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Study Of Infrastructural Development Of Energy Sector In Indian Economy

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ABSTRACT:
One of the major requirements for sustainable and inclusive economic growth is an extensive and efficient infrastructure network. It is critical for the effective functioning of the economy and industry. The key to global competitiveness of the Indian economy lies in building a high class infrastructure. To accelerate the pace of infrastructure development and reduce the infrastructure deficit, the Government has initiated a host of projects and schemes to upgrade physical infrastructure in all crucial sectors. Despite several challenges, the positive results of the Government's initiatives are showing in some sectors. However, required capacity addition in a time-bound manner needs focused attention in other sectors.

Key words: *economic growth, physical infrastructure*

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 labour-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 mechanisation of cultivation, the manufacture of capital goods for agriculture in large scale industries and transportation of surplus products to the marketing centres will also call for an increasing use of commercial power. Thus, adequate application of energy to agriculture not only increases productivity of land and labour 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 mansoon rainfall, inadequate and unassured 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. This study attempts to analyse the country-wise financial and technical collaboration towards the development of energy sector in India.

INFRASTRUCTURE, GROWTH:
INDIAN CONTEXT:

However, the importance of infrastructure goes far beyond its impact on growth. It speeds up the nations production and distribution of economic output as well as to its citizens‟ overall quality of life. It is often said that infrastructure can be considered, if not the engine, then the wheels of economic growth. This is

one part of the infrastructure story. The other part is that infrastructure helps to spread the benefits of growth, which makes the development process more inclusive. Lack of such infrastructure facilities is considered to be a major structural weakness, which holds back to underutilization of existing productive capacity and constrain, that may have unfavorable impacts on profits and production levels adversely. Weak and inadequate infrastructure leaves the country backward and allows its people to stagnate in poverty and a lower standard of living. Investigate the relationship between physical infrastructure and per capita NSDP. What is the impact of infrastructure development on poverty? Patra and Acharya (2011) examine the spatial disparities in infrastructural facilities across 16 major states in India and in turn analyses its impact on regional economic growth. Empirical evidence suggests that there is a positive relationship between Infrastructure Development Index & Per Capita Net State Domestic Product and negative relationship between Infrastructure Development Index & Poverty. Hence, effort should be directed to create more infrastructure facilities at the state level to raise the state domestic product and reduce the level of poverty and unemployment of the people concerned.

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 2014 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 2013 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 Eleventh Five-year Plan.

The National Electricity Policy (NEP) stipulates energy for all by 2013 and annual per capita consumption of electricity to rise to 1000 units from the present level of 631 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 SOURCE-WISE BREAK UP OF ELECTRIC ENERGY
(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%)**

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 Darjeeeling. 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, realisation 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. It was only with the beginning of the first five year plan that energy development received a Phillip.

THE GROWTH IN CAPACITY, PRODUCTION AND CONSUMPTION OF HYDRO, THERMAL AND NUCLEAR ENERGY DURING THE PLANS:

During the first plans (2003-04), construction of a number of major river valley projects like Bhakra-Nangal, Damodar Valley, Hirakund and Chambal Valley was taken up. These projects resulted in the stepping up food production and energy generation. Emphasis in Second Plan was on development of basic and heavy industries and related need to step-up energy generation. During the Third Plan, emphasis was an extending energy supply to rural areas. The significant development in this phase was the emergence of inter-state grid system. The country was devided into five regions, regions electricity boards was established in each region to promote integrated operation of constituent energy system. In the mid-sixties the country experienced successive droughts which influenced the planners to re-orient the emphasis on rural electrification. Thus the three Annual Plans, that followed the Third Plan aimed at consolidating the programmes. initiated during the Third Plan.

During Fourth Plan envisaged the need for central participation in expansion of electricity generation programmes in strategic locations to supplement the activities in the State sector and revoval of imbalance and to enable equitable distribution. Progress in energy generation programmes during the end of the Fourth Plan was substantial.

Emphasis in Fifth Plan was on speeding up the construction and commissioning and the construction work on others was speeded up. A number of power station was 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 K.W.

During the Ninth plan, IREDA sanctioned capacity of 1261.71 MW and 2.84 lakh metric tonnes coal repacment (MTCR/annum). The financial achievements in terms of loan sanction and disbursement were of the order of Rs. 3851.63 crore and Rs. 2027.03 crore respectively.

During the Eleventh plan, capacity addition target of 41,110 MW comprising 14,393 MW hydro, 25,417 MW thermal and 1,300 MW nuclear was fixed for the 11th Plan. The sector wise, type wise summary of this capacity addition target is given in Table below.

Table 2
11TH PLAN 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%)

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 11TH PLAN:

Electricity is in the concurrent list in the constitution. The National Electricity Policy (NEP), 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 2011. To fulfill the objectives of the NEP, a capacity addition of 78,577 MW has been proposed for the eleventh five-year plan. The power sector is expected to grow at 9.5 percent per annum

Table 3

ELEVENTH 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**	

A number of projects envisaged for the Eleventh 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-4.

Table-4

STATUS OF ELEVENTH 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

As per the Integrated Energy Policy (IEP), issued by the Planning Commission, GDP growth rates of 8%-9% have been projected during the 11th 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 11th 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 non-conventional 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 11th Plan, the expected generation would be only around 41 BU. The generation from these renewables 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 2013-14. The rate of return of the State power sector which was (-) 24.0 per cent in 2011-12 is estimated to have improved to (-) 14.3 percent in 2013-14.

Table-5
FINANCIAL PERFORMANCE OF POWER UTILITIES
(Rs. crore)

	2010-11	2011-12	2012-13	2013-14
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
Less subvention from State Govt.	13,414.70	13,752.50	14,159.60	13,358.80
Net Subsidy	**22,125.00**	**26,301.50**	**28,973.10**	**32,728.60**
Surplus Generated by sale to other sector	8,232.70	5,275.60	8,704.00	9,638.90
Uncovered Subsidy	13,892.30	21,025.90	20,269.10	23,089.70
(i) Commercial Losses (excl. subsidy)	22,733.80	28,824.90	25,701.40	26,461.80
(ii) Commercial Losses (Incl. subsidy)	9,319.10	15,072.40	11,541.80	13,103.00
Rate of Return (ROR%)	**-19.7**	**-24.0**	**-18.0**	**-14.3**

CONCLUSION:

Energy is one of the few sectors of the Indian economy, which recorded a spectacular growth during the last five decades. 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 eleventh 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 Eleventh 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.

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