LONG TERM FUEL SECURITY FOR GAS BASED POWER GENERATION

NTPC Limited
Corporate Gas Sourcing

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Global Energy Demand

World Energy Demand, 1990-2035 (quadrillion BTU)

- As per IEO 2011 Reference case (which does not incorporate prospective legislation or policies that might affect energy markets), global energy demand grows by 53% from 2008 to 2035.

- World energy demand is expected to increase annually by 1.6%, and demand for electricity by 2% annually.

Source: IEO 2011
The last decade has witnessed the emergence of Renewables.

Limitation of Renewables is non-availability of consistent supplies on a 24 x 365 basis.

As compared to coal, Gas-based combined cycle power plants have lower carbon footprints on account of increase in cycle efficiencies, besides lower initial cost and time for installation.

Till five years back, the projections for growth in gas-based power were restrained by the limited extractable global gas resources.

In the last five years, unconventional gas has emerged as a strong resource base to augment the conventional gas resource.

Source: IEA 2012
Emergence of Unconventional Gas in US

**Growth**

- Production of Tight gas and CBM gas began in 80s. CBM productions peaked in the 90s.

- With evolving of learning curve on subsurface technologies (Hydraulic Fracturing, and Horizontal Drilling, Micro seismic studies) during the course of production of Tight gas, interest became enhanced for the extraction of shale gas, which required similar technology.

- With the support of subsurface technologies, Shale gas production started to pick from 2005 onwards, and increased steadily.

- In the year 2010, Unconventional gas production in US was around 60% of total gas production of US. Out of this, contribution of Shale gas alone was 23%.

- As per IEA, out of 2600 tcf of remaining recoverable resources in US, around 50% are unconventional.
Emergence of Unconventional Gas in US

**Impact**

- Domestic gas supplies, supposedly having peaked, surged from 2006 onwards.
- Henry Hub came down from 7-8 $/mmbtu in 2007 to a low of 2 $/mmbtu in 2012.
- Dependence on import of RLNG declined.
- This also lead to enhanced power generation on Gas, and, US became an exporter of the surplus coal.
- Import of coal in Europe lead to reduced dependence on RLNG.
- In spite of enhanced gas demand of Japan after shutdown of Nuclear Reactors (post the Fukushima disaster), the Spot prices of RLNG remained moderate.
- US Shale gas producers began to look out for exporting gas, even as RLNG.
- In an EIA-sponsored study of 14 regions in 2010, it was reported that these regions had **as 6622 tcf** recoverable resources of Shale Gas. Considering that as per Oil & Gas Journal, Technically Recoverable gas reserves in 2010 were estimated as 16000 tcf, this is a significant quantity.
Emergence of Unconventional Gas in other regions

Canada

- 80% of Canada’s total remaining recoverable gas resources are unconventional.
- Remaining recoverable unconventional resources in Canada at end-2011 are estimated to be 18 tcm (11 tcm shale gas, 5 tcm coalbed methane and 2 tcm tight gas), representing around 6% of world unconventional resources.
- Shale gas is believed to have the greatest production potential in the longer term, although commercial production is only 3 bcm.

China

- At end-2011, China’s remaining recoverable resources of unconventional gas totalled almost 50 tcm, comprised of 36 tcm of shale gas, 9 tcm of coalbed methane and 3 tcm of tight gas.
- This is around thirteen times China’s remaining recoverable conventional gas resources.

China can be a bigger story than US
Emergence of Unconventional Gas

Australia

- As a sizeable producer of coalbed methane, Australia is one of only a handful of countries already producing commercial volumes of unconventional gas.

- According to official estimates, demonstrated, economically recoverable coalbed methane resources were 930 bcm at the end of 2010 (Geoscience Australia, 2012).

- The estimates of these resources have grown substantially in recent years, as exploration and development has expanded.

- Two RLNG terminals (Gladstone & Queensland Curtis) in addition to 4 more are being envisaged.

With the global unconventional resources becoming successfully monetised in the US and other regions, abundant gas availability is expected and can be produced across the world.
Gas as a Energy Resource

- As per IEA's analysis, remaining technically recoverable gas reserves in the world (at end of 2011) are 752 tcm (26,500 tcf).
- As per projections, the share of unconventional gas in 2035 may be as high as 44% (IEA) to 50% (EIA).
- Global conventional recoverable resources are expected to be equivalent to more than 120 years of current global consumption.
- Total recoverable resources could sustain current production for around 250 years (as per World Energy Outlook 2011).
- The optimism prompted the EIA to conclude in 2011 on arrival of 'The Golden Age of Gas', leading to recast of its projection of gas.
Emergence of Unconventional gas as a major source of energy also impacted the projections for gas-based power in the Energy Scenarios projected by the EIA, IEA and WEC.

As per WEC, well productivity gains from new investments are highest in Shale gas as compared to tight gas and CBM.

As per IEO 2011 Reference Case, World natural gas consumption is expected to increase by 52 %, from 111 tcf in 2008 to 169 tcf in 2035 i.e. 1.6% yearly whereas quantum of natural gas used for power generation increases by 2.0 % yearly from 2008 to 2035.

By 2035, Global gas demand growth equals the combined increase from coal, nuclear & oil (WEO 2012), and Gas will overtake coal as the 2\textsuperscript{nd} most important fuel.
Remaining Recoverable Gas Resources (top fifteen countries)

At the end of 2011

Russia
United States
China
Iran
Saudi Arabia
Australia
Qatar
Argentina
Mexico
Canada
Venezuela
Indonesia
Norway
Nigeria
Algeria

Total gas production in the world is expected to grow by 55% to 2035
Share of Unconventional Gas in total output expected to rise from 14% today to 32% in 2035
Likely impact of Unconventional "boom" on Global Prices

- Unconventional gas boom is expected to arrest increasing trend in gas prices, in particular in Asia-Pacific.
- It is also likely to spur some degree of convergence in global prices by exerting pressure and marginalize oil-price indexation of gas contracts in Europe & Asia.

Average natural gas prices by region (May 2012)
India’s Prospective- Shale Gas Scenario

- As per the initial studies, basins like Cambay, KG, Cauvery & Damodar, are found to be promising w.r.t. Shale Gas

- These basins have shale gas resource of the order of 250 tcf, of which 63 tcf is technically recoverable (*IEA data*)

- As of now, exploration of Shale gas in India is in a nascent stage.

- For rapid development of Shale gas in the country, efforts need to be put for the development of appropriate technology suitable for Indian conditions taking into consideration various issues like environmental aspects, social impact assessment, availability of land and water etc.
Basins with Shale Gas Potential in India

- Rajasthan Basin
- Vindhyan Basin
- Cambay Basin
- Assam-Arakan Basin
- Bengal Basin
- Gondwana Basin
- Krishna-Godavari Basin
- Cauvery Basin
Issues of Concern with Shale Gas Exploration

- Larger Environmental Footprints
  - Requirement Of Large Quantity Of Water
  - Treatment And Disposal Of Waste Water
    The hydraulic fracturing fluid contains various chemicals, including bactericides, buffers, stabilizers, fluid-loss additives & surfactants. This causes Risk of Water Contamination
  - Methane And Other Air Emissions

- Recent restrictions

Various countries like France, South Africa, Canada (Quebec), United States (New York), US (Maryland) have put different kinds of restrictions on shale gas exploration.

Need for caution:

- The U.S. Environmental Protection Agency (EPA) is developing a study to examine relationship between hydraulic fracturing & drinking water resources. The scope of the proposed research includes study of the full life cycle of fracking water.
- In early 2011, EPA submitted its draft study plan for review by the agency’s Science Advisory Board (SAB). Final report is expected in 2014.
Some issues relevant to growth of Shale Gas in India

**Technology and Infrastructure**

- Shale gas plays are different in terms of heterogeneity, reservoir characterization, production methodology & hence demands special skills and experience.
- Availability of shale specific sub-surface data is limited in India & operators need to invest in exploration activities to identify sweet spots.
- Require extensive technical resources and physical inputs
- Large number of service providers to increase availability & competition

**Techno-Economics**

- Availability of services, infrastructure and resources is very limited in India,

**Land Acquisition**

- Population density is 10 times of US, and, may face resistance from inhabitants
- Regulatory framework in US allows sub-surface rights to landowners. In India, sub-surface rights are with Govt., therefore landowners are unlikely to be benefited directly from development.
Some issues relevant to growth of Shale Gas in India

**Pipeline Infrastructure**
- Further, US has network of about 600,000 km of pipeline for off taking the gas to the market.
- The available network of pipelines in India is about 15,000 km only and transport of gas to market can become an expensive proposition.

**Policy Framework**
- Govt of India is in the consultative process of finalization of Shale gas policy.
- Once finalized, it will give more clarity to the developers for planning their activities.
Indian Scenario: Share of Natural Gas Power Generation Capacity In India

Installed Capacity

- **Gas based capacity**: 17743 MW
  - Nat. Gas 8.96%
- **Hydro**: 18.65%
- **Nuclear**: 2.27%
- **Others**: 12.83%
- **Coal**: 57.29%
- **Total**: 210 GW

Source: CEA (As on 31.12..2012)

As per Integrated Energy Policy of GoI, the share of natural gas in Power Generation in India is expected to rise to 16% by 2031-32.
# Present Gas/RLNG Availability in India

## Gas/RLNG Availability

<table>
<thead>
<tr>
<th>Source</th>
<th>Average Daily Gas availability (MMSCMD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONGC</td>
<td>50.78</td>
</tr>
<tr>
<td>OIL</td>
<td>6.63</td>
</tr>
<tr>
<td>PMT</td>
<td>11.87</td>
</tr>
<tr>
<td>Other JVs</td>
<td>3.39</td>
</tr>
<tr>
<td>KG-D6</td>
<td>20.74*</td>
</tr>
<tr>
<td>Long Term RLNG</td>
<td>25.13</td>
</tr>
<tr>
<td>Spot RLNG</td>
<td>21.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>139.74</strong></td>
</tr>
</tbody>
</table>

## Sector wise Gas/RLNG Consumption

<table>
<thead>
<tr>
<th>Sector</th>
<th>Supply (% of Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Sector</td>
<td>37</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>22.7</td>
</tr>
<tr>
<td>CGD (Domestic +CNG)</td>
<td>4.8</td>
</tr>
<tr>
<td>Refineries</td>
<td>11.9</td>
</tr>
<tr>
<td>Petrochemicals</td>
<td>3.4</td>
</tr>
<tr>
<td>Others</td>
<td>20.2</td>
</tr>
</tbody>
</table>

* Present supplies

Around 60% of the Gas/RLNG goes to anchor customers viz. Power & Fertilizer sectors, as top priority, which are Regulated Sectors.

Source: MOP&NG, Data of June 2011.
Opportunities for India

Softening in prices to aid RLNG Imports at competitive prices

- Production of unconventional gas across globe will release trade volumes
- India to strike good deals for RLNG Sourcing.

Investments in acquiring Gas assets and Technology

- BPCL and Videocon each have acquired 10% stake in the promising Rovuma basin in Mozambique with total recoverable potential of 50 tcf on upper side. Production from the fields is expected to start from 2018
- Strategic location of the block is of more importance for Indian gas market
- GAIL & RIL have also invested in Shale gas assets in US.

Prospect of LNG Export from US

- As per present conditions, ample merit in securing LNG supplies from US
Key Enablers for Indian Power Sector

- Increase in Domestic Gas Production
- Asset Acquisition
- Policy Support
- Infrastructure Development

Key Enablers:
- Priority Allocation to Power
- Advance Allocation of gas
- Domestic gas Price
- Tariff Reforms-Peaking power
- Policies for effective utilization of a/v gas (Swapping/ Clubbing/ Diversion)
- Optimization of Tax Regime
- Reasonable Transportation Tariff
Rise of Optimism for gas based generation

Growing Reserves of Unconventional gas

Maturing Subsurface Technology – (Micro-seismic, hydrofracturing, Horizontal Drilling)

Costs of gas sourcing

Experience (US, Australia, China)

Green Fuel (low carbon emissions),

Efficient Gas Turbines

Enabling Logistics (Liquefaction / Regasification Capacity additions)
Thank You
## Remaining recoverable resources of natural gas & indicative production cost (Jan’10, IEA)

<table>
<thead>
<tr>
<th>Region</th>
<th>Conventional</th>
<th>Tight Gas</th>
<th>Shale Gas</th>
<th>CBM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tcm</td>
<td>Cost</td>
<td>tcm</td>
<td>Cost</td>
</tr>
<tr>
<td>E.Europe &amp; Eurasia</td>
<td>136</td>
<td>2-6</td>
<td>11</td>
<td>3-7</td>
</tr>
<tr>
<td>Middle East</td>
<td>116</td>
<td>2-7</td>
<td>9</td>
<td>4-8</td>
</tr>
<tr>
<td>Asia/Pacific</td>
<td>33</td>
<td>4-8</td>
<td>20</td>
<td>4-8</td>
</tr>
<tr>
<td>OECD North America</td>
<td>45</td>
<td>3-9</td>
<td>16</td>
<td>3-7</td>
</tr>
<tr>
<td>Latin America</td>
<td>23</td>
<td>3-8</td>
<td>15</td>
<td>3-7</td>
</tr>
<tr>
<td>Africa</td>
<td>18</td>
<td>3-7</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>22</td>
<td>4-9</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>404</td>
<td>2-9</td>
<td>84</td>
<td>3-8</td>
</tr>
</tbody>
</table>
GAIL’s Recent Deals for LNG Sourcing

<table>
<thead>
<tr>
<th>GAIL deal with</th>
<th>Quantity</th>
<th>Tenure</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sabine Pass USA</td>
<td>3.5 MMTPA RLNG</td>
<td>Supplies for 20 years w.e.f. 2016</td>
<td>Price is linked with Henry Hub</td>
</tr>
<tr>
<td></td>
<td>(about 12 to 13 MMSCMD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gazprom Russia (Singapore unit)</td>
<td>2.5 MTPA LNG</td>
<td>20 years Supplies will start in 2018-19</td>
<td></td>
</tr>
<tr>
<td>GDF-Suez (France)</td>
<td>0.8 MTPA (~ 3.0 MMSCMD)</td>
<td>w.e.f. 2013 for 2-3 years</td>
<td></td>
</tr>
<tr>
<td>FENOSA (SPAIN)</td>
<td>3.0 BCM (~ 2.75 MMSCMD)</td>
<td>3 years</td>
<td></td>
</tr>
</tbody>
</table>

RLNG price from above deals are expected to be lower than present RLNG price from Gorgoan Australia
## Future Domestic Gas Availability

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domestic</strong></td>
<td>124</td>
<td>149</td>
<td>170</td>
<td>177</td>
<td>209</td>
</tr>
<tr>
<td><strong>Imports-LNG</strong></td>
<td>63</td>
<td>87</td>
<td>87</td>
<td>129</td>
<td>150</td>
</tr>
<tr>
<td><strong>Expected Total Availability</strong></td>
<td>187</td>
<td>236</td>
<td>257</td>
<td>306</td>
<td>359</td>
</tr>
</tbody>
</table>

*Source: Report of Dr Rangarajan Committee on the PSC Mechanism in Petroleum Industry*
Future Demand Projections

**Demand including present supplies (In MMSCMD)**

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>135</td>
<td>153</td>
<td>171</td>
<td>189</td>
<td>207</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>55</td>
<td>61</td>
<td>106</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>City Gas</td>
<td>15</td>
<td>19</td>
<td>24</td>
<td>39</td>
<td>46</td>
</tr>
<tr>
<td>Industrial</td>
<td>20</td>
<td>20</td>
<td>22</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Petrochemicals/ Refineries/ Internal Consumption</td>
<td>54</td>
<td>61</td>
<td>67</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Sponge Iron/ Steel</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total Demand</td>
<td>286</td>
<td>322</td>
<td>398</td>
<td>439</td>
<td>466</td>
</tr>
</tbody>
</table>

Source: Report of Dr Rangarajan Committee on the PSC Mechanism in Petroleum Industry
POSSIBLE SOLUTIONS

Business Friendly Regulatory Framework

Govt of India need to create regulatory framework friendly for development of Shale gas exploration in the country.

Some of the initiatives advocated by some of E&P players:

- Suitable fiscal incentives such as royalty exemption, tax holidays
- Appropriate initiatives to facilitate construction of network of gas pipelines all over the country
- To facilitate Statuary grants/approvals from the respective State Govt.
- To consider granting of proper permissions and incentives for setting up bases in India by relevant service providers.
- To set the Shale gas price at levels economical for production
- To take initiatives for generation of multi-client data.
- Need to create a National Database so that operators can identify prospective shale gas areas before making commitment for investment
- Suitable policy for water management: Govt. may make rain water harvesting and recycling of flow back water, mandatory for shale gas operators and provide incentives for taking such projects, helping community welfare
IEA has developed a set of “Golden Rules”, suggesting principles that can allow policymakers, regulators, operators and others to address various issues like environmental and social impacts associated with unconventional gas. These are called them Golden Rules because their application can bring a “social licence to operate” within a given jurisdiction, paving the way for the widespread development of unconventional gas resources on a large scale, boosting overall gas supply and making the golden age of gas a reality.
### Issues of Concern- AFFORDABILITY

#### DC & PLF data for NTPC

<table>
<thead>
<tr>
<th></th>
<th>2009-10</th>
<th>2010-11</th>
<th>2011-12</th>
<th>2012-13 (till Jan’13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC (%)</td>
<td>90.44</td>
<td>93.11</td>
<td>93.86</td>
<td>92.60</td>
</tr>
<tr>
<td>PLF (%)</td>
<td>78.51</td>
<td>72.9</td>
<td>69.45</td>
<td>60</td>
</tr>
<tr>
<td>Generation Loss due to Grid</td>
<td>4059</td>
<td>6437</td>
<td>7867</td>
<td>8604</td>
</tr>
</tbody>
</table>

**For 2012-13:**

- Total PLF: ~ 60%
- Gas – 48%, RLNG (LT + Spot)- 12%
STRATEGIES FOR ACHIEVING LONG TERM FUEL SECURITY

- Need for increased domestic production:

- RLNG Imports at Competitive prices: Deals for RLNG Sourcing

- Infrastructure Development
  - Pipeline Network & Regasification Capacity

- Enabling Policy Support
  - Priority Allocation of gas to Power Sector
  - Advance Allocation of gas to Power Sector
  - Gas Pricing
  - Tariff Reforms-Peaking Gas based Capacities
  - Policies for effective utilization of available gas
  - Optimization in Tax regime for Gas industry
  - Transportation Tariff
Rising supplies of unconventional gas & LNG help to diversify trade flows, putting pressure on conventional gas suppliers & oil-linked pricing mechanism.
Striking deals for RLNG Sourcing

- Due to limited domestic gas availability & future projections, India will have to depend on RLNG (both from conventional & unconventional gas sources) for meeting its requirement in medium term.

- Share of imports is expected to increase from 28% of total Indian gas supply in FY 2011-12 to almost 70% by 2017.

- Indian companies have acquired some promising assets in other countries.
  - BPCL and Videocon each have acquired 10% stake in the promising Rovuma basin in Mozambique with total recoverable potential of 50 tcf on upper side
  - Production from the fields is expected to start from 2018
  - Strategic location of the block is of more importance for Indian gas market

- The increased availability of gas reserves has raised optimism not only about the gas availability but also on the prices for consumers, particularly from non gas producing countries like India.

- In view of increasing production of Shale Gas in other countries, there is an opportunity to import this as LNG in the country at competitive prices.

However, it is important to strike right RLNG deal for the power sector
Striking deals for RLNG Sourcing

The Indian companies have already started striking RLNG deals from various countries like:

- **GAIL’s deal with Sabine Pass USA**
  - Agreement for supply of 3.5 MMTPA RLNG (about 12 to 13 MMSCMD) with Sabine Pass Liquefaction (USA)
  - Supplies for 20 years w.e.f. 2016
  - Price is linked with Henry Hub which at present is around 3.5 $/MMBtu & could be an attractive price

- **GAIL’s deal with Gazprom**
  - 20 years deal for 2.5 MTPA LNG from Singapore unit of Russian gas giant Gazprom
  - Supplies will start in 2018-19

- **GAIL has also entered into certain other RLNG deals with GDF-Suez (France), FENOSA (SPAIN) etc.**

RLNG price from above deals are expected to be lower than present RLNG price from Gorgoan Australia
POSSIBLE SOLUTIONS

- India needs to pursue a two-pronged approach to Shale gas - to acquire assets abroad and energising its domestic exploration.
- Various Indian players like GAIL, RIL, IOCL, OIL have already acquired some stakes in US Shale gas fields.
- These forays will give Indian companies a good exposure to Shale gas business.

**Business Strategy by E&P Operators**

- E&P players may collaborate with the existing players of US through joint ventures. This will also reduce cost and risk.
- Further, to address problems of land acquisition, infrastructure and resources, there is need to build a strong organization, through consortium, which should essentially include Landowners, Water & infrastructure providers, Gas consumers, Local communities & State Govt.
POSSIBLE SOLUTIONS

Business Friendly Regulatory Framework

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- Suitable policy for water management: Govt. may make rain water harvesting and recycling of flow back water, mandatory for shale gas operators and provide incentives for taking such projects, helping community welfare
Regasification Capacity

- Present regasification capacity in the country is 13.5 MTPA (Dahej 10 MTA and Hazira 3.5 MTPA).
- Recently, commissioning of Ratnagiri RLNG Terminal has also commenced.
- Kochi terminal (5 MTAP) is also expected to get commissioned by March’13.
- A no of other regasification terminals are being planned in the country.
- Development of number of LNG Regasification terminals in the country is a good sign for Indian gas industry.

Efforts need to be made for timely commissioning of these terminals
Faster development of Pipeline Network

- Present gas pipeline network in the country is around 15000 Kms with design capacity of ~ 300 MMSCMD and average present flow of ~ 155 MMSCMD.

- There exists regional disparity in terms of access to available gas in India.

- Pipelines shall help in penetration in Industrial and Commercial markets.

- Govt. is contemplating development of National Gas Grid cutting across length and breadth of the country.

- Govt. should ensure timely development of domestic gas fields to ensure timely development of pipeline network.

- Further, it is necessary to establish the gas pipeline networks prior to arrival of gas. This would help establish the market by unleashing the latent demand.

- As regards cross country pipeline, GAIL has signed GSPA with Turkmenistan for supply of 38 MMSCMD natural gas via the TAPI pipeline (56”, capacity 90 MMSCMD). Share of Pakistan and Afghanistan is around 38 MMSCMD & 14 MMSCMD. The supplies through this pipeline are expected to commence w.e.f. 2018.
**Priority Allocation of Gas for Power Sector**

- In the Gas Utilization Policy by EGOM, Power Sector was accorded 3rd priority after Fertilizer & LPG
- Inter-Ministerial committee of Planning Commission has recommended for preferential allotment of domestic gas only for core sectors i.e. Power & Fertilizer sectors on Top priority
- In our view, Power Sector should be on ‘top - most’ priority in allocation of gas on account of the following facts:
  - Fertilizer can be imported by producing it at very competitive prices in Gas rich countries. However, Power can not be imported
  - Since there is a direct subsidy for Fertilizer sector, management of subsidy is easier for Fertilizer sector as compared to Power sector

**Advance Allocation of Gas for Future Gas Projects**

- As per the Gas Utilization Policy, gas will be allocated to new projects, subject to availability, when the projects are ready for commissioning.
- However, investment decision by CPSUs like NTPC can not be taken because of uncertainty of gas allocation.
- Thus gas should be allocated on advance basis, if necessary on 'in-principle' basis which can be firmed up later.
Recently, Dr. Rangarajan Committee on PSC has commended a mechanism linking the domestic gas price to international price indexes in order to encourage E&P sector in the country.

Proposed pricing formula would apply to all sectors uniformly.

With above recommendations in place, Domestic Gas Price would increase substantially (to the order to ~8.5 USD/MMBtu) vis-à-vis the present Base price of US$ 4.2 /MMbtu.

It may significantly affect the generation from the gas based plants.

While it may be appreciated that the Gas producers should be encouraged to produce more by offering them attractive Gas price for reasonable returns, the price appetite of different consuming sectors vary widely. The Non-core sectors like Industries, Refineries, etc can pay higher gas price as compared to a highly regulated sector like power sector.

Govt. may play a balancing act w.r.t. availability and affordability of gas for Power Sector.

Gas price for Power sector should be such that it is competitive and affordable for consumers & at the same time provides adequate returns to Gas Producers.
There is a need in the country to have peaking power as a measure for Energy Security.

There also does exist a latent demand, (being met from DG sets)

Amongst other options, gas based plants are being proposed as peaking plants

CCGTs are designed for ‘Base Load’ operation (Tariff norms by CERC for Fixed cost, O&M cost, Heat Rate, etc. correspond to 85% PLF)

These plants, if operated on peaking mode, it will lead to significant loss in efficiency.

LNG being costliest fuel, is only used for meeting additional power requirement in the country.

Issues for power generators:
- How to utilize existing surplus capacity?
- Norms for Recovery of Costs? (Fixed Charges, Heat Rate, O&M Costs, etc.)
- How to address the provisions of the GSA / GTA? Issues like ToP, SoP,
- Will the offtakers be able to afford it? TOD Tariffs, Enabling regulations and IT interface

A task force has been formed to look into various issues with gas based peaking capacity.