

OVERVIEW OF ENERGY (THERMAL & HYDRO)

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Synopsis

The present installed capacity of electric power generation plants in India is of about 127 GW and is dominated by thermal (66%) and hydro (26%) plants. It is expected that the dominance of thermal and hydro power stations would continue even with the ambitiously planned total capacity addition to a level of about 203 GW by year 2011-2012. This article briefly touches upon opportunities for power generation up to XI Five - Year Plan, inherent weaknesses of prevailing systems and processes in India to meet the targets and addressing some of the critical issues to overcome the impediments.

1. Introduction

Out of the total installed capacity of power generation plants of 127 GW, the thermal and hydro plants constitute about 66% and 26% respectively, the balance being generation from Nuclear and Renewable Energy power plants. Even with the future capacity additions, these proportions are not expected to change drastically. Thus, the Indian Energy system is relying predominantly on coal (largely on domestic coal reserves) and hydel potential.

The present installed capacity is largely in the State Sector (about 55.5%) followed by Central Sector (33.5%) and balance in the Private Sector. It is expected that this proportion may largely weigh towards Central and Private Sector (even in the Hydro Power hitherto dominated by State Sector) in the years to come due to paucity of funds in the state Sector and ability to mobilize economic funds in the Private Sector.

Economists projected that in order to support GDP growth rate of 7% per annum, the power supply growth rate also needs to be realized to fulfill the vision of 'Power for all by 2012'.

Further, some of the present installations would reach their useful life by this period, requiring replacements and / or renovation / modernization (R & M).

2. India's Peak Load Power Demand, Targets and Achievements

It is assessed by the Ministry of Power (MoP) that there is currently huge shortfall in electricity generation while the energy demand has been consistently rising. It is estimated that the existing installed generation capacity in India, which is of the order of little more than 125 GW, has to be doubled over the next decade. The shortage of energy, particularly at peak

demand periods, has been the largest impediment to India's economic growth as the gap between supply and demand continues to widen over the years.

The following Table summarises forecasts of peak demand and energy requirements by the end of X Five-Year-Plan (Year 2006-07) as well as XI Five-Year-Plan (Year 2011-12).

Summary of Forecasts

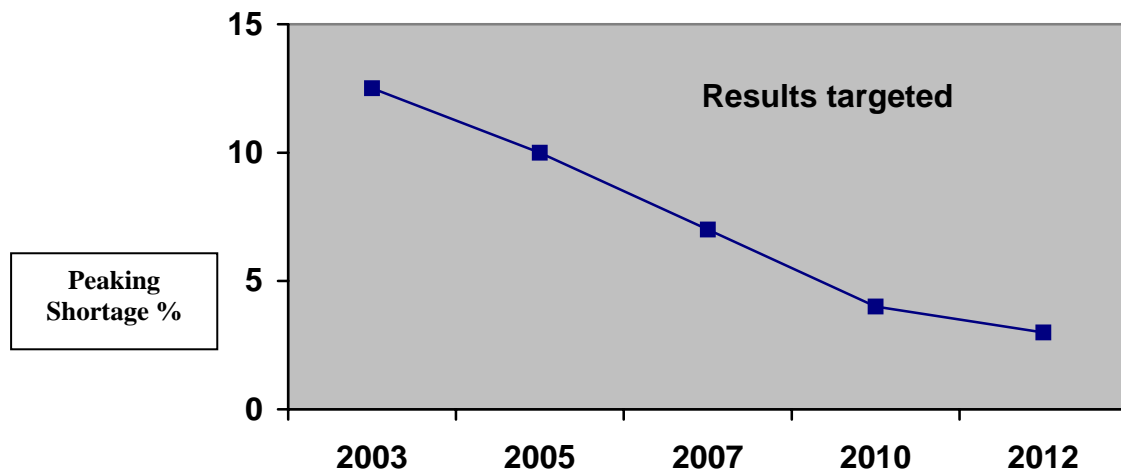
Peak Demand and Energy Requirements

Grid	Energy Requirement (BkWh)		Peak Load (GW)	
	Year 2006-07	Year 2011-12	Year 2006-07	Year 2011-12
	End of X Plan	End of XI Plan	End of X Plan	End of XI Plan
Northern	254.16	350.19	44.01	60.08
Western	239.73	320.96	38.54	51.56
Southern	178.69	234.16	29.07	38.00
Eastern	96.88	135.05	16.72	23.23
N-Eastern	12.06	17.55	2.53	3.66
A&N Islands & Lakshadweep	0.34	0.53	0.08	0.12
Total	781.86	1058.44	130.95	176.65

In view of the above, India urgently needs to expand its installed generation to double the present installed capacity as forecast of demand of electricity is continuing to raise at an annual rate of 6 - 7%. It was, therefore, decided to fix the target as additional 44 GW to new capacity during the X Five-Year Plan. Of the 44 GW, the federal utilities would contribute about 23 GW and the state utilities another 11 GW. Balance 10 MW is expected to be met from renewable energy sources (3 GW) and IPP projects (7 GW ie. 6 GW of thermal and 1 GW of hydro).

For the XI Five-Year-Plan, the targeted additional installed capacity is of the order of 64 GW (excluding slippage from X Plan).

Following graph indicates Ministry of Power's initiative to encourage capacity addition till end of XI Five-Year-Plan to reduce the projected deficit in electricity generation.



The estimated peak load demand is about 176 GW by the year 2012 which requires a capacity addition of nearly 100 GW. However, history proved that we have been consistently missing the targets as indicated below :

Five-Year Plan	Targeted Capacity (GW)	Achieved Capacity (GW)	% Achieved
VIII PLAN	30.5	16	52
IX PLAN	40	20	50
X PLAN	46	31 (projected)	67

3. Target for the XI Five-Year Plan

As per CEA's one of the Reports, the following capacity addition is projected for the thermal and hydro power sector :

Capacity Addition Projected in (GW) during the XI Five-Year Plan

Year	Thermal		Hydro		Total	
	Incr. addition	Cum. addition	Incr. addition	Cum. addition	Incr. addition	Cum. addition
2007-08	13	114	2	40	15	154
2008-09	18	132	2	42	20	174
2009-10	7	139	4	46	11	185
2010-11	4	143	7	53	11	196
2011-12	3	146	4	57	7	203
Total	45		19		64	

To avoid slippages in the X and XI Plans, Govt. of India has put in place a comprehensive project monitoring and control system with a special emphasis on monitoring of projects at pre-implementation stage. Further, frequent reviews to monitor the progress of power projects for commissioning up to 2012 are being carried out. To ensure greater success in capacity addition, the central power generating companies under Ministry of Power are being asked to add 43 per cent of the total required capacity as against a contribution of 33 per cent during the IX Plan.

4. Some of the major Hurdles in accomplishing implementation of Capacity addition

- 4.1 Generation of electricity requires huge investments. At approximately. Rs. 4 crores / MW, the capacity addition of 1 lakh MW requires more than Rs. 400,000 crores. Further, addition of associated transmission and distribution requires yet an equal capital investment. In the years to come funding would be a major problem unless FDIs are encouraged with more sincerity.
- 4.2 Shortage of quality coal due to limitations in production levels particularly due to monopolistic nature of market in India.
- 4.3 Non-availability of adequate make-up water for the power projects.
- 4.4 Power evacuation and subsequent distribution in addition to containing T & D losses would also be a uphill task in the years to come.

4.5 Securing clearances / approvals / NOCs in time due to inherent red-tapism in the Govt. system.

5. Some Suggestions to Overcome Impediments in Implementation of Additional Capacity

5.1 Encouraging private participation more than the current levels of about 12% by quickly achieving separation of generation activities from SEBs, allowing private producers and central power stations' direct access to at least large consumers and assuming the risks of land possession / securing clearances etc. are some of the suggestions experts advocate in overcoming the hurdles of capacity addition and instilling confidence in Private Power Generators.

5.2 It is essential to identify the sources of funds including Government funding, multilateral and bilateral assistance, institutional financing, market borrowings, internal resources, private investment etc; and suggest institutional policy and other measures required for the massive resource mobilization.

5.3 Development of additional coal mines and up-rating of the existing coal mines.

5.4 Lowering the 'Mega Project' status for the power plants of 1000 MW to at least 500 MW would enable a fair competition in the market to achieve optimal project costs and thereby the tariff would go a long way in adding additional capacity by private entrepreneurs.

5.5 In some of the countries, fuel risk and infrastructure risk is to the account of the Federal Govt. The Govt. itself identifies the site, secures basic clearances for establishing power project including certain major Civil works such as sea-water in-take system etc. and calls for tariff-based bids. With such massive support from Federal Govt., investors'/ IPPs confidence would get enhanced and the tariff levels are likely to be fixed within reasonable limits.

5.6 It is essential that state governments shall quickly and sincerely unbundle the generation, transmission and distribution which shall be managed separately since the state governments have proved their inability to develop commercial mindsets.

5.7 Yet another suggestion is to implement the on-going renovation and maintenance (R&M) schemes for the 135 thermal plants and 35 hydel plants to generate about 90 billion units additionally which is apprx. 15% of current level of generation. The R&M schemes are known to cost only Rs. 1 crore / MW as against Rs. 4 crore / MW in case of a new project.

5.8 Another area to concentrate is on the production and supply of indigenous coal of required quantity and quality. With 80 billion tonnes of proven reserves, there should be no shortage of coal in the country if only production is properly managed. The large coal reserves in the country provide a ready and economical resource and ensure energy security. Hence coal has been identified as the mainstay for power generation till the year 1012. Emphasis

has been laid on setting up large pit-head stations to avoid high costs associated with disposal of high ash bearing Indian coal and over-straining the already stretched rail network. In addition, the Govt. should not hesitate to import coal till such time, as the domestic production bottlenecks are removed as well as for the coastal-based mega thermal power projects.

- 5.9 Hydroelectricity is clean energy and its generation is not linked to issues concerning fuel supply, especially the price volatility of imported fuels. It enhances energy security and is ideal for meeting peak demand. Less than one fourth of the vast hydel potential of 1,50,000 MW has been tapped so far. Consequently, thermal generation, which should generally be used for base load operation, is also being used to meet peaking requirements. As against the desirable hydro share of 40 per cent, the current share is only about 26 per cent in India.

Appropriate strategies to fully exploit the country's hydro potential and according high priority for its development are the needs of the hour.

- 5.10 Strengthening transmission and distribution (T&D) sectors is yet another attempt to mitigate the hurdle of power generation. Inadequate investments in T&D infrastructure have resulted in power evacuation constraints from the generating stations. Concentration of coal reserves and hydel sources in a few geographic pockets entails effective inter-regional network to transmit the electricity generated in fuel rich regions to other regions. In the distribution sector, it is said that out of the total energy generated, only 55% billed and only 41% is realized which has caused erosion in the volume of internal resources generation by the SEBs.

The distribution segment shall be made commercially viable by initiatives such as development of a national grid, expansion of networks by transmission utilities, implementation of availability-based tariffs and assigning PPAs to distribution companies etc.