ASIA and the Changing Global Gas Market

Natural Gas Pricing Policy and Incentivizing Natural Gas Use Versus Other Fuels

6 May 2013
Summary

• Introduction
• Rising importance of Natural Gas in Asia
• Gas pricing
  - Regional Gas Pricing
  - Asia Gas price policies roundup
  - Asia Gas Prices
• Development of Asian Gas Markets
• Influence of Unconventional Gas
• Ranking of Gas in ASIA with Alternative Fuels.
• New Gas Demand
• Conclusions
POWER

POWER GENERATION IS THE DRIVING FORCE BEHIND ASIA'S ECONOMIC GROWTH

COAL

GAS

Low Cost developing Asian countries like Thailand, Malaysia, Philippines, China are moving to high income economies.
Growth of Energy Demand in ASIA

Natural Gas is helping to fuel ASIA’s economic growth

Source: IEA, IHS CERA
Note: *Doesn’t include international marine demand
ASIA – Region of Largest Gas Demand

Source: IHS.

<table>
<thead>
<tr>
<th>Year</th>
<th>Gas Demand (Bcm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>3,250</td>
</tr>
<tr>
<td>2020</td>
<td>4,090</td>
</tr>
<tr>
<td>2030</td>
<td>5,030</td>
</tr>
<tr>
<td>2040</td>
<td>6,320</td>
</tr>
</tbody>
</table>

Outlook

2011
- Africa: 4%
- Latin America: 19%
- Europe: 16%
- CIS: 19%
- Middle East: 12%

2020
- Africa: 5%
- Latin America: 13%
- Europe: 23%
- CIS: 23%
- Middle East: 14%

2030
- Africa: 6%
- Latin America: 12%
- Europe: 26%
- CIS: 24%
- Middle East: 17%

2040
- Africa: 7%
- Latin America: 10%
- Europe: 29%
- CIS: 21%
- Middle East: 19%
Power dominates gas demand in Asia but coal is the dominant fuel for power.
Regional Pricing

- Henry Hub prices influenced by Shale Gas
- NBP/TTF/NCG Gas Hubs
- JCC and Oil indexed pricing
- Market
- Term
- Brent Oil
- Asian Pricing
- European Pricing
- North American Pricing
- Coal
- Henry Hub prices influenced by Shale Gas

Source: IHS
Potential Market Reforms in Gas

• **Developing concerns with energy security issues** - reliance on coal and gas is set to increase further as rapid economic expansion continues.

• **Focus on energy policy** - Many resource producing countries in SEA and ASIA are starting to experience depletion, and will need a sustainable energy policy roadmap.

• **Subsidy and market based pricing** – many markets in SEA and ASIA historically relied on an administered price regime, and struggled with retail price subsidies for energy products. Policy reforms are required to address subsidies and motivate power infrastructure investments and new sources of domestic fuel supplies and migrate to market based pricing.
Evolving Energy Policies in ASIA

• Placement on chart indicates relative emphasis of government

Definitions:
• Energy Security = Emphasis placed on securing supplies of fuel, diversifying sources, stocking requirements, etc
• Affordability = Emphasis placed on low cost fuel supply, sensitivity of political process to populist concerns over cost, etc
• Sustainable Development = Emphasis placed on environmental sustainability/impact

Source: IHS

How have country policies moved since 1997

From
How have country policies moved since 1997

To
Likely roadmap for policy development

From
Likely roadmap for policy development

To
How have country policies moved since 1997

Increasing focus on energy security & pricing for domestic gas sector

Depletion Policy

Gas Allocation Policy

Gas Pricing Policy

Fuel Subsidy Policy

Fuel mix Policy

Sustainable Development

Energy Affordability

Energy Security
ASIA Gas Price Policies - 1

Competitive Market
- Liberalized Markets
- Harmonized Regulation
- Independent Networks ops
- Timely New Infrastructure
- Flexibility Supply
- Diversity of Sourcing
- Performance/Efficiency Standards
- Renewables Support
- Emissions Trading
- Or Tax

Security of Supply
- Commitments
- Financing
- Availability
- Stranded cost
- Redundancy
- Flexibility Needs
- Demand
- Load Profile Uncertainties

Low Carbon Environment
- Transparency
- Int'l competitiveness
- Liquidity

Exposure to volatility in global fuel markets..LNG

Source: IHS
ASIA Gas Price Policies - 2

Regulated Power and Gas markets

Liberalised Power and Gas markets

Energy Subsidies – market in transition

Partially liberalised Power market
Gas market early stages of liberalisation

Market based pricing

Source: IHS
Market Maturity

2008
- Gas-on-gas competition
- Oil price escalation
- Bilateral monopoly
- Netback from final product
- Regulation – cost of service
- Regulation – social and political
- Regulation – below cost
- No price

2020
- Gas-on-gas competition
- Oil price escalation
- Bilateral monopoly
- Netback from final product
- Regulation – cost of service
- Regulation – social and political
- Regulation – below cost
- No price

Source: IGU
ASIA Gas Price Comparisons

Source: IHS

Power generation gas price
Development of Gas Markets - 2

Gas Deregulation Maturity

Stage I: Embryonic
Stage II: Growth
Stage III: Mature
Stage IV: Liberalised

New Zealand
UK
U.S. and Canada

Full Unbundling and Competition

Introduction of Competition

Introduction of Third Party Access

Japan
Philippines
Korea
Thailand
Turkey
Columbia
Portugal
Spain
France
Argentina
Australia

Extent Of De-Regulation

Source: IHS
Unconventional gas could change the supply dynamics and pricing in ASIA.

What price is realistic to provide initial investment and sustain supply?

What Regulatory regime would support the development of Shale Gas in Indonesia, China and India?

Source: IHS
## Simplified Ranking of Gas in ASIA with Alternative Fuels

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Gas</th>
<th>Coal</th>
<th>Hydro</th>
<th>Solar</th>
<th>Wind</th>
<th>Biomass</th>
<th>Geothermal</th>
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</thead>
<tbody>
<tr>
<td>Cost</td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Accessibility</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>4</td>
<td>8</td>
<td>3</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Flexibility</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>8</td>
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<tr>
<td>Environmental</td>
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<td>10</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Chemical processing</td>
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<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Storage</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Sustainable</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>56</td>
<td>56</td>
<td>34</td>
<td>36</td>
<td>33</td>
<td>50</td>
<td>41</td>
</tr>
</tbody>
</table>

Ranking criteria: 10 is favourable, 1 is unfavourable
Excluding Nuclear and Oil

- Ranking is subjective
- Fuel of choice is dependent on indigenous resources, accessibility, flexibility and alternative uses
- Taxation will encourage/discourage use of fuels.
New Gas Demand

• Two new uses for LNG which could significantly increase demand in ASIA :-
  - LNG as a Ship bunker fuel,
  - LNG as transport fuel for vehicles

• Marine Environment Protection Committee of the International Marine Organisation (IMO) adopted the revised Annex VI, Prevention of Air Pollution from Ships to the MARPOL 73/78 Convention, which sets limits on nitrogen oxide and sulphur dioxide emissions from ship exhausts, with consequent control of bunker fuel sulphur content being imposed. LNG fuel for shipping is gradually replacing

• LNG bunkering projects and LNG as a marine fuel gained significant momentum during 2012. In April 2012, there were 27 LNG-fuelled ships in operation, and 29 to be delivered. Legislation on bunker fuel has not yet been imposed on ASIA, but the Shipping industry appears to be heading that way. At 40 mt per annum, Singapore is the biggest bunker market in the world..

• LNG as a transport fuel is growing in momentum. There is a fast growing market in LNG fuelled trucks. Also, in China, where the transportation market is expanding rapidly, several cities already use LNG-powered buses.
Conclusions

- Natural Gas is a key fuel in the development of the economy in ASIA
- Coal is a competing fuel to gas for power generation and is likely to remain the dominant fuel for some years.
- Fuel choice is dependent on a number of factors – natural gas is an efficient reasonably priced fuel – the most environmentally acceptable of all fossil fuels.
- Future gas supplies to ASIA are increasingly likely to come from LNG
- Depleting indigenous gas reserves and the economic development of ASIAN nations (Thailand, Indonesia, Malaysia, Philippines, China) will increase pressure to move to market based pricing and limited market deregulation.
- Unconventional (Shale Gas) from local sources could influence gas price formation.
- LNG as bunker fuel and LNG for transport in trucks could impact ASIAN gas demand.
Thank You

Tony Taylor
Research Director & Advisor

Tel :+65 9295 7863
Email Tony.Taylor@ihs.com