



A Study on Consumption and Demand Forecast for Electricity in Mettur Distribution Circle, Tamil Nadu.

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ABSTRACT

Electrical Energy is an essential requirement to perform each and every kind of activity in the Universe and its consumption pattern is in phase with the population and economic growth. The rate of depletion of fuels to generate electricity is the foremost concern to investigate the existing energy usage, consumption pattern and demand, especially in urban areas for efficient utilization of energy. In this respect, the present study is focused on the above said aspect in Mettur Distribution Circle, one of the largest industrial town and densely populated city, in the state of Tamil Nadu, India. This study concentrates mainly on electricity consumers of Mettur Distribution Circle. The variations in energy utilization are assessed and the results are discussed. Since the energy demand and environmental deterioration are in rising trend, and the supply is inadequate, it is necessary to execute the energy conservation measures and utilize wisely not only to overcome the energy demand but also to safe guard the quality of life of the people in the region.

KEYWORDS : Energy; demand and supply; Mettur Distribution Circle

1. Introduction

India is the second densely populated country after china with 1210 million according to the 2011 census. This imposes significant problems in both energy and environmental sector in terms of fast depletion of fuel reservoirs and the subsequent environmental degradation. It is predicted that the world primary energy demand will be increased by 50 percent between 2005 and 2030 and around 45 percent of this increase will be due to China and India alone ^[1]. In India, the largest energy is consumed by the household sector, accounting for about 30 percent of final energy consumption (excluding energy used for transport) which indicates the importance of the household sector in total national energy scenario ^[2]. However, the electricity consumption pattern in household sector varies greatly and that depends on climate, living standards and lifestyles. Hence, it is essential to analyze the structure of energy consumption in developing cities in India in order to find out the demand and ways to compensate the same in the near future.

India ranks sixth in terms of total energy consumption in the world and needs to accelerate the development of the sector to meet its growth aspirations. It is worth to mention here that among the 1.6 billion people in the world whose lifestyle is in the absence of electricity ^[3], more than 1 billion people reside in India and China and the predominant them are in India.

As the economy develops, more and cleaner energy is consumed. In the modern cities of India, household electricity is mainly used for cooking, water and space heating and lighting and the required power is supplied through State Electricity Board. Moreover the same energy source is used for the maintenance of essential services and for powering devices that are used in industry and commerce ^[4].

The forecast for industrial sector is systematic as its consumption is pre-approved. The household and commercial sector energy consumption is dependant of changes in lifestyles and cannot be predicted so accurately. The availability of abundant and cheap power has enabled societies to develop machines and systems that can enhance the quality of human life and increase the efficiency and productivity of our work. Industrialized societies have relied on cheap and abundant supplies of fossil fuels such as oil and coal and their usage have increased steeply in the past century ^[5]. However, the drawbacks associated with the fossil fuels such as air pollution, global warming, waste disposal problems; land degradation and the depletion of natural resources are changing the reliance on fossil fuels currently. Furthermore, the cheap supplies of oil appear to be running out. Due to the instability of fuel prices, energy intensive industries will find it increasingly difficult to maintain a competitive position. Hence both industrial and household sector rely on electricity, thus increasing demand for electricity.

The household energy consumption is expected to increase in future in phase with the growth in population, economy and rise in per capita income. Hence, it is necessary to analyze electricity consumption pattern in the cities to frame policies for promotion of sustainable energy use.

The energy sector is emerging as a vital sector in the Indian economy and in the next few years is likely to see a significant growth in power generation capacity in the country. The growth would be across a wide spectrum of technologies, with significant capacity addition expected in hydro, thermal and nuclear sectors. With the civil nuclear co-operation deal a reality, there would be capacity additions in the nuclear energy sector.

As a result, the power scenario in different states is likely to change significantly. Presently, the environment is conducive for big companies to invest in Tamil Nadu. However, there are many challenges to ensure that the requirements are met both for domestic, irrigation and industrial application. The study examines the current scenario and provides detailed inputs on the various means for providing power to Mettur, Tamil Nadu, that has attracted many domestic connections and power critical industries, and to examine the demand supply gap to look at alternative opportunities.

2. Need for the Study

Electricity has a direct bearing on the quality of life of citizens and it also contributes to prosperity of the nation. Power infrastructure has become a critical ingredient for the sustainable growth of economy. It drives the State's industrial, commercial and overall social and economic growth. The availability of affordable, reliable and quality power is a basic need of the State. For an industrialized state like Tamil Nadu, the demand for quality power increases exponentially and moves in tandem with rate of economic and population growth.

The installed capacity of the State as on 31.5.2012 is 10364 MW. However, the average availability stands at 8500 MW, while the demand for power ranges from 10000- 12300 MW [6]. Even after commissioning of alternate sources of generation, the State is facing acute power shortage due to increasing demand. Increase in per capita consumption pattern due to rise in the number of consumers and their consumption pattern on one side and capacity addition on the other have resulted in widening of the gap between demand and supply. Also, delay in commissioning of projects, acute corridor constraint for transmission of power, etc., are the other factors attributable for power shortage. Due to inadequate tie-up with long terms sources of power generation, the possibility of bridging the gap between demand and supply becomes difficult. At present, the shortage is managed by resorting to power purchases, utilizing wind generation and restriction and control measures.

Hence, special emphasis has been accorded for augmenting power to fully meet the rising demand. Strategic steps are being taken to provide quality and uninterrupted power supply for all the sectors in the State. This in turn improves the quality of life of the people.

To carry-out these activities efficiently and effectively micro level studies has to be carried, considering the industrial cities in Tamil Nadu. Keeping this view, Mettur is selected for this study. Mettur is an industrial hub and has fast growing industries like Aluminium, Chemicals, Steel and many industrial estates. Apart from these, it acts as a commercial hub. As electricity remains as a lifeline for growth of these sectors, it is a need of the hour to carry out this study. This study will provide necessary information for Government to plan and provide adequate knowledge to the Public.

3. Objectives of the Study

The present study has confined into the following objectives:

1. Identifying utilization of present energy sources in domestic, agricultural, commercial, and industrial sector in Mettur region, Tamil Nadu
2. Quantifying electricity used in the each sector
3. Forecast its future requirement based on present growth rate

4. Methodology

- a) **Data Collection:** The required data is obtained from the intranet of Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO), Mettur Distribution Circle. The Study is based on the Primary Data. Various books have also been referred to know the subject matter. Forecast is made on the available data, and the growth of previous years.
- b) **Study Area:** The area selected for the present study is Mettur Distribution Circle, Erode Zone in Tamil Nadu.
- c) **Period of Study:** The Data was collected on September 2014 and the study was carried out for the period of 4 years. i.e. 2010-2013.

5. Assumptions and Limitations

1. The growth rate is assumed as that of previous year's rate of growth.
2. There is no metered reading for free supply of electricity for agriculture. Policy for providing future connections in this category has to be decided by the Government/ Regulatory Board. It is presumed as the policy exists and forecast is given.
3. The study is limited to Mettur Distribution Circle only, using available data.

6. Discussions

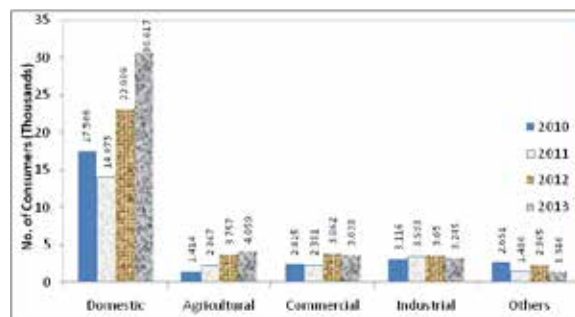
The electricity consumers in Mettur Distribution Circle are categorized as Domestic or household, Agricultural, Commercial, Industrial and Others. Domestic consumers use electricity for day today uses in homes. Agricultural consumers use power for irrigation purpose. These consumers are again classified as free power users and paid customers. Commercial consumers are those, who use electricity for shops, establishment, offices, schools and entertainment houses. Industrial consumers use electricity for manufacturing goods and services. Others fall under hut connections and special purposes predefined by Board/Government.

Table: 1 Consumer Category and No. of Connections between 2010 and 2013

S No.	Consumer Category	No. of Connections			
		2010	2011	2012	2013
1	Domestic	17506	14075	22989	30617
2	Agricultural	1414	2367	3757	4059
3	Commercial	2415	2381	3862	3638
4	Industrial	3116	3533	3650	3245
5	Others	2651	1486	2365	1346
	Total	27102	23842	36623	42905

Source: Intranet, TANGEDCO

Figure: 1 Consumer Category and No. of Connections between 2010 and 2013



Source: Primary Data

The above table shows the number of consumers, in each category for the years 2010, 2011, 2012 and 2013. It is evident from the figure that the domestic consumers occupy the predominant position in the list. Other sector consumers are also plotted in the figure and are self explanatory.

Table 2 illustrates the Percentage of consumers in each sector, and their energy consumption in Percentage for the year 2013, in Mettur Distribution Circle. The Domestic sector consumes 71.36 %, followed by Agriculture, Commercial, Industrial and Others with 9.46 %, 8.48 %, 7.56 % and 3.14 % respectively.

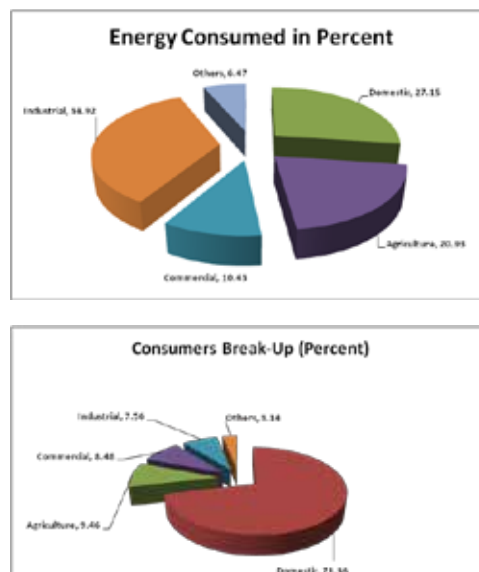
Table: 2 Consumer and Consumption pattern for the Year 2013

Type of Connection	Total No. of Consumers (Percent)	Energy Consumed (Percent)
Domestic	71.36	27.15
Agriculture	9.46	20.93
Commercial	8.48	10.43
Industrial	7.56	34.92
Others	3.14	6.47
Total	100	100

Source: Intranet, TANGEDCO

The Pie-Chart also shows the break-up and Consumption for each sector for 2013.

Figure: 2 Consumer and Consumption pattern for the Year 2013



Source: Primary Data

6.1 Power Generation and Demand for Mettur Distribution Circle

Mettur is one of the main sources of Electricity in Tamil Nadu. It has Thermal and Hydro Electric Power Stations. Thermal Power Station acts as one of the base load power stations for Tamil Nadu Electricity Board.

Table: 3 Sources of Generation and Installed Capacity

S No.	Source of Generation	Installed Capacity(MW)
1	Mettur Thermal Power Station(4*210MW)	840
2	Hydro Power (i)Tunnel Power House (200 MW) (ii)Dam Power House (40 MW)	240

Source: Tamil Nadu TANGEDCO Policy note- 2014

Apart from these sources, Mettur has several Barrage Power houses located in the bank of Kaveri river namely Chekkanur, Nerinjipettai, UratchiKottai. It is having one of the largest private sector power suppliers MALCO, with a power generation capacity of 100 MW from four units of 25MW each.

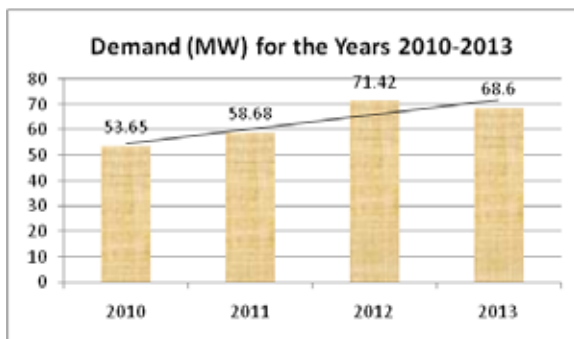
Table: 4 reveals the Electricity demand for the study area for the period 2010-2014.

Table: 4 Electricity Demand -2010- 2013 of Mettur Distribution Circle

S No.		2010	2011	2012	2013
1	Demand(MW)	53.65	58.68	71.42	68.60

Source: Intranet, TANGEDCO

Figure: 4 Electricity Demand -2010- 2013 of Mettur Distribution Circle



Source: Primary Data

7. Demand Forecast

The available data reveals that the demand growth from 2010 to 2013 is 27.86 Percent (say 30 %). Considering the current growth rate scenario and past experience, the demand for 2017 is calculated as 89.18 MW (say 90 MW). [Demand for 2013 *30 % increase for 4 years].

The Demand for the year 2017 for Mettur Distribution Circle is expected to be 90 MW.

8. Conclusion

It is essential to make an Energy forecast for the nation that will give enough preparation, planning and induction time for all new sources of energy, to mature the technology and to make them economical. For this, a thorough knowledge and study of the prospects, economics and long term environmental concerns due to implementation of various energy related technologies are necessary at micro level. Studies have to be conducted growing cities, and this will be more accurate for deciding national energy forecast, and hence this study. Significant technology development in generation of power has taken place worldwide, and to be on track, these studies play a vital role.

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