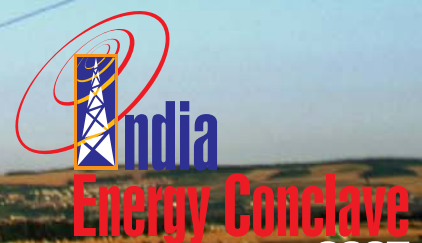


# India Energy Conclave 2007

India Energy Inc. - Emerging Opportunities and Challenges

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# Contents

Acronyms Used	1
Executive Summary: The India Opportunity in Energy Sector	3
Overview of India's Energy Position	7
Coal Sector	11
Oil Sector	15
Gas Sector	19
Nuclear Energy	23
Hydro	26
Renewable Energy	29
Electricity	32



## Acronyms Used

MT	Metric Tonne
MMT	Million Metric Tonne
MMSCMD	Million Standard Cubic Meter Per Day
NELP	New Exploration Licensing Policy
SKO	Superior Kerosene Oil
NG	Natural Gas
MoPNG	Ministry of Petroleum and Natural Gas
MNES	Ministry of New and Renewable Energy
BOO	Build, Own, Operate
PPP	Public Private Partnership
UMPPs	Ultra Mega Power Projects
DFC	Dedicated Freight Corridor
CBM	Coal Bed Methane
DGH	Directorate General of Hydrocarbons
GLC	Gas Linkage Committee
FBR	Fast Breeder Reactor
DAE	Department of Atomic Energy
PHWR	Pressurized Heavy Water Reactor
AHWR	Advanced Heavy Water Reactor
CHTR	Compact High Temperature Reactor
ADS	Accelerator Driven Systems
FMCT	Fissile Material Cut-Off Treaty



## Executive Summary: The India Opportunity in the Energy Sector



The rapidly growing Indian economy requires an investment of around USD 120 to 150 billion over the next five years in the energy sector. Strong private sector participation is required to complement the public sector and to bring in the required capabilities and technologies. Policies have increasingly recognized the need to promote private investment. Private interest in captive coal mining, oil and gas exploration and in the power sector has shown significant progress and is also envisaged in nuclear sector, on conclusion of the Indo-U.S. nuclear deal.

There is also a shift towards market mechanisms with regulatory oversight in energy sector, especially in power and oil & gas. It is important that this transition is gradual till the supply side position improves. In parallel, the Government is making efforts to diversify the fuel basket by increasing the shares of Natural Gas, Hydro and Nuclear energy. At the same time, both Government and private sector companies are looking to acquire equity in energy assets abroad.

Energy transport infrastructure such as ports, railways, pipelines and power transmission networks need significant investment. The policy now allows private participation in all these areas and some private sector activity is already under way. Tariff reform in the energy sector and distribution reform in the power sector are two important steps that need to be successfully carried out. Tariff reform to phase out subsidies or target them effectively and distribution reforms to bring efficiency in the power sector are vital.

The following sections highlight key opportunities in the different sectors:

### Coal

India has vast reserves of coal and participation of the private sector in captive mining, across different user industries, is an immediate opportunity for investment. 38 coal fields with mineable reserves in excess of 2,800 million tonnes<sup>1</sup> have been identified and are in the process of being allocated, involving a total capital requirement of around USD 1.5-2 billion. Investment activity is also seen in other parts of the value chain including washeries.

### Oil

A number of private investors have entered this segment attracted by the government's policies for upstream exploration and production. Six rounds of competitive bidding under the New Exploration Licensing Policy (NELP), have taken place and around 185 blocks were awarded and reserves estimated at 700 MMT<sup>2</sup> of oil and gas have been discovered. There is a huge potential in refining due to the strategic advantages of low cost and location, and is already a net exporter of products. At present, the downstream marketing sector is also open to private participation.

<sup>1</sup> Ministry of Coal & Mines

## Gas

Gas discoveries of around 700 bcm<sup>2</sup> in the last decade point towards a tremendous promise. While in the near term, potential for LNG may be limited due to inability of key sectors such as power to absorb high international prices, in the longer term there would be place for LNG as the share of Natural Gas in India's energy mix increases. On the demand side, an emerging area is auto-CNG and piped gas which together account for 7percent of total gas demand in the last five years. In the next few years, at least 30 cities have been identified for city-wide gas coverage by private and public sector players. The draft gas pipeline policy gives support to the development of a national gas grid meant to create a common gas market across the country.

## Nuclear

India has one of the largest reserves of the nuclear fuel - thorium. However, the nuclear energy programme will continue to be uranium - based until commercial production based on thorium becomes feasible. If the Indo-U.S. nuclear deal goes through, there will be a boost to nuclear energy and private participation in this sector would be expected.

## Hydro

India is endowed with a hydroelectric potential of about 150,000 MW<sup>3</sup>. However, only 17 percent of the hydroelectric potential has been harnessed so far; with another 5 percent under various stages of development. Private participation in the hydro sector will be important to meet the target of an additional 45,000 MW of hydro capacity within the next ten years. Various policy measures are being contemplated to encourage private participation which seek to address issues such as mitigating geological risks, resettlement and rehabilitation of project affected persons through Public Private Partnership initiatives and incentives for performance. The revised hydro policy is currently under discussion by the Government of India.

## Renewable Energy

India has a vast potential for renewable energy sources, especially in areas such as solar power, biomass and wind power. The current installed capacity of renewable energy is around 9220<sup>4</sup> MW, constituting about 7.3 percent of India's total installed generation capacity. India stands fourth in the world in terms of wind based generation capacity and we are seeing significant investment activity in this area. Technological breakthroughs could generate a quantum leap in the renewable energy sector since India is well endowed with solar insolation.

<sup>2</sup> Ministry of Petroleum & Natural Gas

<sup>3</sup> Ministry of Power, Government of India

<sup>4</sup> Ministry of New and Renewable Energy, Government of India

## Electricity

### Generation

The government has envisaged a capacity addition of around 76,640 MW<sup>5</sup> by 2012, with participation both from private and public sectors. Generation opportunities are encouraging on account of opening of power trading, open access in transmission and distribution, and reforms in the power sector. Recent developments in this area include the award of three Ultra Mega Power Projects (UMPPs) each of size 4000 MW on basis of competitive bidding. We are also beginning to see activity in relation to merchant power plants and the Government policy now encourages this by providing assistance in fuel linkages and other clearances.

### Transmission

Private investment in the transmission sector can be done either independently or as a Joint Venture. These participations are envisaged largely for creation of the National Grid<sup>6</sup> along with the state owned transmission utilities. The private sector participation is expected to be in projects requiring a capital outlay of around USD 4.5 billion<sup>7</sup>. In the last year, transmission projects in the western region covering approximately 1500 km were awarded to the private sector on a Build, Own, Operate (BOO) basis in a competitive bidding process.

### Distribution

Opportunities in distribution currently seem to be focusing on the franchising route. A number of distribution areas have been put up for private participation through the franchising route in recent months. While privatization of existing distribution utilities is possible, good opportunities are few owing to the large risks involved. The political dispensation also does not seem to favour privatization of distribution at this time.

### Trading

Power trading, as an activity, is evolving rapidly in India. Currently, around 15 GWh of electricity is traded every year and there are four or five large trading players. Merchant power plants, open access and the move to set up a Power Exchange will all give a fillip to power trading.

<sup>5</sup> Blue Print for Power Development, Ministry of Power

<sup>6</sup> Formation of the National Grid is a plan for strengthening of the inter-state and inter-regional transmission network that will enable unrestricted flow of electricity across regions and enable development of a deep electricity market

<sup>7</sup> Source: Ministry of Power, Government of India



**Energy Savings and Demand Side Management**

A recent study estimated an immediate energy saving potential of 54,500 million kWh and peak saving of 9,240 MW. This has an investment potential of USD 3 billion. In spite of the above opportunities, a lot remains to be done in terms of strengthening and building the regulatory institutions that will allow the Government to distance itself from operational decision making and make the reform process more transparent and sustainable. For example, the electricity regulatory commissions would need to be given more independence to deal with tariff design, market structure development, etc. and given an environment to operate without political interference.

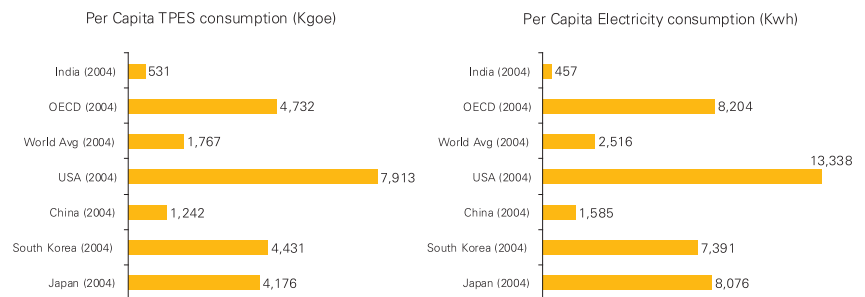
In the following chapters, starting with an overview, each energy segment has been discussed in greater detail; highlighting key issues, the policy and regulatory framework in these segments and the emerging areas for investment in these segments.

## Overview of India's Energy Position



By world standards, India's current level of energy consumption is very low. For the year 2004-05, the total annual energy consumption for India is estimated at 572 Mtoe (million tons oil equivalent) and the per capita consumption at 531 kgoe (kilograms oil equivalent). (Exhibit 2.1)

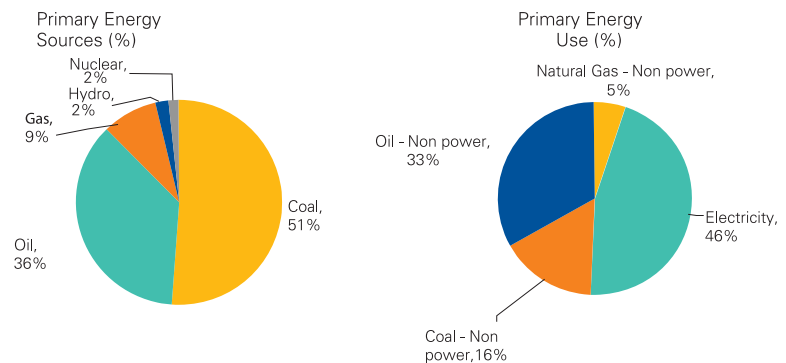
**Exhibit 2.1: India's per capital energy consumption compared to other countries**



Source: International Energy Agency, Key World Statistics 2006

With a target GDP growth rate of 8-10percent and an estimated energy elasticity of 0.80, the energy requirement is expected to grow at 6.4-8percent. This would mean a five-fold increase in India's energy requirement over the next 25 years.

**Exhibit 2.2: India's composition of energy sources and usage**



Source: Planning Commission of India, 2006

## India's Current Energy Basket

India is well-endowed with coal. However, 71 percent of its oil needs are met by crude imports. Exhibit 2.2 reflects that the only primary energy sources are commercially exploited. Rural India is predominantly dependent on traditional fuel sources like firewood, animal dung and biomass, estimated at around 143 Mtoe per annum or approximately 44 percent of the total primary energy use<sup>8</sup>

## Future Energy Requirements and Supply Options

Given the present growth rate of 5 percent in coal production, India's extractable reserves would be exhausted in 45<sup>9</sup> years, and hence there is a greater need to look at sustainable and cleaner fuels. Recent discoveries hold promise for India's gas reserves and coal bed methane. On the nuclear front, advanced technology needs to be infused before being put for commercial use. Renewable energy, especially as wind and solar power is expected to grow rapidly and supplement the short term requirements. Over the longer term, it is expected to gain strategic importance as a sustainable fuel that would help build self-reliance in energy sources. The following figure details the estimated energy reserves in the country.

**Exhibit 2.3: Estimated energy reserves**

Resource	Unit	Reserves
Coal Extractable	Mto	13,489
Oil	Mto	786
Gas including coal bed methane	Mto	1,866
Uranium – metal	Tonnes	61,000
Thorium – metal	Tonnes	225,000
Hydel	MW	150,000

Source: Planning Commission of India, 2006

Different scenarios developed both on supply-side and demand-side are detailed as follows:

- **Energy efficiency in end-use:** Efficient energy use in industry, lighting, home appliances etc. can lower the energy needs by 142 Mtoe in 2031-32 (7.5 percent of the total requirement)
- **Increase in rail road share of freight:** Presently, most of the freight traffic is carried by roads. If the share of railways in freight increases from the current 32 percent to 50 percent by 2031-32, there would be an estimated energy saving of 34 Mtoe in 2031-32 (1.8 percent of total requirement)



- **Increase in transportation efficiency:** Use of mass transport and better utilization and fuel efficiency of vehicles can save upto 81 Mtoe of energy by 2032 (4.3 percent of total requirement)
- **Efficiencies in thermal power generation:** Increase in thermal generation efficiency from the present 31 percent to 38-40 percent through use of super critical boiler technologies could lead to a savings of 111 Mtoe in 2031-32 (or 5.8 percent of the total energy requirement).

Together, there is a potential to save upto 351 Mtoe by 2032 (19 percent of total requirement).

On the supply side, the following options are envisaged:

- Fully exploiting India's hydro potential of 150,000 MW from current level of 32,326 MW
- Development of Natural Gas sources (indigenous, pipeline import or LNG) for power generation
- Development of renewable energy sources (solar power, fuel wood, bio-diesel and wind energy).

The range of utilization of different fuels in 2032 as compared to current levels is shown below:

**Exhibit 2.4: Comparison of energy utilization in 2031-32 with present**

Resource	Utilization in 2031-32 (Mtoe)	Current utilization (Mtoe)
Oil	350-486	119
Natural Gas (including CBM)	104-150	29
Coal	632-1022	167
Hydro	13-35	7
Nuclear	76-98	5
Solar	1200	<1
Wind	10	<1
Fuel	620	140
Ethanol	10	<1
Bio	20	<1

Source: Planning Commission of India, 2006

## Key Imperatives for India

To meet its large and growing energy needs, there are certain key imperatives for the Indian energy sector:

### **Private Sector Investment Needs to Complement the Public Sector**

Reliable and economic energy supply will require as investment of capital as well as capabilities and efforts from both public and private sectors. The government is taking the right steps to attract private players to this sector which will need investments of around USD 120 to 150 billion over the next five years. Further clarity in areas including pricing of products and stability in policy framework is essential to further encourage private investment.

### **Encourage Market Mechanisms with a Credible and Independent Regulatory Oversight**

Market mechanisms will bring in efficiencies, and also encourage investments by minimizing regulatory risks. With an improving supply-side situation, market mechanisms have been gradually introduced in the various segments of the energy chain, and this needs to be extended to other 'left-out' sectors like coal block allocation to encourage private sector participation.

### **Reduce Vulnerability to Price and Supply Shocks**

The biggest challenge is to replace coal (exhaustible in 40 years), representing 51 percent of the energy basket, and oil which is heavily dependent on international supply in the short term towards Natural Gas, Hydro and renewable sources. Apart from diversifying the basket, enhancing domestic production and taking equity positions in energy resources abroad are also necessary steps in reducing the effects of fuel price shocks.

### **Tariff Reform and Power Sector Reform**

Heavily distorted power and energy prices have resulted in inefficient end-use and energy choices. Policy measures with sufficient political will are required to address these issues. Distribution reforms to cut down on network losses due to theft and pilferage are also necessary.

### **Provide Government Support for Energy Efficiency**

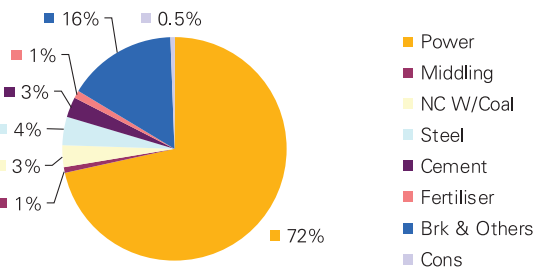
Policies providing incentives for energy efficiency are an urgent requirement. The environment should encourage energy efficiency companies to come up and operate profitably. In parallel, India is also emerging as an active market for Clean Development Mechanism (CDM) projects being conceptualized and registered with the Executive Board (EB). The growing awareness of the benefits from CDM would make this an important investment area and would give the necessary fillip for energy efficiency.

# Coal Sector



The majority of India’s energy requirements are met by coal; which is largely mined in the Eastern and the Central regions of the country. In 2005-06, the total coal production in the country was around 405.2 MMT<sup>10</sup> majorly supplying to steel, power and cement sectors.

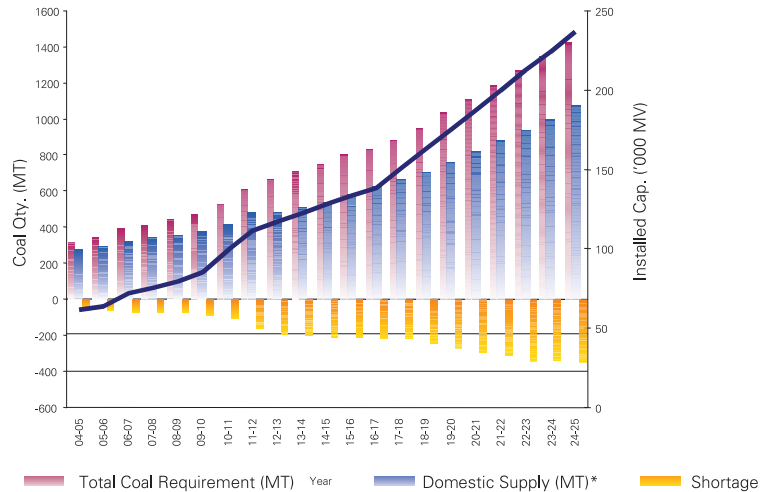
**Exhibit 3.1: Consumption profile**



Source: International Energy Agency, Key World Statistics 2006

In spite of various policy initiatives to diversify the fuel mix, coal continues to be a major energy source. Consumption of coal is projected to rise by nearly 40 percent over the next five years and set to almost double by 2019-20. The demand for coal, both planned and unplanned is exerting severe pressure on the supply side. As per the government’s own estimates, production will lag behind demand by about 100 MMT as of 2011-12 and by 250 MMT by 2019-20.

**Exhibit 3.2: Coal requirement vs availability**



Source: Infraline

## Key Issues Facing the Sector

The critical issues facing the coal sector are highlighted below:

- Minimal use of washed coal, and lack of a suitable approach to deal with fly ash generated at coal power stations<sup>11</sup> is leading to high pollution levels. Clean coal technologies are expensive and in need of modifications to suit Indian conditions.
- Coal mining in India has been associated with poor employee productivity<sup>12</sup>. The 'output per miner per annum' in India varies from 150 to 2,650 tonnes compared to an average productivity of around 12,000 tonnes in the U.S. and Australia<sup>13</sup>
- The coal sector faces huge investment requirements, with a high level of political interference. There is an urgent need to introduce an independent regulatory body which would govern the allocation of coal blocks, mine approvals and encourage competitive pricing.

### Improvement in Operational Efficiency of the Coal Companies

The public sector company, Coal India Limited (CIL), needs to rationalize its mining costs, which are at least 35 percent higher than those of leading coal exporters like Australia, Indonesia and South Africa. This would require an organizational transformation, involving investment in new technologies, process improvements and adoption of a thorough risk management framework<sup>14</sup>.

### Strengthening of logistics in Coal Distribution

Bottlenecks in critical logistic infrastructure (ports and railways) have huge effects on the coal sector. Indian Railways has to augment capacity to ensure ease of transportation from the coal producing regions to the demand centers. Special Freight Corridors like the Dedicated Freight Corridor (DFC) (an INR 220 billion project connecting ports to the hinterland) can increase speed, lower costs and improve reliability of transportation.

### Focusing on Technology for Future

There needs to be a co-ordinated approach towards energy-related R&D efforts. The government can focus on a limited set of promising technology areas including tighter emission standards and development of inexpensive clean-coal technologies - viz. extraction of methane from coal deposits, to get improved recoveries. India holds significant opportunities on commercial exploration of Coal Bed Methane (CBM) as a source of natural gas. Till date 26 CBM blocks, with a potential of covering 13,600 sq kms, have been allotted under the CBM exploration policy.

<sup>11</sup> Around 90-100 MT of ash is generated at power stations in each year. India has been able to absorb only 11 percent of this ash compared to 25 percent by China.

<sup>12</sup> Coal from Coal India Limited (and its subsidiaries), account for around 85 percent of the annual production of coal in India. Coal India Limited is also the second biggest employer in the world with around 500,000 employees

<sup>13</sup> Source: Tata Energy Research Institute, India

<sup>14</sup> A first step, providing a catalyst for improvement, would be to allow competition among mining subsidiaries of CIL. Another would be to encourage joint ventures with world leaders in coal mining.



## Policy and Regulatory Framework

Traditionally, this sector has been plagued by problems arising out of state monopoly, lack of independent regulation and lack of transparency in tariff determination. The government has embarked on structurally reforming the sector through the following measures:

- Distancing of the government from price determination of all grades of coal
- Opening of captive coal mining for private investment for end-use projects, such as power, cement and steel on the basis of competitive bidding<sup>15</sup>. The government also allows coal mining companies with long term contracts with specified end users (viz, power, cement and steel) to apply for a coal block under the captive route.
- While the Ministry of Coal allocates coal mining blocks to non-CIL government companies (often along with the right to sell coal on a merchant basis), State government companies are now allowed to carry out mining of coal and lignite reserves anywhere in the country<sup>16</sup>
- Exemption of customs duty on coking coal
- Inclusion of coal gasification and liquefaction as specified end users for captive block allocation

The following measures have been accepted in principle and are awaiting implementation:

- Freeing the sector from distribution controls
- Establishment of a regulatory authority for resolving price disputes between producers and consumers
- Allowing Public Sector companies to undertake Joint Venture projects with the private sector. On the logistics front, the government has adopted the following measures:

On the logistics front, the government has adopted the following measures:

- 100 percent income tax exemption on port development projects for a period of 10 years, under Section 80 – I (A) of the Income Tax Act<sup>17</sup>
- 100 percent FDI for port development projects under the automatic route
- Allowing private players to invest in minor and intermediate ports

<sup>15</sup> In view of lack of technical understanding, user industries are not expected to be directly involved in activity of coal mining. They will like to appoint a Mine Developer and Operator ('MDO') for the purpose. In this regard, the need of the hour is a framework that will allow for (a) free exchange of relevant information and (b) transparent evaluation of bids from prospective MDOs. The framework is expected to assist both parties in managing the risks that are involved in the activities of planning, development, exploration, etc in an effective manner.

<sup>16</sup> Without the earlier restriction of isolated small pockets also the second biggest employer in the world with around 500,000 employees

<sup>17</sup> Minimum Alternate Tax (MAT) will be applicable during the holiday period for Corporate Tax.



- Allowing private investments and ownerships in rail track, rolling stock and container depot.

## The India Opportunity

Recognition of private investment requirements and acknowledgement of the need to improve operational efficiency has opened up immense investment opportunities in coal and related sectors.

Captive mining across different user industries is an immediate opportunity for private investors. 38 coal fields with mineable coal reserves in excess of 2,800 million tonnes<sup>18</sup> have been identified for captive allocation, involving a total capital requirement of around USD 1.5-2 billion. However, easily extractable surface deposits have largely been explored, requiring agencies to address difficult terrain and search coal at greater depths using better technology, involving a larger scale of operations and more capital investments. More investments are also envisaged in other parts of the value chain including coal washeries.

There is a need to issue new regulations which support a free market, allow the formation of joint ventures or other alliances, and encourage the development of shared infrastructure such as dedicated rail lines and power transmission networks. To achieve these goals, the Government will have to overcome strong opposition from political and business interests within the sector.

Being a related sector, seaports that receive shipments of coal, railroads, etc. would require USD 40-50 billion in investments for harmonious expansion in capacity. The government's plan to invest USD 2 billion to increase capacity and remove bottlenecks at existing major ports is much lower compared to the estimated actual requirement. Similarly, a total USD 15-20 billion is required towards creating new freight corridors and integrating them with existing rail operations.

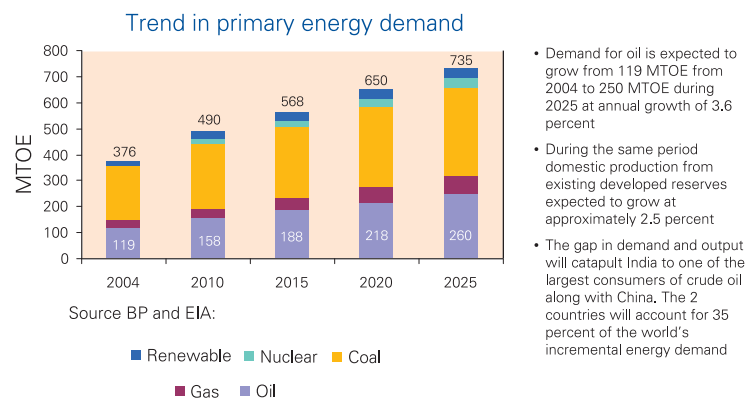
<sup>18</sup> Ministry of Coal & Mines

## Oil Sector



Demand for oil, comprising of 36 percent of India's primary energy consumption, is expected to grow both in absolute and percentage terms to 196 MMT in 2011-12 and 250 MMT in 2024-25. To address the growing demand-supply gap, the government has stepped up exploration and production efforts through private participation under the NELP, and has also developed a more holistic strategy for acquisition of equity in oil abroad.

**Exhibit 4.1: India's energy mix and outlook for oil**



### Key issues facing the Sector

The following are the major issues faced by the oil sector:

- **Absence of statutory framework in the upstream industry:** The Indian Oil Sector is regulated by clauses on health, safety and environment, as also on certain critical aspects of operations and pricing, notably lacking structural reforms. The recently notified Petroleum Regulatory Board, is confined to the downstream industry, leaving the upstream industry under the general policy framework of the Directorate General of Hydrocarbons. There has been an amendment to the relevant rules to give DGH supervisory powers which now have statutory credence in this regard, though not independent of MoPNG. Import dependence - a key issue facing this sector, needs to be tackled with a comprehensive regulatory and statutory framework
- **Incidence of cross subsidy due to social obligations:** The incidence of the subsidy burden on LPG, SKP and diesel has now been spread out across to the private players as well. The differential pricing of Petrol and Diesel coupled with the under-recovery on the sale of the two products, is adding to the market distortion. A long term approach for a market based pricing mechanism is needed to boost investor confidence.

## Policy and Regulatory Framework

- **Investment Policy:** There is a greater focus towards private investment. The government has allowed 100 percent FDI in exploration, creation of pipeline infrastructure, refining and in downstream retailing (subject to a minimum investment in the mid-stream and upstream sector)
- **Pricing Policy:** Over the last five - six years, there has been a marked shift towards a market driven mechanism for prices. Several petroleum products have been de-controlled and allowed to be sold by private companies at market prices<sup>19</sup>. A government appointed committee has recommended wide-ranging measures including a shift from an 'import parity based pricing' to a 'trade based pricing', a reduction in custom duties on petrol and diesel, and the shifting of excise duty from an ad-valorem levy to a specific levy. The recent reduction in excise duty on vehicle fuels is expected to cap the losses of oil market companies that are selling petrol and diesel at state-administered prices
- **Regulation:** The current upstream regulation is provided by Director General of Hydrocarbons (DGH) based more on technical aspects than on the pricing front. The midstream and downstream sectors have largely been unregulated. However, downstream regulation is now in place and operational, subsequent to the recent notification by MoPNG.

## The India Opportunity

### Investments Under NELP

To increase upstream investments, the Ministry of Petroleum & Natural Gas (MoPNG) has introduced a transparent bidding process for allocation of oil and gas blocks. Six rounds of competitive bidding under the Government policy, named New Exploration Licensing Policy (NELP), have already been done, around 185 blocks were awarded and reserves estimated at 700 MMT<sup>2</sup> of oil and gas have been discovered. The recent NELP-VI was a success with 165 bids being received from both domestic and international companies for exploration rights. Going forward, the Directorate General of Hydrocarbons has indicated that about 50-60 blocks, including those in un-explored states, are likely to be made available in NELP-VII.

### Destination India as Refining Hub

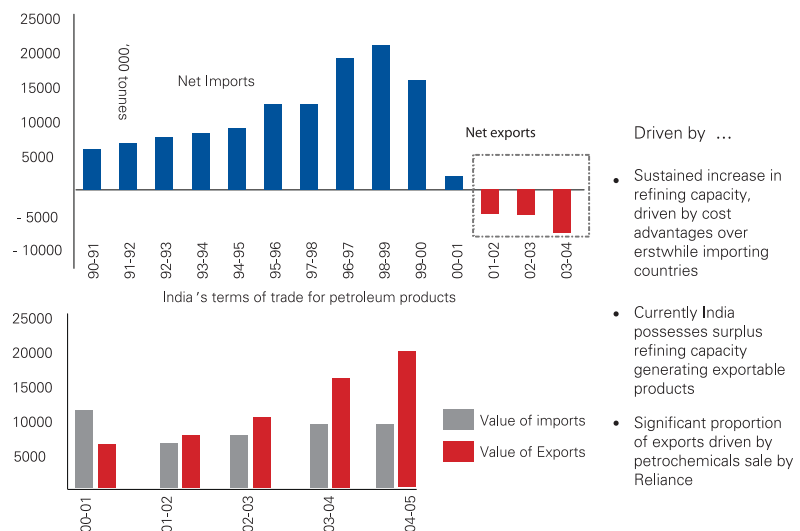
On the refining front, India enjoys significant advantages. It has lower construction and cash operating costs. India's strategic location en route of Middle East crude for East Asian and Pacific-rim markets is another key advantage. In fact, India possesses surplus refining capacity and has already turned into a net exporter of products.<sup>20</sup> The expected worldwide deficit caused by the shut down of small and

<sup>19</sup> Price of gasoline and diesel are still fixed by the Government, although the linkage to import parity price has strengthened significantly over the years

<sup>20</sup> Source(Exhibit 4.2): ENI, Oil and Gas Outlook

uneconomical refineries around the world, bodes well for Indian refineries. The inability of oil majors to invest in refining assets during last decade and significant increase in the Chinese demand has accentuated the deficit. There is a planned addition of 80 to 90 MMTPA in the next four - five years to the existing capacity of around 149 MMTPA. Reliance Petroleum Limited is constructing a 28 MMTPA refinery at Jamnagar in Gujarat which is expected to become operational during the financial year 2008-09. Hindustan Petroleum Corporation Limited (HPCL) has entered into a partnership with Mittal Investments for setting up a 9 MMTPA refinery-cum-petrochemical complex in Bhatinda in Punjab.

**Exhibit 4.2: India's petroleum exports on the rise since 2001**



Source: ENI, Oil & Gas Outlook

### Increased Investment in Fuel Quality Upgradations

Significant investments are planned for upgrading existing refineries to meet the stringent fuel specifications and the domestic 'Auto Fuel Policy' which mandates Euro IV norms by 2010 in the 11 designated cities and Euro III norms in rest of the country. More complex configurations are required to hedge against variation in crude supplies and to achieve cost competitiveness by accommodating cheaper quality crude. The state-owned IOCL has planned investments of INR 230 billion for several refineries. HPCL and BPCL have planned similar investments for their Vishakhapatnam and Mumbai refineries respectively.

### Building a Strategic Petroleum Reserve Through Public Private Partnership

The Government has taken steps to set up strategic crude oil storage reserves at various locations, improving the country's ability to respond to short term supply disruptions. It is also exploring the possibility of increasing oil stockpiles through innovative schemes including leasing of space to international traders, and building additional storage terminals through concessions.



### **Acquisition of Overseas Oil Assets**

MoPNG has conceived a more coordinated approach towards acquisition of overseas oil assets through joint forays. In addition, it is entering into bilateral and multilateral co-operation engagements with other countries in the areas of technology transfers, R&D, safety and training. Recently India has signed a MoU with China for joint bidding of hydrocarbon blocks.

### **Competition in the Downstream (retail and institutional) Segment**

As per the Petroleum and Natural Gas Regulatory Board ('PRB') Act, the upcoming transmission network would have open access. Anticipating competition in the retail segment, major oil firms are expanding their retail network and forging alliances to offer non-fuel products and services as part of their overall proposition. On the institutional segment, incumbents are focusing on profitable segments, including Aviation Turbine Fuel as well as specialty products like Hexane.

## Gas Sector



Per capita consumption of Natural Gas in India is currently amongst the lowest in the world; at 29 cu m as compared with a world average of around 538 cu m<sup>21</sup>. The present share of natural gas in the energy basket is only around 9 percent in India, compared with a world average of around 24 percent. However, demand for NG (at more than 120 mmscmd) in the country has far outstripped supply (about 95 mmscmd), and there has been an increasing trend towards emergence of new NG demand as well as conversion from existing fuels to NG<sup>22</sup>. Though India is a new entrant to natural gas (NG), the significance of the fuel can be gauged from the fact that, by 2025, the country is expected to rival both China and Japan in having the largest NG demand in Asia. Demand in each of these countries is expected to be in the range of 350 MMSCMD<sup>23</sup>. More than 50 percent of NG volume in the country is expected to be as cleaner and cheaper substitutes to petroleum products, with the rest as cleaner substitutes to coal in the power sector. In total, the share of NG in the fuel mix is expected to go up to 22 percent in 2031-32.

### Key Issues

In contrast to oil, 80 percent of Indian NG demand is met from domestic sources. The key issues faced by this factor are as follows:

- **Domestic reserves/ production will not be sufficient:** Declining trends point to reduction in production to less than 50 percent of current production<sup>24</sup> levels from the existing fields by 2015, though, the new gas discoveries can contribute to about 100 MMSCMD of gas production. Even with this, the supply is likely to fall short of the projected demand. There is a renewed focus on identification of new supply sources through the NELP programs to attract greater investment in this area. Unattractive market prices in the last decade may have also contributed to a lag in production
- **Cross-border gas pipelines facing uncertainty, but attracting interest:** Unfavorable political environment and international climate have delayed cross-border pipeline projects. However, increasing LNG costs and the global history of high reliability of supply in transnational pipelines, are factors that are in favour of these projects
- **Inability to take international prices:** 70 percent of the NG market is made of power and fertilizer sectors, who were not able to absorb international prices and were subject to an administered price mechanism till a couple of years ago. Shortages in production have since doubled the prices, and shifted fuel preferences from gas to coal in the power sector. However, gas is still preferred to Naphtha, FO and LPG because of its competitive prices.

<sup>21</sup> Draft Report on the Expert Committee on Integrated Energy Policy, 2005

<sup>22</sup> GAIL – Infraline – Natural Gas in India 2005

<sup>23</sup> Energy Outlook 2004, HV 2025

<sup>24</sup> Referred from LTGP statistics of DGH

## Policy and Regulatory Framework

Over the past six years, the trend in natural gas regulation has been towards opening up the sector for greater investment, setting up an independent regulator to monitor post production activities, and enabling a transition from the administered control regime to a market driven mechanism. Significant regulatory bodies and issues in this sector include:

- **Petroleum & Natural Gas Regulatory Board Act, 2006 (PNGRB Act, 2006):** The authority to regulate all non-production activities in the petroleum and natural gas value chain is intended to promote consumer interests, reliability of supply and competition
- **Policy for Development of Natural Gas Pipelines and City or Local Natural Gas Distribution Networks:** Through investments in critical infrastructure, this policy seeks to facilitate open access for all players without discrimination and the promote competition. It also seeks to set up a Gas Advisory Board for the development of a pipeline network
- **Gas Linkage Committee:** This committee seeks to manage gas allocation to eligible consumers. Though earlier linked with the Administered Price Mechanism (APM), new fields under the NELP are exempt from purview of GLC and can trade at market prices
- **Infrastructure Status for Gas Pipelines:** The grant of 'Infrastructure Status' to the pipeline and storage sector translates into a number of benefits for companies engaged in transmission pipelines. However, if part of these benefits is passed on to consumers, it could also lead to lower tariffs
- **Foreign Direct Investment in NG Sector:** 100 percent FDI is allowed in exploration, pipeline infrastructure, LNG and trading segments. This is likely to bring forth significant investments. An integrated LNG policy is likely to be in place soon.

## The India Opportunity

### Domestic Exploration of NG

The government sees significant domestic exploration potential, to match demand and supply. On average, reserves of more than 70 bcm have been discovered annually. NELP provides significant benefits to private players in terms of 100 percent FDI, a seven-year tax holiday, free marketing rights etc. NELP VI has already proved to be very successful with these initiatives. NELP VII has also opened up a new set of opportunities for investors. Significant finds are crucial to bridge the supply gap in domestic gas. After the formation of the National Gas



Hydrate Program, gas hydrate exploration has also received considerable impetus. India is the third country to engage a specially designed vessel to carry out drilling activities in Indian waters for collecting cores for studies of gas hydrates habitation, contents, etc.

### **Is LNG the Answer?**

LNG as a substitute for costlier Naphtha has seen increasing absorption in the domestic market. However, due to a number of reasons, LNG would find it difficult to compete with other options in the short to medium term for power generation. The lack of a cross-country gas pipeline to enable transmission, the emphasis on coal as the preferred fuel for Ultra Mega Power Plants and the gradual emergence of Coal Bed Methane have made LNG increasingly uncompetitive for power generation. In addition, issues related to pricing and the limited potential of LNG supply sources to India need to be sorted out. However, in the long term, LNG is likely to be one of the most significant areas of investment.

### **Coal Bed Methane (CBM) and Underground Coal Gasification Opportunities**

With proven reserves of 765 Mtoe and indicated reserves of between 1,260 – 2,340 Mtoe<sup>25</sup>, CBM could be another opportunity. CBM exploration has already been taken up seriously, with more than 26 blocks awarded so far and more to be taken up as part of future phases of CBM bidding. Compression of CBM and marketing as CNG could be exploited in potential industries as a monetization option for stranded gas. A related exciting technology is that of underground coal gasification, which is already being exploited in Russia at a small level. Given India's large coal reserve, the UGC technology could potentially produce volumes of multiples of India's free natural gas reserve. For example Gujarat's coal reserves could produce as much as 70 times of ONGC's current free gas reserves<sup>26</sup>.

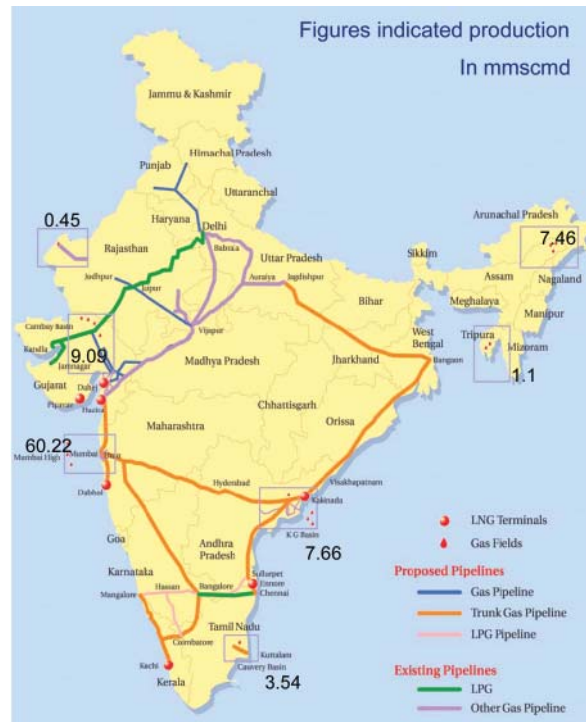
<sup>25</sup> Draft Report of expert committee on Integrated Energy Policy  
<sup>26</sup> Infraline report on status of CBM in India (April 2005)



### Development of a Common Gas Market Through National Gas Grid

The growth in each of the end user industries as well as the widespread growth of the retail segment would need to be supported by the appropriate infrastructure. The planned National Gas Grid connectivity is with a view to harmonize the operations and provide interconnectivity to different gas pipelines.

The New Gas Pipeline Policy announced by the Government provides a framework for development of a National Gas Grid and with the setting up of the Petroleum and Natural Gas Regulatory Board, private interest is expected to increase tremendously in the pipeline infrastructure segment.



# Nuclear Energy



## Nuclear Energy

The government is pursuing nuclear energy as a long term strategic alternative to coal, which is expected to be exhausted in 45 years. The importance accorded to this segment can be gauged by:

- Willingness to enter into civilian nuclear arrangements with several countries, albeit facing political opposition. Deals have already been entered with the Russian Federation for setting up of 1000 MWe Light Water Reactors (LWR's) under IAEA safeguards
- Aggressive targets, including construction of the first Fast Breeder Reactor (FBR) by 2010. Department of Atomic Energy (DAE) has planned to increase capacity to 10,280MWe by the 11<sup>th</sup> Five year plan<sup>27</sup>, to 20,000 MWe by 2020 and to 50,000 MWe in 2030.

## India's Nuclear Power Programme

### Three-Stage Indian Nuclear Programme

Closed nuclear fuel cycle has been the core strategy of the Indian Nuclear Power Programme being followed by the DAE<sup>28</sup> being driven by a three-stage plan to utilize the vast thorium reserves:

- **First Stage:** India has already achieved considerable specialization in the first stage, and it is possible to achieve about 10 GWe of installed capacity with indigenous Uranium. Pressurised heavy water reactors (PWRs) have already been made commercially viable. More public and private spending in uranium exploration has been planned
- **Second Stage:** Setting up of Fast Breeder Reactors (FBRs) backed up by reprocessing plants and plutonium-based fuel fabrication plants are in the technology demonstration stage. FBRs can increase the energy potential of natural uranium to about 300 GWe. It is estimated that FBRs of around 4000 MW each will be built every year from 2021
- **Third Stage:** Research on the third stage is in progress with a 300 MWe Advanced Heavy Water Reactor (AHWR) to expedite transition to a thorium based system. Researches on other advanced technologies like Compact High Temperature Reactor (CHTR), Accelerator Driven Systems (ADS) and indigenously built Tokamaks, as part of fusion research are in full swing.

<sup>27</sup> T2007-2012

<sup>28</sup> "Nuclear Power Programme", Department of Atomic Energy, Government of India

### **Nuclear Power Projects in India: Planned and Under Operation**

There are 17 nuclear power plants in India with an installed capacity of around 4120 MWe operated by the public sector. There is an estimated addition<sup>29</sup> of 2660 MWe by 2008, and of 6800 MWe by 2012 involving both PHWRs and LWRs. PWHR nuclear plants are estimated to cost around INR<sup>30</sup> 6 to 7 Cr<sup>31</sup> per MW with a design life of more than 40 years. Gestation period of setting up new plants has improved to five years. Nuclear power today competes economically with coal-based plants at load centers generation of around 1000 km from the pit head coal mines and generates power at the range of INR 1.75 to 2.80 per unit, depending on the life of the reactor.

### **India Opportunity**

#### **India – U.S. Nuclear Cooperation**

The Indo-U.S. nuclear deal promises access to clean energy and will bring India out of a 30-year old isolation from international technology by enabling agreements with other suppliers including France and Russia to procure fuel, technology and equipment. Key elements of this agreement include segregation of the civilian and military facilities, applying negotiated IAEA safeguards, and finalizing additional Fissile Material Cut-Off Treaty (FMCT) with the U.S. Some of the likely gains from the partnership with U.S. are as given below:

- Assured and uninterrupted supply of fuel to reactors under the IAEA safeguards
- Access to latest reactors will help to meet the urgent short-term energy requirements
- Strengthening India's negotiating position with the Nuclear Supply Group (NSG)
- Facilitation of India's participation in multilateral research into nuclear technology
- Opening of options to enhance capacity through high output plants (1000 MWe), including through private participation and foreign investment.

While political hurdles have stymied its progress, early conclusion of the agreement will fast track India's nuclear program by making parallel options available to use natural and enriched uranium.

**Public- Private Partnership in Commercial Civilian Nuclear Energy**

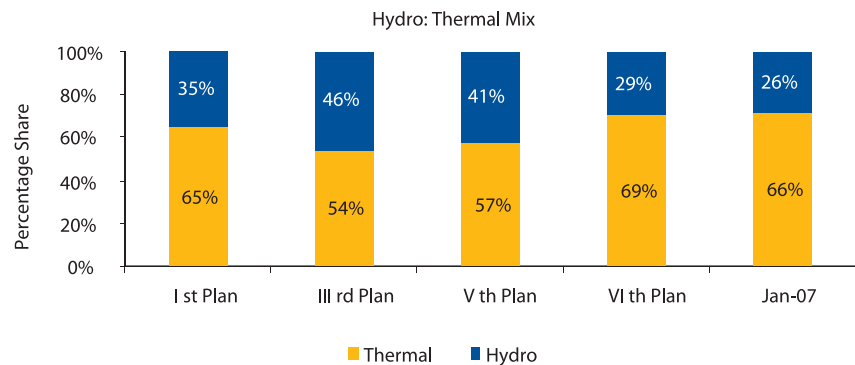
Prior to any form of private participation, an amendment to the Atomic Energy Act, 1962 - which forbids private investments in nuclear power generation - will be necessary. The government is seriously considering the opening up of the non-strategic components of its nuclear programme including opportunities to enter into JVs with the public sector in power generation. The conclusion of the civilian agreements is expected to throw up more opportunities. However, the private sector will face challenges in the following areas:

- Managing the decommissioning of the nuclear plant
- Spent fuel storage and subsequent fuel resource management procedures
- Unlimited liability in the event of a nuclear accident can cause serious financial implications.

# Hydro



India has a very large, viable and exploitable hydro-electric potential, estimated at around 150,000 MW (84,000 MW at 60 percent load factor) compared with an installed capacity of 33,941 MW. The Ministry of Power has undertaken several initiatives to increase the share of hydel in the fuel mix, including the Prime Minister's 50,000 MW Hydro-Electric initiative.



Source: [www.cea.nic.in/InfraLine](http://www.cea.nic.in/InfraLine)

## Key Issues

The following are the key issues for public and private sector investment in this sector:

- **Funding:** Hydel projects involve low life time generation costs, but high initial costs. There is a proposal to fund Central projects by levying a 'power development cess'
- **Geological risks:** 'Geological surprises', often seen after the beginning of construction pose additional risks, which need advanced scientific techniques for mitigation
- **Long delays in obtaining clearances:** Large lead times in obtaining clearances at various stages pose a big challenge. The government has proposed to address this by incubating projects through Public Sector companies at the clearance stage, prior to offering them to the private sector. A mechanism to transfer clearances already secured for non-starting hydro projects to fresh projects is also urgently required.

## Policy and Regulatory Framework

Some key policy initiatives undertaken by the Central Sector are as follows:

- Rationalization of Hydro Tariff: Recognizing difficulties in executing hydro projects, the government has decided to rationalize tariff norms, incentivising efficient operation
- Estimates on Completion Cost (Geological Risks): Completion of projects often involve geological and hydrological risks, cost escalation and natural occurrences of land slides, rock falls, etc. The developer will be able to re-submit such costs for tariff calculation
- Promoting Hydro Projects with Joint Ventures: Renewed emphasis is seen on the JV schemes with private partners, with relaxation of several rules related to the sharing of power
- Support for Acquisition: The state government is completely responsible for land acquisition and any additional costs to the developer will be passed through in tariffs
- Three stage approval process: To rationalize time and costs for setting up hydro projects, the government has introduced a three stage process involving pre-feasibility investigation, pre-construction activity (DPR and acquisition of land) and final approval and execution
- Policy and guidelines: Guidelines to equitably distribute benefits have been framed. While the states hosting the projects will secure 12 percent power for free, surplus power will be made available to deficit states. The introduction of a new hydro power policy is likely to increase investor interest, while addressing several concerns – including abolition of a tariff based competitive bidding process, which has been pointed out as unsuitable for this sector.

## The India Opportunity

In spite of having the 5th largest hydro potential in the world, India's utilization is low (17 percent) as compared to advanced countries having more than 30 percent. The largest potential<sup>32</sup> for development exists in the basins of the rivers Brahmaputra and the Indus. Under the PM's new initiative, pre-feasibility report for 162 new schemes in these areas with a capacity of 47,930 MW have already been prepared. Increased private participation, currently only at 3 percent is crucial to meet the ambitious targets. In addition, 56 pumped storage projects with an

<sup>32</sup> <http://www.nhdindia.com/avd.html>

installed capacity of 94,000 MW and 1512 small, mini and micro projects with a capacity of around 6782 MW have also been identified. In remote hilly areas, where an extension of grid system is uneconomical, small and mini hydel projects hold out much promise. Presently, there is an installed capacity of 1423 MW in 420 such hydro projects (upto 25 MW station capacity). In addition to the existing 187 projects, around 521 MW are presently under construction. In total, there is an estimated potential of about 15,000 MW of small hydro power projects, over 4096 sites in the country. Various incentives for participating in the three stage process, including capital and interest subsidies are available for projects in the North-Eastern region.

#### **Manufacturing Base in India**

India has a reasonably well-established manufacturing base for the full range of small hydro equipment. There are over eight manufacturers in the country in the field of small hydro, supplying various types of turbines, generators, control equipment, etc.

# Renewable Energy



Renewable Energy Sources (RES) are an important element of India's power policy aimed to meet the power needs of remote areas in an environmentally friendly way. Certain forms of renewable energy sources (such as wind energy, small-hydro and biomass) have taken off. Strong private participation is seen in sectors like wind power, in response to the policy and initiatives.

## Key Issues Facing the Sector

The major issues currently being faced by the renewable energy sector are as follows:

- High capital costs and low plant factors raise the cost of renewable energy, which discourages adoption by financially weak state governments. However, technological evolution and the huge power deficit make renewables an active choice for power utilities
- Private sector interest is dependent on regulatory certainty on tariff and other conditions
- Increased competition for land use in certain renewable technologies need to be managed
- Lack of grid presence or transmission capacity in remote areas where renewable energy opportunities exist, is a major constraint in power evacuation.

## Policy and Regulatory Framework

Some of the key legislative, policy and other measures initiated by the various stakeholders for promoting RES are:

- The Electricity Act requires that for State Commissions to fix a minimum percentage for the purchase of energy from renewable energy sources
- The policy recognizes that renewable energy sources should be offered preferential tariffs till they can evolve and compete with other conventional sources
- Generation and distribution in notified rural areas have been de-licensed
- Fiscal benefits and financial support has been extended to interested investors



- A number of fiscal benefits in form of duty exemptions, income-tax holidays, accelerated depreciation norms, etc have been extended. In addition, Indian Renewable Energy Development Agency has also been extending financial support to interested investors.

## The India Opportunity

India has an enormous potential of renewable energy across the various sources as indicated in the table below.

RES	Potential <sup>33</sup>	Existing Installed Capacity*
Wind	45000 MW	~ 7660 <sup>34</sup> MW
Small Hydro (upto 25 MW)	15000 MW	~ 1850 MW
Biomass power / cogeneration	19500 MW	~ 950 MW
Solar Photo Voltaic Power	50,000 MW(20 MW/sq.km)	~ 30 MW Very low exploitation.
Solar Water Heating	140 million sq. m collector area	1.5 million sq. m collector area
Urban and Industrial Waste-based power	70000 MW	~ 34.95 MW.
Biogas plants	12 million	3.8 million
Improved Biomass Chulhas (Cooking-Stoves)	120 million	35.2 million

Source: *Infraline*

The current installed capacity of around 9,220 MW<sup>35</sup> constitutes about 7.3 percent of India's total installed generation capacity. Given the low utilization percentage, there is an exciting opportunity for various participants, including generator and equipment manufacturers.

- **Wind** : India has the 4<sup>th</sup> largest wind energy potential in the world. Given the technological evolution and supply shortages, growth prospects and investor interest continues to be good. Access to technology and availability of wind sites will be crucial factors for new entrants. India could also become a manufacturing hub for turbine components

<sup>33</sup> Source: MNRE website

<sup>34</sup> Source: As on 30th Sep., 2007 (as per the Minister's reply in Rajya Sabha on 26th Nov, 2007)

<sup>35</sup> Source: Presentation by MNES



- **Solar** : Solar Energy is another promising space. Globally, costs of electricity generated by solar Photovoltaics (PV) have been falling. Given the high solar incidence in India, and the need to electrify vast remote off-grid areas, India is set to become a huge market for solar energy. Government subsidies will be crucial in order to ensure affordability in off-grid locations
- **Bio Mass** : The vast agricultural base holds out a huge potential for biomass based power generation. This would depend on innovations in fuel supply chain, in sourcing of agricultural residues and wastes and optimizing the logistics cost
- **Small and Mini Hydel** : Potential for small and mini-hydel (defined as less than 25 MW) is also large and is mainly confined to the hilly states of the north and north-east part of India. Knowledge of the local situation and access to good sites are needed to minimize the risks
- **Bio Fuels**: To encourage bio-diesel and ethanol, the government has already announced norms for ethanol blending and have announced fiscal benefits. State governments have announced land at discounted rates for promoting plantations for bio-diesel. In view of the policy measures, several oil majors have already announced intentions to enter this space.

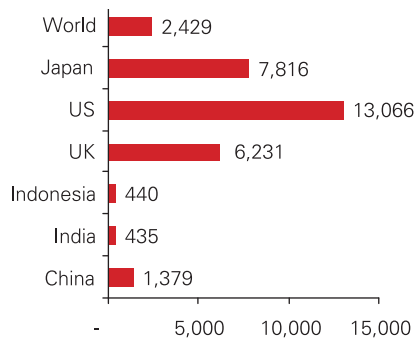
# Electricity



The electricity sector in India falls under the concurrent jurisdiction of the Central and State governments. In most Indian states, vertically integrated State Electricity Boards have now been unbundled into state-owned Generation, Transmission and Distribution companies. While only around 10.6 percent of the installed capacity is in the private sector, private distribution licenses have been awarded in the state of Orissa and in some cities like Delhi, Kolkata, parts of Mumbai, Ahmedabad and Surat in the western state of Gujarat.

## Demand Supply Position and Expected Trends

**Exhibit 9.1: Per capita consumption KWh, 2003**



Source: IEA

The projected elasticity of electricity w.r.t. GDP is 0.95. With this, the growth rate in electricity consumption is expected to be 7.6 percent. The per capita consumption presently stands at 606 kWh<sup>36</sup> (2005), far below the world average of 2,429 kWh. With an 8 percent GDP growth, the per capita consumption of India in 2032 is estimated to be 2,643 kWh, which is just comparable to the present day world average.

With an installed capacity of 132 GW, the country currently faces an energy shortage of 8 percent and a peak demand shortage of 11.6 percent. In order to sustain a growth rate of 8 percent, it is estimated<sup>37</sup> that the power generation capacity in India would have to increase to 227 GW by 2012 and to 317 GW by 2017. On the transmission side, there is a proposed increase of inter-regional capacity to 37 GW by 2012 from the existing 17 GW.

## Key Issues Facing the Sector

- **Inadequate Generation and Transmission Capacity:** There is an estimated shortfall of 15 percent in generation capacity in the sector. Inadequate transmission capacity leads to an inability of meeting regional deficits from surpluses elsewhere
- **Financial Losses:** The power sector faces revenue losses of around USD 6 billion per annum due to under-compensation from state government for heavy and poorly targeted subsidies, and high levels of network losses (30-40 percent) due to theft, pilferages, non-collection of dues and also due

<sup>36</sup> Ministry of Power, Government of India

<sup>37</sup> The India Electricity Market Outlook Report, 2007, KPMG

to transmission losses over long low voltage lines. Over time, such losses have accumulated, leading to a drastic degradation in the financial capacity of the SEBs. This situation in turn leads to their poor capacity for escrow and payment security, acting as a major constraint for attracting private capital

- **Poor Quality of Supply:** Capacity constraints are also affecting the quality of output, leading to planned and unplanned interruptions and deviations in voltage and frequency from prescribed parameters. There has been some improvement in these parameters in recent years, owing to penalties and incentives for utilities for deviations
- **Lack of availability of fuel:** Shortages in the availability of coal and gas have resulted in under-utilization of power generation plants.

### Policy and Regulatory Framework

The policy framework for the power sector, hinges on bringing in competition, private sector participation, independent regulation and removal of government interference. As a concurrent subject, both central level and state level jurisdiction are now in place spurred by the Electricity Act, 2003. Clear guidelines are also to be found under the National Tariff Policy, National Electricity Policy and the Rural Electrification Policies.

On the regulatory front, the Central Electricity Regulatory Commission (CERC) is responsible for all matters involving more than one state, whereas the State Electricity Regulatory Commissions (SERC) oversees intra-state affairs. An independent appellate tribunal has also been setup. In addition, the Central Electricity Authority (CEA) under the Central Government is responsible for power planning and for according approvals for large hydro projects.

With a view to bring in greater competition, policymakers have adopted the following measures:

- Private sector generation will be contracted through the competitive bidding route. It is planned to extend this policy to include the public sector in five years. Pricing will be regulated only in cases where competitive bidding has not been adopted
- Open access on the common carrier principle is allowed on transmission networks and is being phased in on distribution networks, enabling competition for bulk and retail supply to large consumers. While such access is subject to bearing a share of the cross-subsidy burden on the incumbent state utilities, the National Electricity Policy has observed that the amount shared should not be so onerous that it eliminates competition. The national tariff policy also requires reduction and better targeting of government subsidies



- Parallel competitive distribution networks are being provided for, albeit only in areas where the existing network is in a very poor state and the consumer profile is favourable
- Allowing 100 percent FDI in non-nuclear generation, transmission, distribution and trading.

The government should strengthen steps to reduce the lead time for securing multiple clearances and encourage greater transparency in tying up fuel linkages for independent power projects.

## The India Opportunity

### Generation

The private sector has huge opportunities to fulfill the demand-supply gap. Several projects generate and sell power mostly through long-term contracts with distributors, and some also through the open access route directly to large consumers. Surging power prices in the bulk power segment and the evolving power trading market further encourage merchant plants. However, there is still a preference towards long term PPAs with distributors, due to the prevalence of supplier discrimination in the spot market. The Government has initiated the process of awarding upto Nine Ultra Mega Power Projects (projects of size greater than 4,000 MW) through competitive bidding to private players. The bids for Sasan, Mundra and Krishnapatnam plants, have been quite successful in extracting very low prices for power.

Allowing captive coal mining, and fiscal concessions for large power projects, (including waiver of customs duty), make private generation a very attractive opportunity. The government has identified a capacity addition of 76,460 MW by 2012 from both public and private sectors. If additions in capacity take place as planned, it is estimated that supply constraints will cease to exist beyond 2015-17, implying a mature market, dominated by early entrants. The government is now taking a fresh look at the entire value chain, and has framed a policy that is more conducive to the IPP players, with a whole gamut of measures including opening up of distribution franchising, grid-interlinking, increased transmission capacity, open access, power trading and creation of a power exchange.

### Transmission

Private players can either invest in 100 percent private Independent Power Transmission Company (IPTC), or take a minority stake in a joint venture with state-owned companies. A national Grid<sup>38</sup>, estimated to cost around USD 4.4 bn, with both forms of private participation is also being planned. However, issues relating to payment security, obtaining right of way (ROW), and securing clearances need to be addressed to encourage private investment in this segment. Similar to UMPP projects, there have been recent efforts to award large transmission projects on a tariff based competitive bidding basis.

<sup>38</sup> Formation of the National Grid is a plan for strengthening of the inter-state and inter-regional transmission network that will enable unrestricted flow of electricity across regions and enable development of a deep electricity market in India

### **Distribution**

Privatization of existing entities faces several operational, regulatory, information and political risks. Recent policy initiatives provide adequate signals to make this segment more attractive to the private players. In the near future, privatization is expected to be focused on franchising of specific areas of operation as in the case of Maharashtra, distribution in select urban areas following the recent Delhi example, and in setting up parallel distribution utilities in specific areas<sup>39</sup>. Good packaging of the distribution areas, in terms of load profile and consumer mix, due diligence to ensure reliability and saleability of baseline data and well defined improvement trajectories in line with the international standards on the commercial and operational front, are required to make private involvement a success.

### **Trading**

Investment opportunities in power trading have been growing due to the following:

- Allowing open access in generation and transmission to large consumers
- 100 percent FDI in power trading, promising greater depth and maturity of the trading market
- The government's efforts to enhance transmission capacity and setting up of National Grid
- Power traders are better managers of payment risks and demand uncertainties, and there is a growing trend to sell power to traders in preference to financially weak distributing entities
- With rising short term prices, there is a good potential to earn larger returns in trading. However, the regulation of trading margins is being debated at present.

The issue of guidelines from the Central Regulator and efforts to set up a power trading exchange are important steps to bring in depth, transparency and structure to this segment.

<sup>39</sup> However, to be specified by the Commission



### **Energy Savings and Demand Side Management**

An ADB study in 2003 has estimated that there is a potential of energy saving of around 54,500 million kWh (16 percent of total demand) and peak saving of 9,240 MW, which involves an investment potential of over USD 3 billion, with additional savings potential in reducing auxiliary consumption in generation plants. Generation of carbon credits through the emission cuts, will also help in financing these investments. Some aspects which need attention in order to encourage Energy Efficiency (EE) are:

- Allowing the utility to retain the achieved savings by implementing EE
- Developing novel financing mechanisms for funding EE for energy service companies
- Consumer awareness through mandatory EE labeling on all high energy consuming equipments
- Setting of load research centres with the regulators so that scientific load research is carried out at the equipment level.

### **Equipment Manufacturing**

The large growth needs implies growing demand for generators, lines and equipment, meters, etc. While it is estimated that the existing manufacturing capacity in the country can support an addition of about 6,000 MW of capacity, the future requirement is 15,000 MW every year for the next ten years.

## About Confederation of Indian Industry (CII)

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the growth of industry in India, partnering industry and government alike through advisory and consultative processes.

CII is a non-government, not-for-profit, industry led and industry managed organisation, playing a proactive role in India's development process. Founded over 112 years ago, it is India's premier business association, with a direct membership of over 7000 organisations from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 90,000 companies from around 362 national and regional sectoral associations.

A facilitator, CII catalyses change by working closely with government on policy issues, enhancing efficiency, competitiveness and expanding business opportunities for industry through a range of specialised services and global linkages. It also provides a platform for sectoral consensus building and networking. Major emphasis is laid on projecting a positive image of business, assisting industry to identify and execute corporate citizenship programmes. Partnerships with over 120 NGOs across the country carry forward our initiatives in integrated and inclusive development, which include health, education, livelihood, diversity management, skill development and water, to name a few.

CII's theme of 'Building People, Building India' puts the spotlight on Human Resource Development: making people more efficient, entrepreneurial and innovative, to make India and Indian industry even more competitive, across all sectors of the economy and all sections of society, at all levels – Global, National, Regional, State and Zonal.

With 62 offices in India, 8 overseas in Australia, Austria, China, France, Japan, Singapore, UK, USA and institutional partnerships with 271 counterpart organisations in 100 countries, CII serves as a reference point for Indian industry and the international business community.

### **Summit Website:**

<http://www.energyexpo.biz>



## About KPMG in India

KPMG is the global network of professional services firms of KPMG International. Our member firms provide audit, tax and advisory services through industry focused, talented professionals who deliver value for the benefit of their clients and communities. With nearly 113,000 people worldwide, KPMG member firms provide services in 148 countries.

The member firms of KPMG International in India were established in September 1993. As members of a cohesive business unit, they respond to a client service environment by leveraging the resources of a global network of firms, providing detailed knowledge of local laws, regulations, markets and competition. We provide services to over 2,000 international and national clients, in India. KPMG has offices in India in Mumbai, Delhi, Bangalore, Chennai, Hyderabad, Kolkata and Pune. The firms in India have access to more than 2000 Indian and expatriate professionals, many of whom are internationally trained. We strive to provide rapid, performance-based, industry-focused and technology-enabled services, which reflect a shared knowledge of global and local industries and our experience of the Indian business environment.

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