

# **PROBLEMS AND PROSPECTS OF ELECTRICITY DEVELOPMENT IN KERALA**

**Dr. Varghese Antony**

**Associate Professor, Department of Commerce**

**ST. Thomas College, Kozhencherry**

## **Abstract**

Energy is an important parameter in the overall economic development activity of any country. It has become synonymous with progress in all fields of activities. Electric power is a critical component as well as a determinant of a nation's development. It is the most widely used form of domestic and commercial energy. It has become an inevitable necessity influencing every aspect of life and forming an increasing proportion of consumption, particularly in developing countries. It is the most economical and therefore, the most essential form of energy for industrial and agricultural growth. Hydro power has been the main source of generating electricity in Kerala. In spite of the overall development that has taken place, the power supply industry has been under constant pressure to the rate of growth in the demand bridge the gap between supply and demand. The rate of growth in the demand side variables such as number of consumers, number of street lights, number of irrigation pump sets etc. is greater than the growth rate in supply side variables like installed capacity and electricity generation.

## **Introduction**

Electricity is the most versatile productive input and modern society owes a great deal to it for its economic affluence and social comforts. Electricity not only lightens the country, but also heightens its economy. It plays a vital role in rejuvenating the economy. It runs the wheels of industry and leads the country to prosperity. The availability of cheap power is generally believed to give fillip to the fast industrial growth and modernization of agriculture. Without ready availability of cheaper energy, the greater strides taken by the society, industry, transport and agriculture could have been unimaginable. Consumption of electricity is considered as one of the yardsticks to measure the development of the nation. It is in this context, an attempt is made in this study to examine the pattern of growth and development of electricity sector in Kerala. This paper examines the performance and problems of power development in Kerala during the planning periods.

Kerala has been fortunately endowed by nature with immense potential of hydroelectric power at low cost. The state is blessed with a network of perennial rivers. Since all precipitations in the hills flow down to the sea, this calls for storage of water at appropriate points and levels in order that the water may be regulated and utilized all the year round. The rainfall is highly uneven, concentrated in four to five months and the remaining period is practically dry. Hence, the storage capacity in the reservoirs should be adequate to cater to the needs of the power loads all through the year. Owing to the fact that the run off to the rivers in the dry season is quite meager, no hydro scheme other than storage schemes would suit the Kerala state.

## **History of Electricity Development**

The genesis of power generation in Kerala can be traced back to a mini hydroelectric power plant established by the Kannan Devan Hill Produce company in 1906 at Munnar, with an installed capacity of 200 KW. The plant was meant only for the use of tea factories of the company in their tea estate at Munnar. Later, the capacity of the station was increased to 1900 KW. Government efforts for power generation come for the first time when a small thermal station of 5 MW was opened in Thiruvananthapuram in 1929. Licenses were issued to two private parties for generating and supplying power and as a consequence electric supply was started at Kottayam in 1931 and at Nagarcoil in 1933. During the period the attention of the Government was mainly focused on providing comparatively cheap electricity for industrial and agricultural purposes. Investigations aimed at harnessing several river systems were conducted. An Electricity Department was formed in the state in 1933.

### **Growth of power projects**

The commissioning of the Pallivasal project in the district of Idukki in 1940 marked a new era in the development history of Kerala power system. It was the first hydro electric power project started on a commercial basis under the state initiative. The power station fed into a small transmission and distribution network comprising 66 KV and 11 KV lines and sub-stations. Its first stage become operational in 1940, when the Swiss made Pelton Prime Mover generated 5 MW electricity from the project constructed in the reservoirs of Kundala and Mattupetty. The commissioning of the Pallivasal project was a significant development in the power history of Kerala. The capacity of the project was subsequently raised to 15 MW by 1942 and further to 37.5 MW by 1951.

The second power station (Sengulam) started functioning in 1954 at Anayirinkal reservoir. Initially, its capacity was fixed at 12 Mw, which was later increased to 48 Mw in 1955. Sengulam was the first hydro electrical power project sanctioned and commissioned during the post independence period in Kerala as per the stipulations of Indian Electricity (supply) Act of 1948.

The expansion of Pallivasal project to 37.5 Mw capacity and the commissioning of the Sengulam project with an installed capacity of 48 Mw were carried out during the first five year plan period (1951-1956). This helped to step up generation of electricity to 350 MU per annum in the final year of the first plan period. The growth of electricity sector in Kerala during the plan periods is presented in the table 1. The annual per capita consumption increased from 13 units in 1950 to 18.5 units in 1956. During the first plan period, 222 villages were electrified and 50656 consumers were given electric connection. Also 17,584 street lights were set up and 702 irrigation pump sets were energized additionally.

**Table 1**

#### **Kerala Electricity Sector - Growth indicators**

Period	Installed capacity Mw	Generation MU	No. of Villages Electrified	No. of Consumers (Lakhs)	No. of Street lights (Lakhs)	No. of Irrigation Pump sets

1950	38	151	159	0.28	0.07	191
End of First plan 31-3-1956	86 (55.8)	350 (131.8)	381 (139.6)	0.79 (182)	0.24 (242.8)	893 (367.5)
End of second plan 31-3-1961	132.5 (54)	582 (66.3)	872 (128.9)	1.75 (121.5)	0.96 (300)	4615 (416.8)
End of third plan 31-3-1966	193 (45.7)	842 (44.7)	1083 (24.2)	3.25 (85.7)	1.07 (11.5)	7007 (51.8)
End of fourth plan 31-3-1974	622 (22.3)	2510 (198)	1173 (8.3)	7.77 (139)	2.74 (156)	37611 (436.8)
End of fifth plan 31-3-1979	1012 (62.7)	5190 (106.8)	1224 (4.3)	11.72 (50.8)	3.02 (10.2)	66240 (76.1)
End of sixth plan 31-3-1985	1012 (0)	4885 (-5.8)	1268 (3.6)	22.17 (89.2)	4.52 (49.7)	131991 (99.3)
End of seventh plan 31-3-1990	1477 (45.9)	5075 (3.9)	1268 (0)	31.92 (43.9)	4.98 (10.2)	199504 (51.1)
End of Annual plans 31-3-1992	1477 (0)	5326 (4.9)	1384 (9)	36.98 (15.8)	5.44 (9.2)	238206 (19.4)
End of Eighth plan 31-3-1997	1508.5 (2.1)	5502.86 (3.3)	1384 (0)	66.62 (35.3)	7.97 (30.2)	315149 (32.3)
End of ninth plan 31-3-2002	2601.62 (72.5)	7142.18 (29.8)	1384 (0)	66.62 (35.3)	7.97 (30.2)	405900 (28.8)
End of Tenth plan 31-3-2007	2657.22 (2.1)	7745.78 (8.5)	1384 (0)	87.14 (31)	9.99 (25.3)	474602 (16.9)
As an 31-3-2010	2746 (3.34)	74240.38 (-6.5)	1384 (0)	97.43 (11.8)	11.48 (14.9)	512101 (7.9)
% change	7126	4695	770	34696	16300	268015
Annual average compound Growth rate (%)	7.39	6.66	5.29	10.25	8.87	14.06

Source: 1) Kerala state Electricity Board, "Power system statistics"

Thiruvananthapuram (Various issues)

2) KSEB, 'Annual Administration Report'. Thiruvananthapuram (Various issues)

Note: Figures in brackets show the percentage increase over the previous

During the second five year plan period (1956-61), the Kerala State Electricity Board, which was established on 31-3-1957, completely took over the responsibility for development and distribution of electricity in Kerala state. During this plan period, the installed electricity generation capacity was increased to 132.5 Mw and the generation of electricity was raised to 582 MU by 1961. The per capita consumption rose to 30 units during the same year. During this period, 491 villages were electrified, 96219 electric connections were given, 71569 street lights were additionally put up and 3722 additional irrigation pump sets were energized.

The third five year plan (1961-66) started with a shortage of 6 Mw in firm power capacity. The addition of 2 units of 15 Mw in Neriamangalam station during this period helped to increase the installed capacity. Commissioning of 2 units of 15 Mw each at Panniar station helped to increase the installed capacity to 193 Mw. In spite of the additional supply of electricity from Tamil Nadu, the shortage of electricity in the state was about 75 Mw at the end of the third five year plan. During this plan period, 211 villages were electrified 150069 consumers were given electric connection, 24351 more street lights were put up and 2392 irrigation pump sets were energized additionally.

With the commissioning of Idukki (stage-1) in 1976, the generation capacity of the system rose to 1011.5 Mw in the fifth plan period. The per capita consumption of electricity increased to 96 units. By 1978 March, 1224 out of 1269 villages were provided with electricity and by 1980 all the villages were electrified thereby achieving 100 percent electrification.

In the sixth plan (1980-85) the strategies proposed for electricity development were (i) completion of all continuing projects for load balancing (ii) phasing out the backlog in transmission and distribution work and (iii) balancing the load generation to reduce losses in transmission. The sixth plan envisaged the commissioning of the ongoing Idamalayar, Idukki (stage -II and III), Sabarigri augmentation and Kallada. But these could not be commissioned as scheduled on account of labour problems, contract failures etc. During the plan period, the per capita consumption of electricity rose to 123.5 units, 9.25 lakh consumers were given service connections, 1.25 lakh street lights installed and 61,682 pumps sets were energized.

The seventh five year plan laid emphasis on implementation of ongoing projects rather than starting of new electricity projects. Almost ten electricity projects were completed by the end of the seventh plan and the installed capacity of these projects were increased to 1477 Mw. During the seventh five year plan, it was proposed to start work on Pooyamkutty Hydro Electric scheme and the small Hydro Electric Schemes of Malampuzha, Madupetty, Malankara, Chimoni and Peppara. Subsequently, Ashutha Diversion scheme was also taken up. Accordingly, the total generation of electricity increased to 5075 MU by the end of the plan period.

During the eighth plan, more capacity was added to the electricity system by the commissioning of Idukki (stage. II) and Idamalayar projects. Due to factors like environmental issues, taking up of new hydro electric projects became a problem in the state and hence the eighth five year plan document stressed the need to go in for more non-Hydel power projects. Even at the end of the seventh plan, also the per capita power consumption in Kerala was 164 Kwh as against the national average of 238 Kwh. Some of the important projects taken up during the eighth plan were Kakkad, Ashutha diversion, Kallada and small hydro electric schemes such as lower Periyar, Malampuzha, Malankara, Chimony and Pooyamkutty. However many of the new projects envisaged during eighth plan could not be completed as expected.

By the end of ninth plan, the installed capacity was increased to 2601.62 Mw and the generation of electricity increased to 7142.18 MU. The per capita consumption of electricity in the state increased to 395 Kwh. The number of consumers rose to 66.62 lakh, the number of street lights increased to 797053 and the number of irrigation pump sets energised reached to 405900.

By the end of tenth plan, the installed capacity was increased to 2657.22 Mw and generation increased to 7745.78 MU. The per capita consumption of electricity increased to 465 Kwh. The number of consumers increased to 87.14 lakh and the number of street lights increased to 9.99 lakh.

With the commissioning of the Neriamangalam Extension and Kuttiyadi Tail race projects, the installed capacity has been increased to 2746 Mw as on 31-3-2010. The per capita consumption increased to 474 kwh and the number of consumers increased to 97.43 lakh. But generation of electricity has decreased to 7240 Mu due to the damage caused to the Sabarigiri and Panniar Generating stations.

Table I discloses the annual average compound growth rate in the various growth indicators in the electricity sector between the period 1950 and 2010. The growth rate in installed capacity was at the rate of 7.39 percent whereas the generation has increased only at the rate of 6.66 percent. The number of consumers increased at the rate of 10.25 percent and the number of villages electrified at the rate of 5.29 percent. Number of street lights increased at the rate of 8.87 percent and number of irrigation pump sets increased at the rate of 14.06 percent. An analysis of the growth rate of the various indicators shows that the growth rate in the demand side variables such as number of consumers, number of street lights and number of irrigation pump sets is more than the growth rate in the supply side variables such as installed capacity and generation.

## **Conclusion**

The foregoing analysis of the growth of electricity sector in Kerala has thrown up several issues of serious concern in the context of electricity system restructuring. Kerala's power sector has registered significant progress since the process of planned development of the economy began in 1950. Hydro power has been the main source of generating electricity in Kerala. In spite of the overall development that has taken place, the power supply industry has been under constant pressure to bridge the gap between supply and demand. The major issues are the supply side variables such as installed capacity and electricity generation grew much slower than the demand side variables like number of consumers, number of street lights and number of irrigation pump sets. The rate of growth in installed capacity and generation was only at the rate of 7.39 percent and 6.66 percent where as the rate of growth in consumers was at the rate of 10.25 percent, street lights at the rate of 8.87 percent and irrigation pump sets at the rate of 14.06 percent. This led to widening gap between electricity supply and demand, in turn, leading to very fast increase in electricity import. The need for new thinking, fresh management approaches for restoring operational efficiency and financial viability in power sector, is more urgent now than ever before. So also the need for augmenting alternative power sources to balance the power requirement, conservation practices and preventive maintenance measures to manage the power at their levels.

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