"Outlook for Asian and Indian LNG market: Drivers and Challenges"

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GAIL (India) Limited
1. Global Macro Economic Outlook
2. World Energy Scenario
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Global Macro Economic Outlook
Emerging Economies to Drive Growth and Energy Demand

Growth rate projection for 2017

Emerging & Developing Economies 6.2%
Advanced Economies 2.6%
World 4.6%

Source: IMF
Emerging Powerhouses: India and China

- Rapid growth in China & India will make their combined GDP soon to surpass that of the G7 economies and exceed that of the entire current OECD.

1. Global GDP is taken as sum of GDP for 34 OECD and 8 non-OECD G20 countries.

Source: Long-term Growth Scenarios, OECD Economics Department Working Paper No. 1
The world’s Population will rise by more than 25% from 2010 to 2040 reaching nearly 9 billion.

75% of the world’s population will reside in Asia Pacific and Africa by 2040 – India is likely to have the largest population, post-2030.

By 2040, about 70% of India’s population will be of working age driving India’s economic growth and increasing need for energy over the future.
World Energy Scenario
Oil demand grows by 25%.
Gas Demand grows by 65% (fastest) & will displace coal as the 2nd largest fuel by 2025
Coal is predicted to end up at the same level.
Nuclear may double.
Wind, Solar & Bio-fuels may increase 5 times.
Oil, Gas & Coal will provide approximately 80% of total global energy by 2040.
Wind, Solar and Bio-fuels will only make up 3-4% of total world energy.

Source: Exxon Mobil – An Outlook for Energy: A view to 2040
The Energy demand in developing countries rises by about 65% from 2010 to 2040 while OECD is likely to stagnant. Non-OECD countries shall contribute to more than 2/3rd of the total world energy demand by 2040 (The same was 1/3rd in 1970s and closer to 50% in 2000).
Natural gas – the dominant fuel of the 21st century

- Over 200 years of natural gas available in the world
- By 2040, global gas supply increases ~65%; 20% production in North America
- It will account for 30% of global electricity generation (vs just over 20% today)
Gas Market - Asia
Present Scenario

- There are three major regional markets
- Their own specificities and own ways of pricing gas with very large variations in price
- Gas has 11% share in the energy mix vs 24% global average
- Gas consumption is largely thru LNG import
- Though Asia accounted for 71% of global LNG consumption in 2012, it still continues to pay the highest price
- India and China represented a combined 12% market share in 2012
- The growing appetite for LNG in India and China resulted in 7.7% & 12.2% growth in 2012 (YoY basis)
Asian LNG Demand remains robust

Demand for LNG almost doubling over the next decade.
Challenges for Asian Market

a) Lack of adequate infrastructure particularly cross-border gas pipelines
b) No ‘gas to gas’ competition
c) LNG prices are still linked to oil prices
d) Despite large volume of gas consumption, Trading Hub and regional Index are missing in Asia-Pacific region
e) Absence of trading hubs is keeping Asian gas prices very high vis-à-vis North America and Europe

• Regional Cooperation among Asian Buyers is of prime importance to achieve this objective
Gas Market - India
Natural gas currently ~11% of India’s energy mix; Expected to reach 20% by 2030
Gap Between Demand and Domestic Supply

Gas demand and supply, 2017 (BCM)

- **2011 consumption**: 60
- **Base case Demand at “as-is” policies and prices**: 80
- **Addition if gas is committed at USD 10–15/MMBtu at customer gate (some volume is also dependent on peaking power regulations)**: 22-26
- **Upside case**: 102-106
- **Additional demand at USD 8–10/MMBtu at customer gate**:
  - **16-20**
  - **13%**
- **Potential**: 120-124

GAP: 64-68

(At current coal & fertilizer pricing. Will change as power and fertilizer policy reforms progress)

**SOURCE:** McKinsey, GAIL
Existing and Projected LNG Regas Capacity

Existing Regas capacity: 14.8 MMTPA
Projected Regas capacity: 53.5 MMTPA

Source: MOPNG, GAIL
**Gas Pipeline Infrastructure**

<table>
<thead>
<tr>
<th>EXISTING</th>
<th>13,500 KM</th>
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<tbody>
<tr>
<td>AUGMENTATION BY 2015-16</td>
<td>31,000 KM</td>
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Towards ‘*PAN INDIAN*’ Network to serve the big market
Policy Reforms in Oil & Gas sector

Upstream
- Award of licenses through ICB
- Deregulation of LNG terminals
- 100 per cent FDI in upstream & LNG terminals
- Independent Regulator in place since 2007
- Integrated Gas Grid by 2017
- Third party carriage allowed on pipelines with mandated 25% extra capacity
- Pipeline laying through competitive bidding

Midstream
- Tax rationalisation/introduction of GST
- Declared Goods Status for natural gas
- Peaking power regulation to enable time of day tariffs
- Pipeline tariff revision for the national gas grid
- Uniform postal tariff/uniform grid tariff to avoid cascading effect
- Unbundling of transportation and trading in future

Downstream
- Arm’s length transactions between midstream and downstream companies
- Open access and private participation in power generation and distribution

Pricing
- Administered pricing mechanism (APM)
- Market price gas (MPG)
- Price pooling

Existing
- Under discussion/ consideration
- Open Acreage Licensing Policy (OALP) in lieu of NELP – for any acreage anytime, instead of for fixed blocks and at fixed timeslots
- Policy for unconventional resources
Value through Partnerships
## Partnerships: Avenues in Asia

### Vertical integration

<table>
<thead>
<tr>
<th>Partnership</th>
<th>Potential outcomes</th>
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</thead>
<tbody>
<tr>
<td>LNG</td>
<td>- Traditional: Greater stability &amp; certainty</td>
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<tr>
<td></td>
<td>- HH Indexed: for demand in core sectors</td>
</tr>
<tr>
<td></td>
<td>- New Sources (Africa): for new markets</td>
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<tr>
<td>Cross-border pipelines</td>
<td>Asian grid linking Central Asia, ME, India, SEA, China</td>
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<tr>
<td>Downstream integration</td>
<td>Downstream investments by suppliers in power, petchem</td>
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### Horizontal alliances

<table>
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<tr>
<th>Partnership</th>
<th>Potential outcomes</th>
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</thead>
<tbody>
<tr>
<td>Trading platforms</td>
<td>- Asian gas price index de-linked from crude</td>
</tr>
<tr>
<td></td>
<td>- Asian gas trading hub to enable greater liquidity</td>
</tr>
<tr>
<td>Joint project development</td>
<td>Cross-equity holdings in liquefaction and regas</td>
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### Technology alliances

<table>
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<tr>
<th>Partnership</th>
<th>Potential outcomes</th>
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<tr>
<td>FLNG / FSRU</td>
<td>Joint Participation in FLNG / FSRU</td>
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<tr>
<td>Shale gas/CBM</td>
<td>Unconventional production (esp. in China)</td>
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Source: GAIL, McKinsey
Opportunities for:

- Partnership in LNG Regas Terminals
- Joint LNG Liquefaction assets overseas
- Setting up gas storage facilities in India
- Trading exchanges in India
- Acquisition of Shale assets or joint ownership of production assets
GAIL – The Partner of Choice
GAIL - An integrated gas major

**Pipelines**
- NG Transport Capacity 204 MMSCMD (~10600 Kms.)
- LPG Transport Capacity 3.8 MMTPA (~2050 Kms)

**International sourcing & Trading**
- Gas Marketing - 82 MMSCMD
- 13MMTPA Long Term LNG
- 1 MMTPA Short Term LNG
- Spot LNG purchases

**Petrochemicals**
- Significant Player (~ 20% as of now)
- 300% Capacity addition

**LHC**
- Sizeable contribution
- 7 LPG Plants across India
- (1.4 MMTPA)
**Significant presence across Gas Value Chain**

**Exploration & Production**
- 20 Domestic Block
- 2 Overseas (2 Myanmar)
- 20% working interest in Shale Gas Asset in U.S.A

**Overseas**
- Investments in Egypt, Myanmar, China & US
- Opened office in Egypt, USA, Singapore

**Gas Retailing**
- Wholly owned Subsidiary - GAIL Gas Ltd.
- 8 Joint Ventures (PNG & CNG)

**Diversification / Others**
- LNG
  - Dahej- 10 MMT; Kochi- 5 MMT; Dabhol- 5 MMT
  - Renewable (wind-118 MW, Solar-5 MW)
  - RGPPL – Power (2184 MW)
  - GSEG – Power (156 MW)
In September 2011, GAIL purchased 20% stake in Eagle Ford shale assets of Carrizo Oil & Gas for USD 95 Mn
- GAIL is evaluating opportunities to acquire larger Shale Gas assets, primarily in the US and Canada
In December 2011, GAIL signed a 20-year SPA with Sabine Pass Liquefaction, LLC for supply of 3.5 million tonnes/year of LNG.
• GAIL also signed a 20 Year Gas Purchase agreement with M/s. GAZPROM, Russia for supply of 2.5 MMTPA LNG.
In May 2012, GAIL signed GSA with its counterpart, paving the way for ambitious TAPI pipeline.

- GAIL will receive 14 BCM / Year from the project.
• On April 1, 2012, GAIL signed TSA and PPA with Dominion Cove Point, LP for 2.3 mtpa.
Partnerships – The Prime Imperative
Thank You
Integrated Regasification & Pipeline Infrastructure

Map not to Scale

TAPI P/L

DAHEJ I & II
10 mmtpa

HAZIRA
3.6 mmtpa

DABHOL
5 mmtpa

KOCHI
2.5 mmtpa