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Building of India's power sector

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Abstract
Power sector is most basic industry and key to industrial development of any country. The use of electricity is a defining moment in the industrial revolution and shift in the development story. India at the outset of independence was indeed in the infancy of the development of the power sector. A lot has been done in this regard which in turn has resulted into the industrialization of the country. However, there exist several problems which have been addressed with the passing time. This paper outlines how India addressed its power need after the independence of the country to address the need of industrial self-reliance.

Keywords: building, power sector, industrial development

Introduction

Power constitutes the basic infrastructure for the industrial and socio-economic development of a country. It is one of the core sectors of our national economy and is a sine-quo-non in the overall development of a country it is the convenient form of energy and can be generated from many natural resources. The origin of power in the country can be traced to the turn of the century. The growth and performance of power sector in India was quite depressing till 1947. In fact, it received a big boost after independence and with the initiation of the planning era. The Electricity (Supply) Act, 1948 came into existence providing for administrative and legal framework for the organisation and control of power sector in the country. This paper examines the growth pattern of power sector in the matter of in-stalled capacity and power generation in India. It also brings into focus the problems relating to the power sector and suggestions thereon.

Power sector is a highly capital intensive area where the Government has invested huge sums of money during the plan periods. By the end of the Seventh Plan period this investment was approximately Rs. 70,000, crores. The heavy investments on power development have resulted in the expansion of the installed capacity of power plants at a fast rate. This growth is depicted in Table.1 below.

Data set out in the above table clearly indicate the installed capacity and electricity generation in the county. The hydel plant capacity of power generation has considerably gone up from 600 MW in 1950- to 17798 MW in 1988-89, showing an overall increase of nearly 2866.33 per cent. Or 75.42 times more during the period under review. The share of thermal plant generation capacity has constantly been on increase in total generating capacity. The thermal capacity at present constitutes over 67 per cent of the total plant capacity of India. It was recorded at about 39677 MW in 1988-89 as compared to the capacity of 110 MW in 1950-51 which registered a significant improvement of more than 3507 per cent or more than 92.28 times. The capacity of nuclear power plant was 420 MW in 1970-71. The same rose to a figure of, 1565 MW in 1988-89, indicating a rise of roughly 272.6 per cent or 15.4 times more during the same period. The total installed capacity of power generation in the country has recorded a massive increase of more than 337.2 per cent, i.e., from 1700MW in 1950-51 to 59040 MW in 1988-89. The installed capacity of hydel, thermal and nuclear power plants has constantly been increasing during the years under study. Similarly, the power generation from hydel power plant went up from 2523 million kwh in 1950-51 to 57823 million kwh in 1988-89, showing an approximate rise of 2191.8 per cent or more than 57 times during the period under reference. The table indicates that the contribution of thermal generation in total electricity generation in the country has been increasing by leaps and bounds, i.e.: from 2596 million kwh in 1950-51 and touched a, record figure of 157547 million kwh in 1988-89, a tremendous increase of around 5968.8 per cent or 157 times more. Likewise, power generation from nuclear power plant rose from 2417 million kwh in 1970-71 and it reached the figure of 5825 million kwh in 1988-89, indicating an overall rise of more than 141 per cent or 7.83 times more. Consequently, the total electricity generation in the country went up by more than 422.1 percent, i.e., from 5119 million kwh in 1950-51 and it jumped to 221195 million kwh in 1938-89. From the above table, it is quite apparent that the power generation from thermal plant is steadily increasing year by year. This increase was mainly because of successive improvement in the performance of thermal power stations as well as commissioning of the additional capacity. The electricity generation from hydel and nuclear power plant increased remarkably but punctuated by decrease here and there. The following table indicates the compound annual growth rates of hydel and thermal power plants in total plant capacity as well as power generation in the country between 1950-51 and 1988-89.

Table 1: Installed Capacity and Power Generation Between 1950-51 - 1988-89

	Installed Capacity (10^3 MW)				Power Generation (10^4 kwh)			
	Hydel	**Thermal**	**Nuclear**	**Total**	**Hydel**	**Thermal**	**Nuclear**	**Total**
1950-51	600	1100	__	1700	2523	2596	__	5119
1960-61	1917	2736	__	4653	7837	9100	__	16937
1970-71	6384	7906	420	14709	25248	28162	2417	55827
1975-76	8464	11013	640	20117	33302	43303	2625	79230
1976-77	9025	11804	640	21469	34836	50245	3252	88333
1977-78	10020	13008	640	23668	38007	51090	2272	91369
1978-79	10833	15207	640	26680	47159	52594	2770	102523
1979-80	11384	16424	640	28448	45478	56273	2876	104627
1980-81	11791	17563	860	30214	46542	61301	3001	110844
1981-82	12173	19312	860	32345	49565	69515	3021	122101
1982-83	13056	21447	860	35363	48373	79868	2022	130263
1983-84	13855	24389	1095	39339	50021	86739	3536	140296
1984-85	14465	28880	1095	42440	53941	98864	4129	156934
1985-86	15549	30057	1198	46804	51019	114324	5007	170350
1986-87	16297	31797	1198	49292	53989	128788	5092	187869
1987-88	17324	35553	1316	54195	47414	149516	5023	201953
1988-89	17793	39677	1565	59040	57823	157547	5825	221195
1989-90	18625	43741	1545	63931		182300		251300

Source: Economic Survey, Government of India, 1988-89, Table S-28.

Table 2: Compound Annual Growth Rates of Installed Capacity and Power Generation Between 1950-51 and 1988-89 (Percentages)

Years	**Installed Capacity**			**Power Generation**		
	Hydel	**Thermal**	**Total**	**Hydel**	**Thermal**	**Total**
1950-51 & 60-61	12.3	9.5	10.6	12.0	13.4	12.7
1960-61 & 70-71	12.8	11.2	12.2	12.4	12.0	12.7
1970-71 & 80-81	6.3	8.3	7.5	6.3	8.1	7.1
1980-81 & 88-89	5.3	10.7	8.7	2.8	12.5	9.0
1950-51 & 88-89	9.3	9.9	9.8	8.6	11.4	10.4

Source: Compiled and computed from Table No. 1.

The above table clearly reveals the growth pattern of installed Capacity, and power generation of hydel and thermal power plants, in the country since 1950-51: The installed capacity of hydel plant grew at the rate 12.3 per cent per annum during 1950-51 and 1960-61, while power generation witnessed 12.0 per cent. The capacity of thermal plant recorded annual growth rate of 9.5 per cent and power generation of these plants has increased at the rate of 13.4 per cent during the period under review. The total plant capacity in India rise at the rate of 10.6 per cent, while the electricity generation has gone up at the rate of 12.7 per cent per annum. Similarly, the annual compound growth rate of hydel and thermal capacity went up to 12.8 per cent and 11.2 per cent respectively and power generation of hydel plant grew at the rate of 12.4 per cent but thermal generation decreased to 12.0 per cent during 1960-61 and 1970-71. The total installed capacity and electricity generation also went up at the rate of 12.2 per cent and 12.7 per cent respectively. Likewise, between 1970-71 and 1980-81, the respective annual growth rates of plant capacity of hydel and thermal has declined to 6.3 per cent and 8.3 per cent, while power generation declined to 6.3 per cent and 8.1 per cent per annum. The annual rate of installed capacity and electricity generation down to 7.5 per cent and 7.1 per cent respectively. Consequently, the growth rate of hydel capacity further declined to 5.3 per cent, while the share of thermal plant grew at the rate of 10.7 per cent during the period 1980-81 and 1988-89. The power generation from hydel plant declined to 2.8 per cent and thermal generation stood at 12.5 per cent per annum. During the period 1950-51 and 1988-89, the respective annual growth rates of hydel and thermal capacity stood at 9.3 per cent and 9.9 per cent. The hydel generation increased to 8.6 per cent but lower than that of the capacity growth rate, while power generation of thermal declined to 11.4 per cent per annum. The total installed capacity grew at the rate of 9.8 per cent per annum and electricity generation went up to 10.4 per cent per annum. It is apparent from the foregoing table No. 2 that the growth rate of hydel generation is less than the growth rate of hydel capacity while the growth of thermal generation is higher than the growth rate of thermal capacity during the years under reference. It also depicts that the efficiency level of working plants of thermal was impressive during the same period.

However, the growth of power sector in respect of Installed capacity has not been able to cope with the increasing demand of power. A number of measures have been adopted by the Government to increase the power supply but the demand has always been out-stripping its availability. One of the important reasons for short falls in power supply has been the substantial slippages in addition to the installed capacity. The target fixed in plans has never been fully achieved. The expenditure in each Plan period has exceeded the outlay for the sector. The following table is the evidence of the slippages during the plan periods.

Table 3: Plan wise Slippages in Addition to Installed Capacity

Plans	**Target (MW)**	**Achievement (MW)**	**Slippages (percent)**
First Plan (1951-56)	1300	1100	15.4
Second Plan (1956-61)	3500	2250	35.7
Third Plan (1961-66)	7040	4520	35.8
Annual Plans (1966-69)	5430	4120	24.1
Fourth Plan (1969-74)	9264	4579	50.6
Fifth Plan (1974-79)	12499	10202	18.4
Annual Plan (1979-80)	2945	1799	38.9
Sixth Plan (1980-85)	19666	14226	27.7
Seventh Plan (1985-90)	22245	22123	0.5

Source: Productivity, Jan. - March, 1989, p. 456.

The above table clearly depicts the plan wise slippages in addition to the installed capacity during the plan periods. The highest shortfall in capacity addition was 50.6 per cent during the Fourth Plan period where the target was fixed at 9264 MW but the achievement was 4579 MW. During the Fourth Plan, the investment was 18.6 per cent of the total Plan outlay even then the target was not fully achieved. Similarly, the lowest slippage in the capacity was 0.5 per cent during the Seventh Plan. It can be observed that the target during the Seventh Plan was approximately achieved. The slippage during the plan periods was due to various factors like constraints on avail ability of sufficient fiscal and physical resources. The supply of major equipment, approval of projects from Environmental Pollution Board, resettlement of displaced population, lack of financial resources, etc. have largely contributed to the delays in commissioning of power plant which also resulted to the cost escalation of the project problems.

The power sector is beset with a number of problems. Firstly, coal is the major source of thermal energy and the abundant reserves of low grade coal is available in the country. Modern pulverised boilers are supposed to be more efficient in burning of inferior coal and take comparatively less time for combustion. But in practice, serious problems arise due to inconsistent quality of coal supplied to the power stations. A related problem is that of ensuring adequate coal supply to the power stations well in time. The coal reserves are located far away from load centres. Transporting of bulk quantities of coal 'to respective power stations cause a tremendous strain on an already overstrained railway system. It also adversely affects the transportation of other essential commodities. The transport freight sometimes, doubles the cost of coal itself and hence increases the cost of power supplied to the consumers. Secondly, one of the major problems which is inhibiting the growth of power sector is the uneconomic tariff structure in various State Electricity Boards. Power by no means is a cheap form of energy. In most of the SEBs, the price of power supply to the consumers are at a late below the actual cost. The power supply to the consumers is purely on credit basis and the revenues are not realised well in time. The agriculture and industrial sectors continue to get the largest subsidy in their tariffs. As a result, the situation becomes all the more dangerous and the losses incurred by-the various Boards are just a part of the loss that the economy has to bear. Due to this, the required investment funds are not forthcoming from many states and therefore restricts the new instalment of power plants to meet the power demand. Thirdly, one of the disturbing feature of power front is the lag in investment and project implementation. The lack of financial resources is the major constraint for unsatisfactory development of power sector and also additional generating capacity to compete the-power shortage in the country. The projects involving a long gestation period especially in thermal plants are quite complex, requiring simultaneous and synchronised implementation of activities. There are also heavy slippages in the instalment of new additional generating capacity due to financial constraint. Fourthly, the power supply position has been acting as a severe constraint in the growth process of the country. The rapid development of industries, speedy rural electrification, expanded irrigation facilities and change in the socio-economic life of people, due to planning process, have intensified the consumption of power. Besides, the problem is not only the shortage of installed capacity compared to demand but also the very low efficiency levels in power stations of the country. The power supply position depicted a peak shortage ofpowerabout4000 MW during the year 1988-89. Lastly, one of the biggest flaws in power supply system is the transmission and distribution losses. The line losses are also due to haphazard growth network and are further aggravated by theft and other malpractices. Under these conditions, the planning for power in the country needs much attention of the planners and also requires immediate measures to overcome the power shortage. The measures like load management, energy conservation and optimum use of existing plant capacity should be adopted so that the shortage Could be minimised and demands, to a great extent, could be met. Better utilisation of resources and efficient working capital management will certainly increase the availability of power in the country. There is an urgent need to introduce foreign technology for renovation and modernisation work which would facilitate the improvement of reliability and availability of the country's power plants. Secondly, the prices of the power supplied to the consumers should be fixed in a manner to recover the cost of production and to some extent a reasonable rate of return on capital employed too. If its efficient use is encouraged, price of electricity should reflect its true economic values. The State Electricity Boards should not only improve their operational efficiency but should also rationalise their tariff structure in order to achieve their objectives. Another field of improvement which needs much attention is to improve the financial structure of the power sector. Them is a need to generate financial resources for improving the operational and maintenance standards and also for the efficiency improvement of the power plant. Again the finance is needed to set up new additional generating capacity to cope with the shortage of power. The last but not the least there is an emergent need of vigilance in the distributional aspect of power to consumers.

Conclusion

From the above discussion it may be concluded that power is an important ingredient for all-round growth and development of the national economy. The progress and prosperity of the country is, to a great ex tent, dependent on the growth of power. sector. The development of power sector in India has been very rapid during the plan periods but these developments are not enough to cope with demands for power, The Government has taken various steps to wipe out these backlogs but there, has always been a big leap in power generation. Hence, there is an urgent need that the working of the power sector should be streamlined and concerted efforts be made to improve th6 efficiency of this vital sector of the economy. The sufficient investment funds should be allocated for expansion and modernisation of power stations which would enable power availability at every stage. All these steps could go a long way in achieving better results.

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