquid
- Semi Liquid
- Liquid
- Near Perfect

LNG

Participation in 10 years
- Dynamic Trading strategy
- Sophistication of portfolio mgmt. capability
- Strong and rapid market understanding

- JKM as reference price for 0-3+ yr deals
- Likely we would see the first long term deals within this timeframe
- Wide use of JKM for risk management

Recognition of significant shift in capability required
and/or
Consideration of alternative business models