MEETING DEMAND CHALLENGES OF AN EMERGING LNG MARKET: INDIA

By:
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Petronet LNG Limited
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OVERVIEW

- India’s Energy Consumption
- Natural Gas Demand Supply Balance
- Gas Infrastructure
- Role of LNG & Meeting Demand Challenges
- Petronet’s Terminal
India is **the 4th largest consumer of energy** in the world after USA, China and Russia accounting for around 4.6% of world energy consumption.

The total energy requirement is projected to **grow at 6.5% per year** between 2012-13 and 2016-17.

While the per-capita energy consumption of India at present is almost half the global average i.e. **0.8 mtoe vis-a-vis 1.8 mtoe**, with the rising income levels along with growth in Indian economy, the per capita energy consumption is likely to see a **two-fold increase in next 10 years**.
PRIMARY ENERGY CONSUMPTION (mtoe) - WORLD

Source: BP Statistical Review-June 2012
PRIMARY ENERGY CONSUMPTION (mtoe) - INDIA

Source: BP Statistical Review - June 2012
PRIMARY ENERGY SOURCES PRODUCTION CAGR (1970-2011)

Source: Statistical Data 2012, Ministry of Statistics
CURRENT GAS DEMAND & DOMESTIC SUPPLY SCENARIO

Source: Vision 2030, Natural Gas Infrastructure in India
## SECTOR WISE PROJECTED GAS DEMAND

### Gas Demand (mmscmd)

<table>
<thead>
<tr>
<th>Year</th>
<th>Power</th>
<th>Fertilizer</th>
<th>City Gas</th>
<th>Industrial</th>
<th>Petchem/Refineries/Internal Cons.</th>
<th>Total Realistic Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-13</td>
<td>86</td>
<td>60</td>
<td>15</td>
<td>20</td>
<td>38</td>
<td><strong>227</strong></td>
</tr>
<tr>
<td>2013-14</td>
<td>104</td>
<td>60</td>
<td>16</td>
<td>20</td>
<td>40</td>
<td><strong>248</strong></td>
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<tr>
<td>2014-15</td>
<td>122</td>
<td>60</td>
<td>17</td>
<td>22</td>
<td>42</td>
<td><strong>272</strong></td>
</tr>
<tr>
<td>2015-16</td>
<td>139</td>
<td>72</td>
<td>18</td>
<td>25</td>
<td>44</td>
<td><strong>307</strong></td>
</tr>
<tr>
<td>2016-17</td>
<td>157</td>
<td>97</td>
<td>22</td>
<td>27</td>
<td>47</td>
<td><strong>358</strong></td>
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<tr>
<td>2019-20</td>
<td>202</td>
<td>106</td>
<td>36</td>
<td>35</td>
<td>54</td>
<td><strong>443</strong></td>
</tr>
</tbody>
</table>

Source: Vision 2030, Natural Gas Infrastructure in India
INDIA – A MAJOR GAS/LNG CONSUMER

- 13th largest gas consumer – 61 bcm (~165 mmscmd)
- 5th largest LNG importer – 17 bcm (~46 mmscmd ~ 13 mmtpa)
- Economy growing at CAGR of 6-7% with similar growth in Energy Consumption
- Share of Natural Gas in Indian Energy basket to increase from 10% to 20% by 2025
- Despite increase in domestic gas production, dependency on imported gas to increase substantially
- LNG which currently constitutes 30% of natural gas consumption in country to have a share of more than 50% by 2025
SNAPSHOT OF OPERATIONAL, UNDER CONSTRUCTION, PLANNED & POSSIBLE LNG TERMINALS IN INDIA

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2016</th>
<th>2020</th>
<th>mmtpa</th>
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<tbody>
<tr>
<td><strong>Existing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Dahej</td>
<td>10.0</td>
<td>15.0</td>
<td>20.0</td>
<td>Petronet LNG</td>
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<tr>
<td>Hazira</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>Shell &amp; Total</td>
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<tr>
<td>Dabhol</td>
<td>1.2</td>
<td>5.0</td>
<td>5.0</td>
<td>RGPPL (GAIL &amp; NTPC)</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>16.2</td>
<td>25.0</td>
<td>30.0</td>
<td></td>
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<tr>
<td><strong>Under Construction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kochi</td>
<td>-</td>
<td>5.0</td>
<td>5.0</td>
<td>Petronet LNG</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>-</td>
<td>5.0</td>
<td>5.0</td>
<td></td>
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<tr>
<td><strong>Proposed</strong></td>
<td></td>
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<tr>
<td>Ennore</td>
<td>-</td>
<td>5.0</td>
<td>5.0</td>
<td>IOCL</td>
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<tr>
<td>Gangavaram</td>
<td>-</td>
<td>5.0</td>
<td>5.0</td>
<td>Petronet LNG</td>
</tr>
<tr>
<td>Mundra</td>
<td>-</td>
<td>5.0</td>
<td>5.0</td>
<td>Adani - GSPC</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td>-</td>
<td>15.0</td>
<td>15.0</td>
<td></td>
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<tr>
<td><strong>Possible</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>West Coast</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td>Hiranandani</td>
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<td>Jamnagar/Kakinada</td>
<td>-</td>
<td>-</td>
<td>5.0</td>
<td>RIL-BP</td>
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<tr>
<td>East Coast (FSRU)</td>
<td>-</td>
<td>2.5</td>
<td>5.0</td>
<td>Shell/GAIL</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>-</td>
<td>2.5</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>16.2</td>
<td>44.5</td>
<td>60.5</td>
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</tbody>
</table>
INDIA’S GAS INFRASTRUCTURE

Existing P/L Network: 11900 KMS (283 mmscmd)
Proposed additional P/L Network: 14000 KMS (540 mmscmd) by 2016-17
LNG SOURCING FOR INDIA

To ensure sustained and continuous availability of RLNG, 70-75% to be tied-up on long term basis, balance through mix of short term & spot

Current Long Term contracts:
- Petronet’s Contracts
  o Petronet-RasGas 7.5 mmtpa supplies commenced in 2004
  o Petronet-Exxon Mobil(Gorgon) 1.5 mmtpa supplies to commence in 2015
- Other Contracts
  o GAIL – Cheniere Energy 3.5 mmtpa supplies likely to commence in 2018
  o GAIL-GAZPROM 2.5 mmtpa supplies to commence in 2020/21
  o GSPC-BG 1.25 mmtpa with option of 1.25, supplies to commence in 2015

Other Long Term Opportunities
- Middle-East: Qatar, Yemen: Shipping advantage for West Coast of India
- Australia: Large capacities: favourable for South & Eastern India
- Mozambique: Price, Logistically favourable
- Russia: Portfolio & price advantage
- US: Price Advantage (indexation to HH etc), portfolio diversification
KEY CHALLENGES OF INDIAN MARKET- DOMESTIC

- Large appetite with high Price sensitivity and competition with alternate fuel
  - Regulated power and fertilizer end use prices
  - 5<sup>th</sup> largest coal reserves
  - Large consumption of liquid fuels like Diesel, FO

- Development of Infrastructure
  - LNG terminals
  - Domestic and transnational pipeline networks
  - Gas storage
  - Unbundling of transmission and marketing entities

- Consumers behavior
  - Long term / short term/ Spot – how much to be tied-up
KEY CHALLENGES OF INDIAN MARKET- EXTERNAL

- Competition from Global buyers:
  - Japan, Korea, Taiwan - high paying markets
  - New emerging markets like China, Singapore, Thailand
  - India becoming a fall back market on spot basis at right prices

- Large capital requirements for acquisition of upstream assets and formation of strategic partnership

- Multiplicity of index like JCC/Brent/Henry Hub with no specific index for emerging markets
LARGE DEMAND BUT SENSITIVE TO PRICE
McKinsey Analysis 2010

Gas demand and supply, 2015
mmscmd, At customer gate prices

<table>
<thead>
<tr>
<th>Category</th>
<th>2010 year end consumption</th>
<th>Price of $16-17/ mmbtu</th>
<th>Price of $13-14/ mmbtu</th>
<th>Price of $11-12/ mmbtu</th>
<th>Price of $8-10 mmbtu</th>
<th>Potential demand, 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>171</td>
<td>146</td>
<td>185</td>
<td>185</td>
<td>185</td>
<td>203</td>
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<tr>
<td>Medium</td>
<td>59</td>
<td>45</td>
<td>91</td>
<td>126</td>
<td>126</td>
<td>185</td>
</tr>
<tr>
<td>High</td>
<td>230</td>
<td>46</td>
<td>35</td>
<td>311</td>
<td>77</td>
<td>388</td>
</tr>
</tbody>
</table>

Sectors with demand
- Industries
- CNG transport
- Refineries
- Industries
- Power cogen
- Peaking power plants
- Baseload power
- New fertilizer plants

Prices at Crude of $ 100/Bbl

1 Based on estimated LNG supply of 8 mtpa in 2015 including RasGas (7.5 mtpa) and 1.5 mtpa from Gorgon LNG in 2015

SOURCE: Indianpetro; DGH; Company annual reports; Expert interviews; McKinsey analysis
LARGE DEMAND BUT SENSITIVE TO PRICE
Petronet Analysis-2013

Petronet Analysis 2013
Gas demand and supply, 2016
mmcmd, at customer gate prices

2012 year end consumption
Price of $19-20/ mmbtu

2015
High
Price of $11-12/mmbtu
Potential demand, 2015

2012 year end consumption
Price of $19-20/ mmbtu

2015
Medium
Price of $16-17/ mmbtu

2015
Low
Price of $19-20/ mmbtu

2012 year end consumption
Price of $19-20/ mmbtu

Sectors with demand

- Industries
- CNG transport
- Refineries
- Industries
- New fertilizer plants
- Peaking power plants
- Base load power
- Existing fertiliser plants

Prices at Crude of $110/Bbl

SOURCE: Vision 2030. PLL analysis
WAY FORWARD

- Development of regional LNG/GAS index to cater growing demand of emerging economies/Indian sub continent
- Robust growth in Infrastructure development
  - LNG Terminal
  - Gas Storage
  - Gas Pipelines on national & transnational basis
- Participation by global players in India’s infrastructure development
- Government support & creation of Sovereign fund to handle stiff global competition enabling acquisition of overseas upstream assets in stiff competitive environment
- Consumers mindset in pricing, supply security needs to undergo change: Market driven
DAHEJ TERMINAL
- Commencement of Operations in 2004
- Capacity (mmtpa): 5.0 → 10.0 → 15.0
- Truck Loading facility can handle 2500 loadings/ yr.
- LNG Cargoes unloaded: 1000+ cargoes

KOCHI TERMINAL
- Set up second LNG Terminal of 5.0 mmtpa capacity at Kochi, State of Kerala.
- Tied up 1.44 mmtpa LNG from Exxon Mobil’s Gorgon Project
- Plant Mechanically completed, scheduled commissioning mid 2013

GANGAVARAM
- Pre Project activities started for the 3rd Terminal of 5 mmtpa capacity at Gangavaram, State of Andhra Pradesh with estimated investment of US$1 Billion.
DAHEJ TERMINAL – FACILITIES
THANK YOU

KOCHI LNG TERMINAL