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Cost Analysis for Infrastructural Development of Energy Sector

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ABSTRACT:
Since Independence, the Indian economy has been developing in the international background. The centuries old national environment also played a significant role in the post-independence Indian economy. In this context, a need of foreign collaboration was realized to meet the social economic and political situation of the country. The export earnings of the country were insufficient to cope with the expenditure likely to insure for the development of the country including energy sector. The acceptance of the foreign assistance was the only option left for the economic development of the country.

Key words: post-independence, social economic, political situation

INTRODUCTION:

The development of economic infrastructure requiring huge investments and longer gestation period is the prerequisite for industrialization and economic development of the newly developing economics like India. Energy being an important ingredient of economic infrastructure and pre-condition for the accelerated pace of economic development, needs huge capital investment in the initial years In the context of labor-intensive, capital-scarce, technologically deficient and industrially under-developed Indian economy, it was conceived by Indian leaders even before the Independence, that economic irrigation needs of rural India alone justify rural electrification of the Planning Commission as well as two studies of the National Council of Applied Economic Research of Punjab and Kerala throw considerable light on these benefits. Apart from the energy requirements for irrigation in agricultural sector in India, as in many third world countries, "Production of fertilizers and mechanization of cultivation, the manufacture of capital goods for agriculture in large scale industries and transportation of surplus products to the marketing centers will also call for an increasing use of commercial power.

Thus, adequate application of energy to agriculture not only increases productivity of land and labor but also reduces human drudgery and open avenues, for inter-dependent agro-industries. In India context, large scale dependence on left-irrigation due to uncertainly and seasonal character of monsoon rainfall, inadequate and un assured availability of surface water supplies, on account of under-developed irrigation infrastructure, power becomes indispensable factor for sustained agricultural growth which is the dominant sector of Indian economy. Hence, a study of the cost and benefit of analysis of foreign collaboration in the development of energy sector in India is of considerable importance. The development of economic infrastructure requiring huge investments and longer gestation period is the prerequisite for industrialization and economic development of the newly developing economics like India.

This paper attempts to study the pattern and structure of energy development in India. The developments of various sources of commercial energy have been studied under three headings, namely, hydro, thermal and nuclear energy. Attempts have been made to bring out the salient features of each of them and to give a brief account of recent developments in these fields. The growth of production, consumption and productive capacity is shown together with other basic information, and a description is also given of the main changes that have occurred in the organization and ownership of these forms of energy.

CAPACITY ADDITION IN THE ENERGY SECTOR:

The all-India installed capacity of electric energy generating stations under utilities was 112 058.42 MW (megawatt) as on 31 March 2013 consisting of 77968.53 MW of thermal, 29 500.23 MW of hydro, 2720 MW of nuclear, and 1869.66 MW of wind energy which as increased to 115 544.81 MW as on 31 January 2014 consisting of 80 201.45 MW of thermal, 30 135.23 MW of hydro, 2720 MW of nuclear, and 2488.13 MW of wind energy. A capacity addition of 41 110 MW has been targeted for the Twelfth Five-year Plan.
The National Electricity Policy (NEP) stipulates energy for all by 2012 and annual per capita consumption of electricity to raise to 1000 units from the present level of 831 units. To fulfill the objectives of the NEP, a capacity addition of 78,577 MW has been proposed for the 12th plan. This capacity addition is expected to provide a growth of 9.5 % to the energy sector. The break up of the capacity addition target is given as under:

Table 1: Capacity Addition Target

(in MW)

Type/sector	Central	State	Private	Total
Thermal	9685	26800	3380	39865 (50.7%)
Hydro	3605	24347	0	27952 (35.5%)
Nuclear	3263	7497	0	10760 (13.8%)
Total	16553 (21%)	58644 (74.6%)	3380 (4.4%)	78577 (100%)

Source: Annual Report 2012/13, Ministry of power, Government of India.

PATTERN OF ENERGY INDUSTRY DEVELOPMENT:

Energy is the most convenient and versatile form of energy and plays a crucial role in the economic development of a country. The history of energy development in India dates back to 1887 when first a hydro station was established at Darjeeling. In the early years, most of the energy supply facilities were privately and local bodies owned the catered to the needs of big towns and cities. The first thermal energy station in India was established in Calcutta in 1899 with a total installed capacity of 1000 KW. During the first two decades of the twentieth century steam power stations at Kanpur, Madras and Calcutta of 2,170 KW, 9000 and 15000 KW were commissioned.

In 1902, hydro-electric plants of 4,500 KW at Sivasamudram in Karnataka, in 1907, 3000 KW at Mahara in Jammu and Kashmir, in 1911, 500 KW at Simla in Himachal Pradesh, in 1914, 1550 KW at Gokak Falls and in 1915, 40,000 KW at Greater Bombay were installed. Between 1921 and 1940 total installed capacity increased by about 10 times, from about 0.13 million kilowatts to 1.3 million KW[2]. The industrial boom following World War I, realization of the use of electricity in industries and the interest shown by some of the provincial Government were responsible for this increase. By the end of 1940 that total installed capacity was 0.6 million comprising steam 0.5 million hydro and 0.1 million diesel.
The growth of electricity development between 1941 and 1951 was hardly substantial. Steam generating capacity rose by 60 per cent and slow growth were the stresses and strains of the Second World War and the abnormal post was conditions that followed. The available plants were used up to the maximum capacity and were subject to heavy wear and tear and frequent break-downs. Deterioration of coal supply and shortage of fuel oil also worsened the situation. Thus, at the end of the war, the energy supply industry was in a very precarious position.

GROWTH IN PRODUCTION AND CONSUMPTION OF HYDRO, THERMAL AND NUCLEAR ENERGY:

During the twelfth plans, emphasis in Plan was on speeding up the construction and commissioning and the construction work on others was speeded up. A number of power stations were commissioned and construction work on others was speeded up. Consequent upon these efforts, the total installed generating capacity in the country reached to about 8 million KW at end of Fifth Plan. The installed capacity at the beginning of the current sixth plan period was 26 million KW. The sector wise, type wise summary of this capacity addition target is given in Table below.

Table 2 - Capacity addition target-sector wise

(Figures in MW)

SECTOR	Hydro	Thermal	Nuclear	Total (%)
CENTRAL	8,742	12,790	1,300	22,832 (55.5%)
STATE	4,481	6,676	0	11,157 (27.2%)
PRIVATE	1,170	5,951	0	7,121 (17.3%)
TOTAL	14,393	25,417	1,300	41,110 (100%)

Source: Annual Report 2012/13, Ministry of power, Government of India.

A moderate target was set for state and private sectors keeping in view the preparedness of various state power utilities and IPPs.

Growth in Generation during 12th Plan

Electricity is in the concurrent list in the constitution. The National Electricity Policy (NEP), 2005 recognizes electricity as a "basic human need" and targets a rise in per capita availability from 631 units to 1,000 units per annum by the end of 2012. To fulfill the objectives of the NEP, a capacity addition of 78,577 MW has been proposed for the twelfth five-year plan. The power sector is expected to grow at 9.5 percent per annum

Table 2 : Twelfth plan power capacity addition targets (MW & per cent)

Sector	Hydro	Thermal	Nuclear	Total (MW)	Share (%)
Central	9.685	26,800	3,380	39,865	50.7
State	3,605	24,347	0	27,952	35.5
Private	3,263	7,497	0	10,760	13.8
Total	16,553	58,644	3,380	78,577	
Share (%)	**21.1**	**74.6**	**4.4**	**100**	

Source: Economic survey 2012-13, Govt. of India

A number of projects envisaged for the twelfth Five-Year Plan have made steady progress, with most of these in a position to be commissioned well within the Plan period. The status of placement of orders for the main plant (thermal projects) and main civil works (for hydro projects) is given in Table.

Table 3 : Status of twelfth five year plan Capacity addition (MW)

Status	Central	State	Private	Total
Commissioned	2,230	4,783	250	7,263
Under Construction	27,945	14,337	8,578	50,860

Source: Economic survey 2012-13, Govt. of India

As per the Integrated Energy Policy (IEP), issued by the Planning Commission, GDP growth rates of 8%-9% have been projected during the 12th Plan. Assuming a higher growth rate of 9% and assuming the higher elasticity projected by the IEP of around 1.0, electrical energy generation would be required to grow at 9% p.a. during the 12th plan period. Also generation has to be collectively met by utilities, captive plants and Non-conventional energy sources. No reliable plans about captive power capacity expansion are available but based on indications available from the manufacturers for addition in captive capacity and present utilization of available capacity, the generation from captive plants is expected to increase from 78 BU to 131 BU per annum. Since the load factor of nonconventional energy sources is very low (about 20% on an average), even though the capacity projected by MNRE from these sources is about 23,500 MW by the end of 12th Plan, the expected generation would be only around 41 BU. The generation from these renewable however has not been taken into account for planning purposes.

FINANCIAL PERFORMANCE OF POWER UTILITIES

Improving financial viability of power utilities is one of the key deliverables of power sector reforms. The total commercial losses excluding subsidy of the State power sector has been estimated at Rs. 32,728.60 crore in 2012-13. The rate of return of the State power sector which was (-) 14.03 per cent in 2012-13 (P) is estimated to have improved to (-) 14.3 percent in 2012-13 (RE). Nevertheless, the gross subsidy remained substantially higher at Rs. 43,132.6 crore with the subvention estimated at Rs. 13,358.80 crore in 2012-13.

Table-4

(Rs. crore)

		2009-10 (Actual)	2010-11 (P)	2011-12 (RE)	2012-13 (AP)
A	Gross Subsidy on sale of electricity of	35,539.60	40,054.00	43,132.60	46,087.40
	(i) Agriculture	23,833.40	26,605.70	29,299.40	30,194.20
	(ii) Domestic	10,432.50	13,171.80	13,307.90	14,499.20
	(iii) Inter-State Sales	1,273.00	276.50	525.40	1,394.00
B	Less subvention from State Govt.	13,414.70	13,752.50	14,159.60	13,358.80
C	**Net Subsidy**	**22,125.00**	**26,301.50**	**28,973.10**	**32,728.60**
D	Surplus Generated by sale to other sector	8,232.70	5,275.60	8,704.00	9,638.90
E	Uncovered Subsidy	13,892.30	21,025.90	20,269.10	23,089.70
F	(i) Commercial Losses (excluding subsidy)	22,733.80	28,824.90	25,701.40	26,461.80
F	(ii) Commercial Losses (Including subsidy)	9,319.10	15,072.40	11,541.80	13,103.00
G	**Rate of Return (ROR%)a**	**-19.7**	**-24.0**	**-18.0**	**-14.3**
H	Revenue Mobilization - From introducing				
	50 Paise/ Unit from Agriculture/irrigation	1,541.10	1,631.90	1,768.80	1,308.60

Source: Economic survey 2012-13, Govt. of India

CONCLUSION

Energy is crucial variable to determine the rate of growth and development as well as crooning and poverty have a link with power sector. More important is the fact that plans after plan energy development was accorded relatively greater importance, which is reflected in the fact that investment on energy increased. Proposed outlay for the twelfth plan of Rs. 10460 crore (at constant price) includes GBS of Rs. 3537 crore. The main challenge before the energy sector for fuelling the proposed growth in the twelfth Plan is to enhance energy supply in cost-effective ways. The persistent shortages of electricity both for peak power and energy indicate the magnitude of the problem. Average peak shortages are estimated to be 12% in 2013-14 which is an underestimate as scheduled load shedding is not included in it. The very high load factor of 76.8% for the system indicates that the system is operating under strain or has limited reserve. At the same time, for want of natural gas, some gas-based power plants are kept idle. Nuclear plants are also operated at lower load factors for want of adequate uranium. Power shortages are an indication of insufficient generating

capacity and inadequate transmission and distribution (T&D) networks. To a great extent this is the outcome of poor financial health of the State Electricity Utilities having high levels of Aggregate Technical and Commercial (AT&C) losses.

The pace of energy development in India has, however, not been in accordance with demand for energy. The persistence of chronic shortages of energy in India is attributed to a number of causes which have been examined in the paper dealing with the energy crisis and its impact on Indian economy.

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