Analysis of Power Sector in India: A Structural Perspective

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The inhibitors to growth in power sector were many—small and big but the main roadblock in the growth path was Government Policy, which made it difficult or rather impossible for a private player to enter. This further aggravated the problem that Indian entrepreneurs didn't have enough knowledge and experience in developing power projects. To worsen the scenario, the SEBs and other Government Agencies became financially weak to propel any future expansion or growth in the sector. Electricity Act, 2003 was a major step in solving the above underlying problems of the power sector. A whole new system was evolved where private players were invited to be an active participant. The system demanded financial, political and other infrastructural growth—with major requirement in roads and communication. Some of the bold steps taken in the Act were moving generation and distribution out of 'License Raj' regime, opening access to national grid and demolishing the 'Single Buyer' model. The failure of the huge federal structure and the changing global scenario have forced Government to think of ways to revive this fundamental infrastructure sector. Two of the avenues that government can count on for future growth of this sector is "Midgets or Small Power Plants" and "CDM—Clean Development Mechanism".

India and Infrastructure

With traditional government controlled vertically integrated monopoly giving way for new multi-player market-driven scenario, the opportunity in power sector attracted entrepreneurs into the sector. The ever-growing demand gap asked for addition of 1000 MW generation capacity per year. These forces coupled gave rise to different strategies that were new to the sector. One of the fast growing strategies that attracted a lot of players was—Small Power Plants or 'Midgets'.

State treasuries were empty and debt was already killing loss making state run power units. The lack of internally generated funds and the inability of treasuries to provide funds have resulted in severe shortages of capital for expanding generating capacity[1]*.* Governments (central and state) and utilities hoped to solve these capital scarcity problems with an influx of private capital. It was also believed that the indigenous private sector might not have the necessary capital, as the foreign exchange component of funds required by the power sector could be large.

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[1] http://www.ieiglobal.org/ESDVol5No2/indianreform.pdf

The target of keeping the power sector under tight government regime was to have proper access, equity and distribution of power to various sections of society. The socialist dream didn't materialize, the benefits of electricity have not reached the whole population—a significant fraction of the population (particularly the rural poor) does not have access to electricity. At the same time, some consumer categories, not necessarily the poorest, are given subsidized electricity. Benefits are skewed in favor of certain categories of consumers (e.g., irrigation pump set owners). Agriculture consumes almost one third of the power in India, yet provides less than 5% of the revenues.

NIMBY (Not in My Backyard) Syndrome is a major concern in India, which is unique as far as developing nations are concerned. These concerns are focused on pollution from coal-based thermal plants, on the various problems of nuclear plants such as reactor safety, the NIMBY (Not in my backyard!) syndrome, low-level radiation and disposal of high-level wastes, and on the negative impacts of hydroelectric plants including the displacement of people, the submergence of forests and situation. There are also concerns about global warming impacts of energy production and use.

The hardship of the state controlled power units, due to lack of fresh capital, environmental concerns and inability of these units to meet the socialist agenda, forced government to open the floodgates and allow private participation. A number of policy initiatives have been taken since 1991 for encouraging private investment in power sector with a view to streamline the procedure and delegation of power for early implementation of projects.

Mega Power Plants' high investment requirements is the first major inhibitor. Non-availability of reliable customer, NIMBY syndrome, political pressure, technological risk and long development and set-up time are the other causes that deter entrepreneurs from this option. To add to the fear are the burning examples of Dabhol, Tehri, Naptah Jakhri and many others.

The negatives of Mega Power Plants lead private players to look for alternatives and there came in Midgets or Small Power Plants. Midgets are relatively less capital intensive with added advantage of less political pressure, small gestation period, less NIMBY hassles and as generation is small we can have our own tie-ups with individuals, corporations and other parties or consumers.

Government also favored this concept as it would help to have a distributed network of plants which would help it to reach larger area and utilize small pools of energy resources like gas wells, lignite mines and high wind zones. The idea of Midgets was further propelled with the latest technological advancements in the areas of small engine and turbine technology.

All the above logic and citations clearly lead us to the fact that Indian Power Sector is going under a major revamp of ideology. The paradigm of 'Goliaths' has started withering and 'Midgets' are gaining ground. The future looks promising and full of light.

India Shining

"In the past our growth rates of Gross Domestic Product (GDP) have been such as to double our per capita income over a period of nearly 20 years. The changing world scenario—political, economic, social and cultural has proven to all of us that such a growth rate will reduce India's stature in the world and put it in the receiving end of the game."[2]

Reacting to the above fears and recognizing the importance of making a quantum jump compared with past performance, Planning Commission started examining the feasibility of doubling per capita in the next ten years and stated that "with population expected to grow at about 1.6% per annum, the target requires the rate of growth of GDP to be around 8.7% over the Tenth (2002-2007) and Eleventh Plan (2007-2012)".

The approach paper to the Tenth Plan admits that 8 to 9% annual growth target for the next ten years is technically feasible, but, that it could not be achieved through a "business as usual" approach—'Radical Changes' are necessary. "The principal reason why 8% growth may be feasible in the Tenth Plan is that the scope for bringing about improvements in efficiency is very large, both in the public sector and in the private sector"[3]

Infrastructure—The Growth Imperative

The basic requirement and detrimental factor for growth and success of all companies—industrial or service—is Infrastructure. The infrastructural sectors—transport, power and telecommunication—have direct bearing on the improvements of all production companies. Industrial output growth in India has closely tracked the movements in the composite index of infrastructure industries during 1980s and 1990s [Figure 1]. This observed relationship between infrastructure growth and industrial performance has important implications for sustaining higher output growth.

The decline of infrastructural growth between 1980s and 1990s was mainly from the decline in growth of electricity, coal and petroleum—essentially the energy sub-sectors. Thus, identification and bridging of the sectoral infrastructure gaps assumes critical importance for sustained high economic growth.[4]

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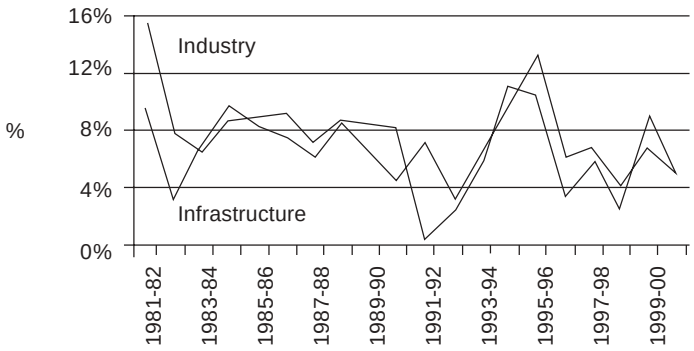
[2] As stated in 'Reliance Review of Energy Markets' in reference to existing Indian Growth Scenario.
[3] Statement by Planning Commission in Tenth Plan (2002-2007).
[4] As inferred in 10th Plan Approach Paper, Planning Commission.

Figure 1: Industry and Infrastructure Growth Relationship



Source: Reliance Review of Energy Markets, 2002

Power Sector in India

Introduction and Overview

Among the important sectors—transport, power and telecommunication—power sector has shown significant and sustained gaps for long. The poor performance of SEBs, with increasing financial strain emanating from low average tariffs and high cross subsidies to agriculture and household sectors have stifled the growth of this sector.

According to Tenth Plan approach paper, "The energy infrastructure will be major constraint on any effort to achieve a significant acceleration on the growth of GDP in Tenth Plan period … This will place heavy demands on the generation and distribution of electric power. Furthermore, in globally competitive environment, the quality of these services in terms of both price and reliability are as important as availability and it is well-known that we face serious problems on both counts."

But fundamental issues—such as frequent power cuts, both scheduled and unscheduled, erratic voltage and low or high supply frequency have added to 'power woes' of the consumers[5]*.* The Indian Power industry has since independence faced the demand and supply gap [Figure 2]. The said gap is still prevalent even after government initiated the reform process in early nineties. The graph below shows the current region-wise deficit.

Roadblock to Power Sector Development

Some of the factors responsible for present situation are as under:

- Lack of focus and absence of a clear-cut policy (e.g. Government of India's initial attempt at promoting projects based on liquid fuel like naphtha which turned nonviable, mega projects which could not take shape etc.).

[5] http://www.worldenergy.org/wec-geis/news_events/member_news/comm_power.asp

Figure 2: Demand Supply Gap of Electricity in India

Year-wise Peak Demand and Peak Met in India (1996-97 to 2002-03)

(In Million Units)

Year	Peak Demand	Peak Met	Shortage	Shortage
1996-97	63853	52376	11477	18.0%
1997-98	65435	58042	7393	11.3%
1998-99	67905	58445	9460	13.9%
1999-00	72669	63691	8978	12.4%
2000-01	78037	67880	10157	13.0%
2001-02	78441	69189	9252	11.8%
2002-03 (April 2002-January 2003)	**81492**	**71520**	**9972**	**12.2%**

Source : Annual Report 2002-03, Ministry of Power and Past Issue, Government of India

- Lack of exposure of Indian entrepreneurs to the Indian power sector, which limited their perspective on developing and operating power projects.
- Inexperience of SEBs in operating in the changed market environment and their poor financial health, which limited their escrow capacity.
- Unavailability of fuel and unwillingness of fuel suppliers to enter into bankable contracts.
- Lack of necessary infrastructure to transport and store fuel and high cost risk involved in transporting fuel.
- Limited financial capability of the promoters to bring equity.
- Weak financial condition of SEBs was the biggest roadblock for sector's development. [Figure 3]

Due to un-remunerative tariffs and irregular payment of subsidies by state governments, SEBs have not been able to invest in capacity additions and system upgradation. Also SEBs have not been able to make full payments for the purchases, and therefore their creditworthiness is questionable.

The Government has realized the importance of power in the economic development of the country. The Union Ministry of Power has developed appropriate strategies and a blueprint to address the problems in a time-bound manner. These strategies and the blueprints are flexible and can be adjusted to accommodate positive inputs and developments.[6]

[6] As stated in Blueprint for Power Sector Development, 1991, by Ministry of Power.

Figure 3: Financial and Operating Performance of State Electricity Boards

Fiscal Year	Rate of Return (%)	Gross[a] Subsidy (Rs. Billion)	Cost of Supply (Paise/kWh)	Average Tariff (Paise/kWh)	Agriculture Tariff (Paise/kWh)	Cost Recovery (%)	T&D Losses (%)
1994	-12.3	111	149.1	116.7	17.9	78.3	20.2
1995	-13.1	135	163.4	128.0	18.8	78.3	21.1
1996	-16.4	168	179.6	139.0	19.0	77.4	22.3
1997	-19.6	200	215.6	165.3	21.2	76.7	24.5
1998	-22.9	243	239.7	180.3	20.2	75.2	24.8
1999	-34.2	288	263.1	186.8	21.0	71.0	26.5
2000	-43.1	328	305.1	207.0	22.6	67.8	30.8
2001	-39.1	370	327.2	226.3	35.4	69.2	29.9
2002	-44.1	427	349.9	239.9	41.5	68.6	27.8

T & D = Transmission and distribution.

[a] Subsidy to agriculture and residential customers.

Source: Annual Report on Working of State Electricity Boards and Electricity Departments. Planning Commission.

In line with the above strategies and to offer a much needed momentum to the sector, Government of India, introduced Electricity Act, 2003 (hereinafter referred to as the "Act"). The Act is expected to act as a strong business driver by not only ushering in competition in the power sector but also inducing structural changes. Its provisions can create new business opportunities as well as build new capabilities within the existing business organizations.

Electricity Act, 2003—The Booster

The 'Act' provides for:

(a) Generation of electricity is free from licensing,

Impact[7]: More industries will be encouraged to setup captive power plants. Also, the time required for setting up a power plant—from the proposal to the completion stage—will be shortened considerably.

(b) Captive generation freely permitted, for both or a one-to-one basis, as small as or a group captive basis.

Impact: Captive Power Plants (CPPs) will be allowed to use power not only for captive use but also to sell to other licensees. This will allow captive generators to sell excess power at more remunerative prices than before, and thus raise the capacity utilization to existing plants and also encourage new capacity addition.

(c) Open access for captive use on payment of wheeling charges.

Impact: This will allow open access to transmission lines, thus allowing them to bypass the SEBs and sell power directly to the distribution and trading licensees.

[7] As discussed and understood by us during our discussion with various officials of KSK.

(d) Consumers would have a right for non-discriminatory open access to transmission/distribution network subject to payment of surcharges to meet current level of cross subsidy as well as the applicable wheeling charges.

Impact: With this freedom to buy and sell power, initially in the wholesale market and eventually in the retail market, the end-user will benefit both in terms of choice of supplier and reliability of supply.

(e) Stand alone Generation/Distribution of Electricity for Rural areas Permitted.

Impact: This will allow potential private entrants to enter the distribution business, while putting pressure on incumbents to enhance performance and customer service.

(f) Mandatory purchase of power from renewable sources by the distribution licensee.

(g) Single Buyer model is completely abolished.

Impact: This will bring competition in the industry. Competition among players will also enhance efficiency and led to better customer service standards.

The Sector Setup

The organization of power sector is determined by the country's federal structure. In India, the subject of electricity is covered under the Concurrent List in the Constitution of India, implying that both the central government and state governments have the power to make legislation for the sector. As a result, all major issues affecting the power sector require concurrent action by the central government and state governments.

The Government's Ministry of Power provides overall guidance to the sector through the Central Electricity Authority. The recently established Central Electricity Regulatory Commission is empowered to regulate the central power utilities in accordance with the Electricity Regulatory Commission Act, 1998. The central power utilities include the National Thermal Power Corporation (NTPC), the National Hydroelectric Power Corporation (NHPC), and the Nuclear Power Corporation (NPC), which are engaged in generation, and the Powergrid Corporation, which is engaged in interstate power transmission. The Government also owns financing institutions devoted solely to power sector lending such as the Power Finance Corporation Limited (PFCL) and the Rural Electrification Corporation. Recently, the Government established the Power Trading Corporation (PTC), to be responsible for power trading among states and between states and central power utilities.[8] At the State level we have SEBs and EDs responsible for their respective jurisdiction areas' power generation, transmission and distribution. (See Box 1)

[8] As described in the official website of Ministry of Power, Government of India, at www.powermin.nic.in

Box 1: The Organization of Power Sector in India
At the state level, the state governments control the sector through 21 State Electricity Boards (SEBs) and 14 Electricity Departments (EDs). These SEBs and EDs are responsible for generation, transmission, and distribution, usually within their own states and territories. The central power utilities own and operate 30% of the country's total generation capacity, while SEBs and EDs have 59% of the total. In addition, five privately owned utilities, operating in certain urban centers and responsible for power distribution within their franchised areas, and some independent power producers have a share of 11% of the generation.
Source: Reliance Review of Energy Markets, 2003

The existence of huge demand supply gap clearly indicates the inefficiency of the mammoth organizational setup of the Indian Power Sector [Figure 4]. On critical analysis of the setup, we found that the inefficiency is caused as most of them have overlapping functions. The involvement of State Government in this sector has further complicated the issue, each state has developed its own electricity policy and pricing based on its own interest rather than thinking of country as a whole. The different pricing regimes and distribution policies of state governments further aggravated the power situation.

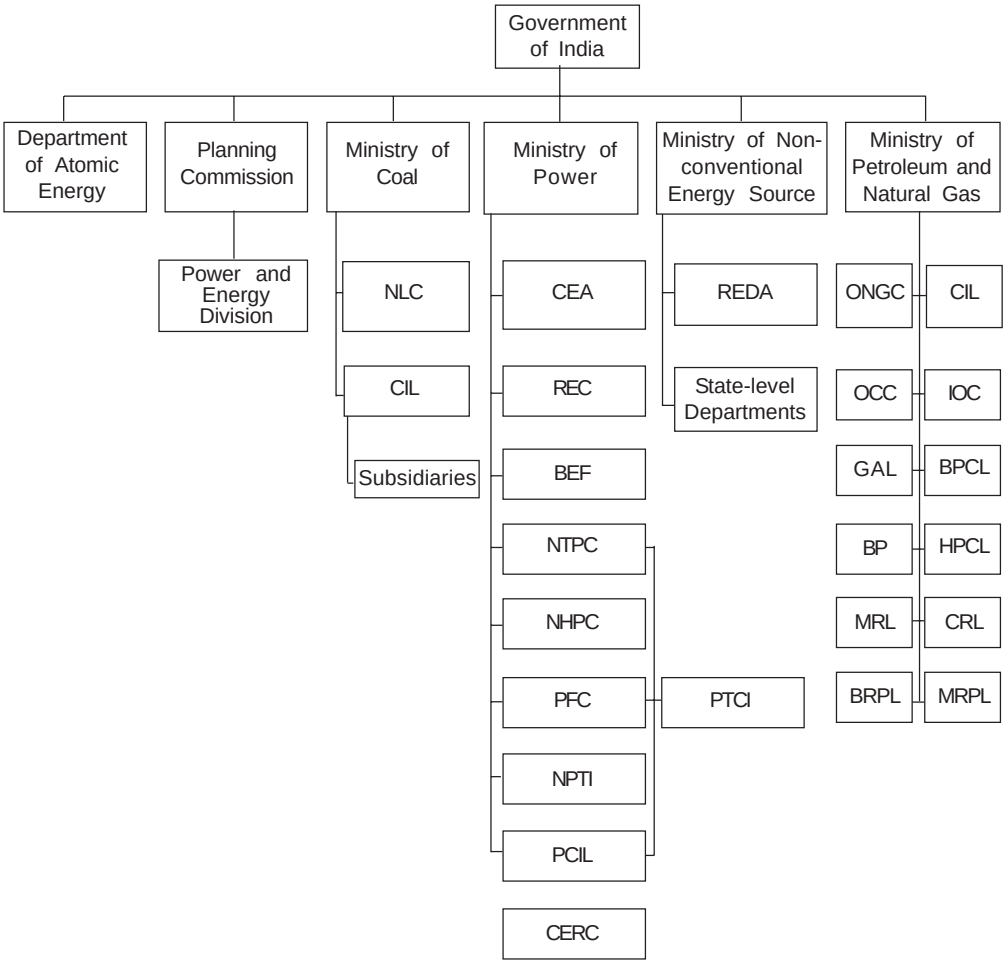
The failure of the huge federal structure and the changing global scenarios have forced Government to think of ways to revive this fundamental infrastructure sector. Two of the avenues that government can count on for future growth of this sector are "Midgets or Small Power Plants" and "CDM—Clean Development Mechanism".

The Rise of Midgets in the Indian Power Sector

For the major part of the previous century, the traditional school of thought considered power generation, transmission and distribution as a natural monopoly. Electricity was viewed as a national strategic asset and hence, best provided by a vertically integrated monopoly, usually owned and directly controlled by the state. Even in cases where the monopoly providers were private players (as in the US), the state still maintained tight control through heavy-handed regulatory policies and measures.

Monopoly and state control of the sector became highly questionable around the globe in the last two decades. Cry for reduction of government participation and interference in industry coupled with fiscal deficit forced in a strategic reshaping of the sector [Figure 5]. The forerunner of the race was Chile followed by Argentina. The real momentum making this restructuring a global phenomenon was given by UK when it embarked on its ambitious privatization reforms. The wave since then has swept countries like US, Japan, Norway, Netherlands, Canada, France and Australia. This paper aims at studying the effect of the wave in the context of India.

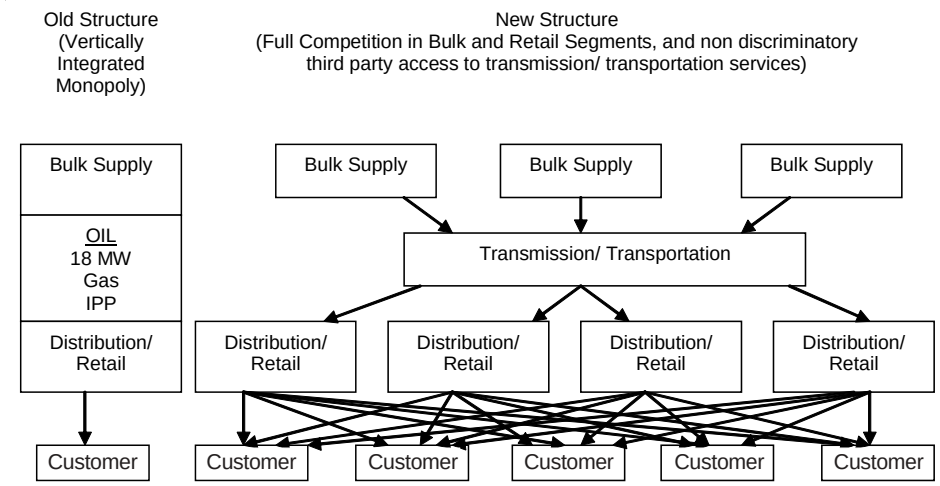
Figure 4: Indian Power Sector's Organizational Setup



BPCL: Bharat Petroleum Corporation Ltd
BEF: Bureau of Energy Efficiency
BRPL: Bangalore Refinery and Petrochemicals Ltd
CEA: Central Electricity Authority
CERC: Central Electricity Regulatory Commission
CIL: Coal India Limited
CRL: Cochin Refineries Ltd
DAE: Department of Atomic Energy
GAIL: Gas Authority of India Ltd
HPCL: Hindustan Petroleum Corporation Ltd
IOC: Indian Oil Corporation Ltd
IREDA: India Renewable Energy Development Agency
IBP: Indo-Burma Petroleum Company Ltd
MRL: Madras Refineries Ltd
MRPL: Mangalore Refinery and Petrochemicals Ltd
MNES: Ministry of Non-conventional Energy Sources
NHPC: National Hydro-electric Power Corporation
NLC: Neyveli Lignite Corporation
NPTI: National Power Training Institute
NTPC: National Thermal Power Corporation
OCC: Oil Coordination Committee
OIL: Oil India Limited
ONGC: Oil and Natural Gas Corporation
PCIL: Powergrid Corporation of India Ltd
PFC: Power Finance Corporation
PTCI: Power Trading Corporation of India Ltd
REC: Rural Electrification Corporation

Source: www.powermin.nic.in

Figure 5: Changing Structure of Energy Industry



Source: Reliance Review of Energy Markets, 2002

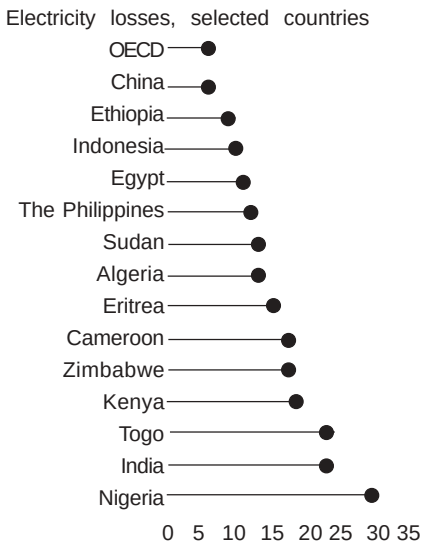
Electricity consumption in India has more than doubled in the last decade, outpacing economic growth. The primary energy supply in the country is coal-dominant with the power sector accounting for about 40% of primary energy and 70% of coal consumption. It is also the single largest consumer of capital, drawing over one-sixth of all the Indian investments over the past decade[9].

Fuelled by high coal and investment consumption, India's power sector has grown 80-fold since independence to over 107,000 MW but the per capita power consumption is very low, approximately 350 kWh/year [Tongia,2004]. This number is not precisely known, since a significant fraction of the consumption is unmetered, and there is a large proportion of theft. Ostensibly, transmission and distribution (T&D) losses are about 25% [Figure 6], but only some fraction of the losses are technical losses; the theft is bundled together as "commercial losses." The fundamentals are very poor—with every kWh sold, the utilities lose over 1.1 rupees[10] on average. This results in enormous losses for the utilities and the government, despite billions of rupees in explicit and implicit subsidy. One major reason for the system's non-viability is the skewed retail tariffs, whereby agricultural consumers receive virtually free power (with flat-rate pricing averaging under 0.50 Rs/kWh) and even domestic consumers receive modest subsidies. Together, these are about half the consumption. The remaining paying customers (primarily commercial and industrial) cross-subsidize these sectors through very high tariffs. Worse, industry cannot rely on the grid for power supply.

[9] http://www.pewclimate.org/global-warming-in-depth/all_reports/india/pol_india_execsumm.cfm
[10] Planning Commission 2002, Annual Report on the Working of SEB and Electricity Department.

When not suffering from hours of blackouts or burnouts, the supplied power is of very poor quality, with voltage and frequency deviating well beyond the norms of 6% and 3% deviation, respectively [Tongia, 2004]. To add to the above problem is the widening demand supply gap. Official estimates of Ministry of Power placed the energy shortage at 12.2% in 2003.

Figure 6: Electricity Losses



Source: World Development Indicators 2004

The above state of the Indian Power Sector can be viewed both as a crisis and as an opportunity. It is a crisis for the government controlled electricity generation, transmission and distribution companies, for they have to do something fast to improve their financial health. The opportunity lies in the hands of private entrepreneurs who can venture in any of the three avenues, but the question that troubled most of the aspiring industrialists was and is—Will the government open the gates? If Yes, when and how much?

Reasons for Change

For over 15 years, Indian electricity boards (as India's utilities are called) have been trapped in the crises of capital, access/equity/distribution, environment and performance [Reddy, 1993].

Severe financial losses have led to the almost total inability of these utilities to self-finance improvements. Utilities also borrowed heavily and aggravated their losses. In the past, these losses used to be made good by government treasuries, but now, most treasuries are "empty". The lack of internally generated funds and the inability of treasuries to provide funds have resulted in severe shortages of capital for expanding generating capacity. Governments (central and state) and utilities hoped to solve these capital scarcity problems with an influx of private capital [Reddy and D'Sa, 1995]. It was also believed that the indigenous

private sector might not have the necessary capital, as the foreign exchange[11] component of funds required by the power sector could be large.

The target of keeping the power sector under tight government regime was to have proper access, equity and distribution of power to various sections of society. The socialist dream didn't materialize, the benefits of electricity have not reached the whole population—a significant fraction of the population (particularly the rural poor) does not have access to electricity. At the same time, some consumer categories, not necessarily the poorest, are given subsidized electricity. Benefits are skewed in favor of certain categories of consumers (e.g., irrigation pump set owners) [Figures 7 and 8]. Agriculture consumes almost one third of the power in India, yet provides less than 5% of the revenues. [Tongia, 2003].

Figure 7: Power Consumption by Sector (2000-01)

	Consumption [billion kWh]	Share [%]
Domestic	66.99	21.28
Commercial	16.27	5.17
Agriculture	91.74	29.14
Industry	96.02	30.50
Traction (Railways)	7.19	2.28
Outside the state	3.91	1.24
Others	32.71	10.39
Total	314.83	100.00

Source: Planning Commission, Annual Report 2001-02

Figure 8: Key Sectoral Consumption Trend

		1950	1970	1974-75	1980-81	1985-86	1990-91	1995-96	2000-01
Share of Industry	Out of total Consumption	62.6	70.8	65.8	61.7	59.1	50.1	38	30.5
Share of Agriculture	Out of total consumption	3.9	9.2	13.3	16.1	17.5	23.9	30.9	29.5

Source: Calculated from Ministry of Power and Planning Commission Data

In spite of the well-known common fact that electricity supply is less than demand, Indian public shows a high degree of concern for environment, which is unique as far as developing nations are concerned. These concerns are focused on pollution from coal-based thermal plants (particulates, acid rain, etc.), on the various problems of nuclear plants such as reactor safety, the NIMBY (Not in my backyard!) syndrome, low-level radiation and disposal of high-level wastes, and on the negative impacts of hydroelectric plants including the displacement of people, the submergence of forests and siltation [Reddy 2001]. There are also concerns about global warming impacts of energy production and use.

[11] The foreign exchange is mostly required for purchasing electricity generation equipments.

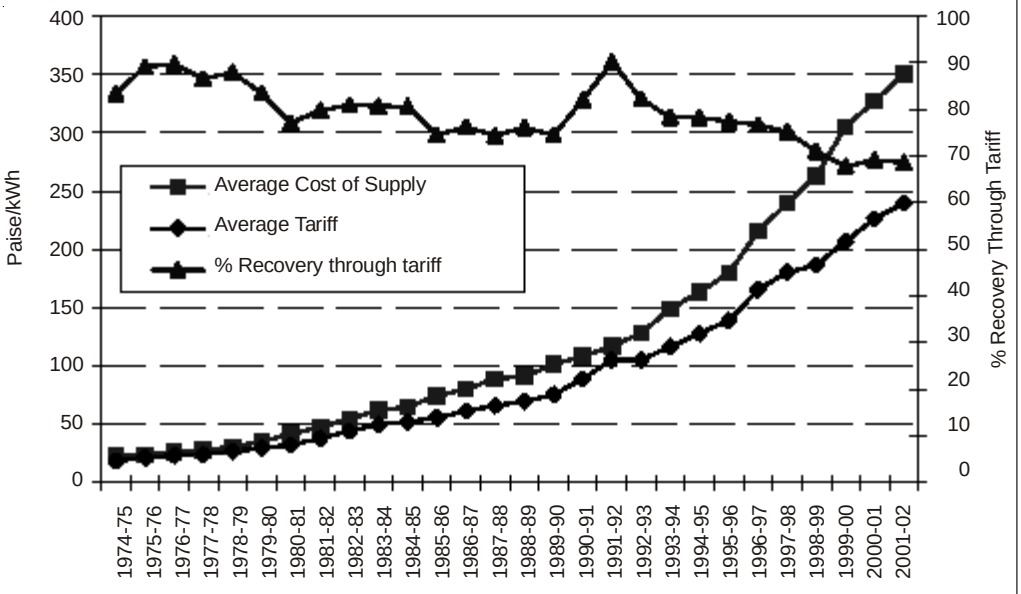
The hardship of the state controlled power units, due to lack of fresh capital, environmental concerns and inability of these units to meet the socialist agenda, was further aggravated because of their declining technical performance [Figures 9 and 10]. All this and the growing trend of liberalization in the country caused a shift in the stand of the government.

Figure 9: Financial Status of SEBs / Utilities

	1991-92	1996-97	2000-01	2001-02	2002-03
(Rs billion)					
1 Gross Subsidy to specific sectors:					
a. Agriculture	59.38	156.28	240.74	255.70	269.59
b. Domestic (households)	13.10	42.34	99.68	108.94	116.51
c. Inter-State Sales	2.01	2.85	3.86	2.47	2.26
2 Total Gross Subsidy	74.49	201.47	344.28	367.13	388.36
3 Subventions recd. From State Govt.	20.45	62.84	88.20	100.99	79.81
4 Net Subsidy	54.04	138.63	256.07	266.13	308.55
5 Surplus from sales to other sectors	21.73	78.49	34.35	36.15	74.99
6 Uncovered Subsidy	32.31	60.14	221.72	229.99	233.56
7 Commercial losses					
a (excluding subventions)	41.17	94.53	253.95	273.06	243.21
b (including subventions)	*N.A.*	*N.A.*	165.75	172.07	163.40
8 Rate of Return (RoR) on Net Asset	-12.70%	-17.20%	-41.80%	-39.50%	-32.10%

Source: Ministry of Finance, 2002

Figure 10: Cost of Supply and Average Tariff, 1974-2002



Source: Data from the Indian Planning Commission; revised estimates are used for 2000-2001. Data for 2001-2002 are from the Annual Plan.

The electricity needs were enormous. Government's perspective plan for the power sector indicated that there would an incremental capacity requirement of 142000 MW during the period 1992-2007 to meet the demand over this period. That would imply creation of an incremental capacity of nearly 10000 to 12000 MW per year[12]. This mammoth task and the decreasing health of the State finances[13] forced government to invite private participation in the power sector.

The private participation was invited in all the three parts of the sector – generation, transmission and distribution. A number of policy initiatives have been taken since 1991 for encouraging private investment in power sector with a view to streamline the procedure and delegation of power for early implementation of projects.

'Goliaths' Lose Faith

The reform government, Narasimha Rao's Congress led Government, awarded "fast track" status to eight mega[14] projects (many with foreign participation), promising rapid clearances and central government repayment guarantees—which were never offered again [Tongia 2003]. Of the above eight projects only three[15] have produced power to date—more than a decade after the fast track initiative. Two of these projects—one built by GVK Industries and the other by Enron—both of which have faced and still facing a lot of problems.

Mega Power Plants invariably need to have a Power Purchase Agreement (PPA) with any of the State Electricity Boards (SEBs) or transmission and distribution company in advance to mitigate the risk of the high investment. This PPA being for longer periods (20 to 30 years) are subjected to various post signing problems. As for Enron, they were affected by change of government. A new Shiv Sena government elected in 1995 in Maharasthra filed suit to cancel the PPA on grounds of corruption and fraud. SEBs are also financially weak because of their past and hence, their payment of dues timely is also questionable.

Like Enron, GVK also had its brush with a public utility company. Its Jegurupadu power plant was supposed to run at a maximum theoretical efficiency of 68.5% but at present is running at 85%, thus reducing per unit cost substantially and increasing profitability [Tongia 2001]. The PPA rate was based on the theoretical efficiency and hence, the plant has been under a continuous legal battle with Government of Andhra Pradesh, which demands a reduction of the rate at which it purchases power from the plant.

NIMBY syndrome is another major concern in establishing a mega project. The projects are difficult to initiate and complete because of high local resistance. Concern for environment, loss of land and high expectations (employment, health benefits etc.) are some of the many things that are to be taken care of.

[12] As stated in Ministry of Power's Report titled "India's Electricity Sector—Widening Scope for Private Participation" published in 1991.

[13] The States' Balance from Current Revenue had deteriorated continuously, declining from Rs. 3118 cr in 1985-86 to Rs. 220 cr in 1992-93 after which it turned negative and reached the massive figure of minus Rs. 32306 cr in the year 2000-01 [Source: Reliance Review of Energy Markets, 2003].

[14] Mega Project refers to 100 MW and above capacity projects.

[15] The third project is the smallest of the three—Spectrum Power's 208 MW gas-based Kakinada Project, located in Andhra Pradesh and commissioned in January 1998.

Tehri Hydel Power Plant (1000 MW), a government owned and initiated project is all stagnant at an advance stage of construction because of the syndrome.

To add to the plight of the promising hydel power sector of India was Naptha Jhakri case. Naptha Jhakri Hydel Power Plant of 1500 MW was the most prominent recipients of official funding in India's power sector and which exemplifies many of the serious problems of large dams *[Bosshard, 2002]*. "As far as mega hydroelectric projects are concerned, words like 'tomorrow' are just not applicable," *The Tribune* of Chandigarh (December 21, 2001) editorialized after the World Bank announced closure of its loan for the project from March 2002 on the grounds of cost and time overrun of the project. Faulty design, environmental unconcern and wide scale corruption lead to revision of completion date from July 2000 to July 2004 and project cost from 16 to 100 bn rupees [Bosshard, 2002].

In recent past, we haven't seen initialization of any Mega Power Plant by the private sector.[16] Government interference and NIMBY Syndrome can be cited as the two main reasons. These two problems were further augmented with smaller problems like clearances, finance, corruption and long gestation period. This forced aspirants who want to benefit in power sector boom to look for newer business ideas that could mitigate the above problems to maximum extent. One of the many strategies that rightly solves this problem is Development of Small Power Plants—'Midgets'.

Rise of 'Midgets'

Energy Resource Map of India [Figure 11] clearly shows that Southern and Western are equally rich in energy resources as the North and East part, but on seeing the Power Deficit Map [Figure 12] we see that Southern and Western parts are relatively more power deficit than the rest of India. On further examination of Resource Map, it was observed that in other parts of India, the resources are concentrated and available in large quantity while in Southern and Western it is distributed and less in quantity, specially oil and gas. The availability of fuel resources in the form of isolated gas wells, biomass, canal drops and run of the river hydro sources, to name a few, present a lucrative opportunity to be exploited through projects of small sizes.

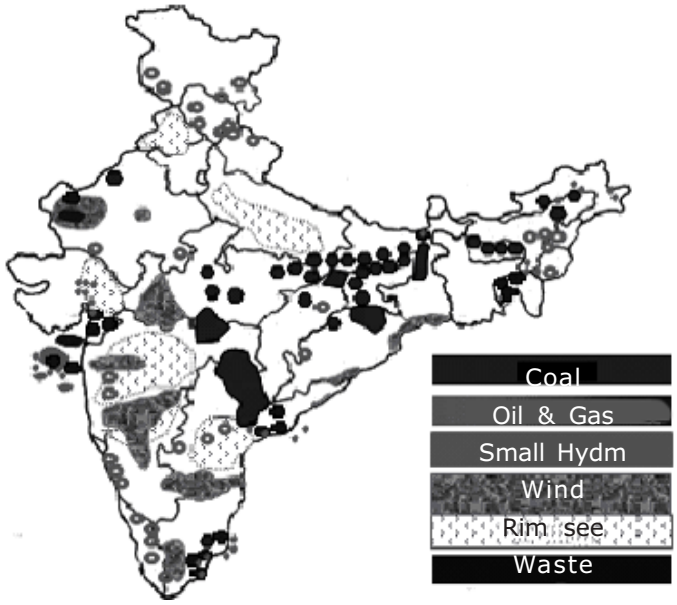
The idea of small power plant was subdued in the past because of unavailability of proper technology that could use these resources efficiently. Recent technological advancement, in areas like small capacity engines and micro turbines, has fuelled rapid growth in this area.

Faced with unreliable power supply, many industries have invested in on-site power generation, which as per CMIE estimates now accounts for more than 10% of total capacity. This ratio is likely to increase as the Electricity Bill, 2001 eliminated the need for license for power generation and allows power trading. Due to this deregulation, many industries will put up power plants for their individual usage. Such plants will predominantly be midgets.

Small power plants are simpler in technology and construction as in comparison to a large power plant. This simplicity of the plant reduces a lot to development complexities, which in turn reduces the project execution time. Small power plants can be setup in a time span of 9 to 12 months and require less investment. Thus, it can be stated as a low investment and fast return opportunity. Smaller gestation

[16] Reliance has announced Hirma 3690 MW plant in Orissa and proposed a 1000 MW plant in Uttar Pradesh. Both of these projects are still to clear and are in the pre-financial closure stage.

Figure 11: Energy Resource Map of India



Source: Ministry of Non-Conventional Energy, December 2002

Figure 12: Power Deficit Map of India

State/Region-wise Actual % Peak Deficit
(April 2001-March 2002)

Source: Central Electricity Authority

period and small size makes Midget as a potent tool for distributed capacity development. With same capital and other resources as a central large power plant, we can develop many smaller power plants distributed over a larger area. The payback period in Midgets would be smaller than in Goliaths and the capacity developed being distributed will give a more reliable and steady power grid.

Due to less complexity, the clearances required in smaller plants are also less and can be obtained much faster than for a large project. Large projects have larger concerns, so have to deal with both Central and State Government but for smaller ones State Government is maximum level. Thus, Midgets not only enjoy a faster and smaller execution time but also a simpler and shorter inception and development phase.

A large part of India has still not seen the magic of electricity as the power cannot be distributed to those areas due to terrain and distance problems. A large part of these places are in the Himalayan Ranges or in the Tropical Forests of South India. The solution to this problem is also development of Midget. Installation of small capacity power plants, based on non-conventional technologies like wind, solar, biomass, tidal or a combination of these, would be able to bring light in these areas of the country. Such projects would require active government participation and assistance.

The risk in Midgets has been mitigated as compared to Goliaths and so, following the Risk-Return Concept, the return on Midgets is also less. The economies of scale and ease of control is lost in Midgets. This increases per unit cost of electricity in comparison to Goliaths.

The cost of transportation of electricity from plant to usage point per unit would be more as the electric design of the evacuation system depends mostly on Voltage rather than units transmitted. Thus, evacuation cost per unit is more for Midget than Goliaths.

Conclusion

Energy privatization has been part and parcel of a recent trend, which has placed greater reliance on market forces and less dependence on government in the allocation of resources. Although India is just at the beginning of the energy reforms, we sense the opportunities that can enable us to leapfrog into new scales of development process.

The growing demand-supply gaps, ill health of state run units and technological advancement, along with government willingness to relinquish its control, heralded the incoming of private investors into the sector in a big way. The initial experience with large power plants gave soar taste to many due to many different reasons and hence, the idea of 'Midgets' rose to its pinnacle.

Midgets provide a major growth opportunity for the investor. They can be a huge help in reaching the development goal of 'Electricity to Everyone'. They can be used to harness the most out of even the smallest of the energy reserves available. And being small they hardly pose any major environmental threat.

All the above logic and citations clearly lead us to the fact that Indian Power Sector is going under a major revamp of ideology. The paradigm of 'Goliaths' has started withering and 'Midgets' are gaining ground. The future looks promising and full of Light. ✠

Reference # 02J-2004-11-03-01