

POWER SECTOR IN KARNATAKA: AN ANALYSIS OF ELECTRICITY GENERATION, SUPPLY AND CONSUMPTION

Abstract:-

Electricity is very essential for human life in modern days that is why our Honorable Prime Minister Narendra modi always speaking about electricity, he knows that electricity is one of the key input for economic development. The main objective of Indian government to provide electricity to all in manner 24×7 and improves the electricity system in the line of. The present study is going to shed light on these aspects and the main objectives of this work is try to know about power sector scenario in Karnataka to help improve the system by new government in central.



The study also tries to give the effective solution to overcome problems of Karnataka power sector with the help of some effective policy implications. The present work has used secondary sources like Economic surveys, working papers which published by Govt. of Karnataka and Govt. of India and to analyze the electricity generation, supply and consumption, some statistical tools and charts like CAGR and AGR are adopted.



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Keywords:

Karnataka power sector, Generation, Supply and Consumption.

I. INTRODUCTION

The state of Karnataka can proudly be considered a pioneer in the development of many areas of electricity not only in India but also many parts of Asia. Starting from one of the first hydro-electric station in Asia at Shivanasamudra in 1902. The first state to promote the use of electricity in residences and agriculture in 1960s, and to start one of the first co-operative society for electricity distribution in 1969, it had been a story of bold initiatives and adventurous actions. But it has also been a sad story of power shortages during the last few decades. The present study focuses on power sector position and try to know about Power generation, transmission and distribution status.

The electricity supply system contains three different functions namely Generation, Transmission and distribution, electricity is produced from a number of energy sources, generation stations produced power and the transmission system is used to transfer large amounts of energy from the main generation areas to major load centers and finally distribution systems carry the energy to the furthest customer.

The State of Karnataka is located in the southern region of India with installed electricity generation capacity of 13,596 MW in 2012-13. Karnataka constitutes 6% of the total installed electricity generation capacity of India which is mainly from fossil fuels such as coal and natural gas. Private sector has a 35% share in the total installed capacity, implying a healthy investment environment. The private sector capacity includes mainly the renewable energy sources of power generation with a share of nearly 60%. The status of power sector in terms of both installed capacity and electricity generation for Karnataka

II. INSTITUTIONAL STRUCTURE OF THE POWER SECTOR IN KARNATAKA:

In order to improve the performance of the power sector in the state, the Karnataka Legislature (Government of Karnataka) passed the Karnataka Electricity Reforms Act (KERA) in 1999. It mandated unbundling of the Karnataka Electricity Board (KEB). Therefore, the government of Karnataka formed four new independent distribution companies in year 2002. These are Bangalore Electricity Supply Company, Mangalore Electricity Supply Company, Hubli Electricity Supply Company and Gulbarga Electricity Supply Company. One more Distribution Company was formed in Mysore w.e.f. 1.4.2005 by bifurcating the jurisdiction of Mangalore Electricity Supply Company Ltd. Karnataka Electricity Regulatory Commission (KERC) forms regulations in the state and also look after all other regulatory matters related to electricity generation, transmission and distribution. Karnataka Power Transmission Corporation Limited (KPTCL) incorporated in year 1999 and wholly owned by the Government of Karnataka. KPTCL is engaged in power transmission in the State of Karnataka and also constructs transmission lines.

III. ELECTRICITY INSTALLED:

Karnataka Power Corporation Limited has been pioneering the capacity addition for power generation in the public sector and various private generators have also established power plants in the State. The total installed generation capacity has been increasing in both the public sector and private sector including the State's Share in the central generation stations from 5133.48 MW in 2002-03 to 13934 MW in 2012-13. about 9.5 per cent CAGR recorded in 2012-13 same in public sector hardly 3% CAGR was recorded and private sector installed capacity has been increasing with 29.5 % CAGR. The table 3.1 shows that in Karnataka electricity installed capacity in private sector has been increasing and this good sign for Karnataka power sector and it also noticed total installed capacity annual growth was very high in 2010-11 (30.86%).

Table: 3.1

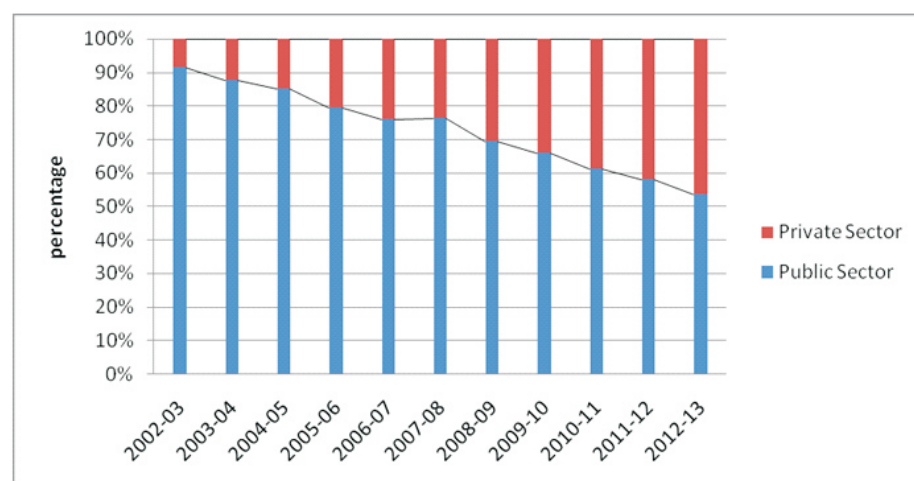
Sector Wise Total Installed Capacity in Karnataka 2002-03 to 2013-14 (MW)

Year	Public Sector	Private Sector	Total	A G R %
2002-03	4699.03 (91.54)	434.45 (8.46)	5133.48	-
2003-04	4713.83 (87.58)	662.39 (12.31)	5382.22	4.85
2004-05	4884.83 (85.14)	852.76 (14.86)	5737.59	6.60
2005-06	4994.83 (79.55)	1283.88 (20.45)	6278.71	9.43
2006-07	4994.83 (76.10)	1568.25 (23.90)	6563.08	4.53
2007-08	5509.83 (76.28)	1713.08 (23.72)	7222.91	10.05
2008-09	5739.83 (69.54)	2514.45 (30.46)	8254.28	14.28
2009-10	5725.96 (65.92)	2959.95 (34.08)	8685.91	5.23
2010-11	5975.91 (52.58)	5375 (47.29)	11366	30.86
2011-12	6014 (49.88)	6042 (50.12)	12056	6.07
2012-13	6499 (46.64)	7435 (53.36)	13934	15.15
2013-14	6499 (46.02)	7623 (53.98)	14122	1.35
C A G R	3.0	29.5	9.5	

Source: Karnatak Economic Survey 2002-03 to 2013-14

In the figure 3.1 observed that installed capacity in public sector has been decreasing around from 90 per cent to 50 percent in other hand in private sector installed capacity has been increasing around 10 per cent to 50 percent in Karnataka. This is good movement in Karnataka power sector, but it is not enough, in coming days the installed capacity should be increase in private sector then only we can meet power requirement in Karnataka.

Figure: 3.1
Sector Wise Installed Capacity Trend in Karnataka: 2002-13 to 2012-13



Source: Karnatak Economic Survey 2002-03 to 2013-14

IV. ELECTRICITY GENERATION:

Electricity generation is the process of generating electric power from other sources of primary energy. In Karnataka water, coal, wind and solar are the main sources for the electricity generation. In Karnataka electricity generation has been increasing include both private and public sector, from 19014 MU in 2002-03 to 93884 MU in 2013-13 with 7% Compound annual growth rate.

Electricity is key input for economic development of a country, agriculture and industry heavily depend on electricity and it's also improving the quality of living standard of the people. In Karnataka electricity supply has been increasing from 28057 MU in 2002-03 to 57373 MU in 2012-13, with 6.7 % CAGR was recorded in 2012-13, except 2005-06 and 2008-09 year on year growth rate positively grown, in the year 2003-04 (20.5%) highest growth rate was recorded and followed by 2011-12 (20.4%). In Karnataka Electricity generation has been increasing with CAGR 7 % in 2012-13 and year on year growth

also increasing, but hardly 70% of electricity produced in Karnataka and around 30.5 per cent depend on imports from central and other states is provide table. 4.1

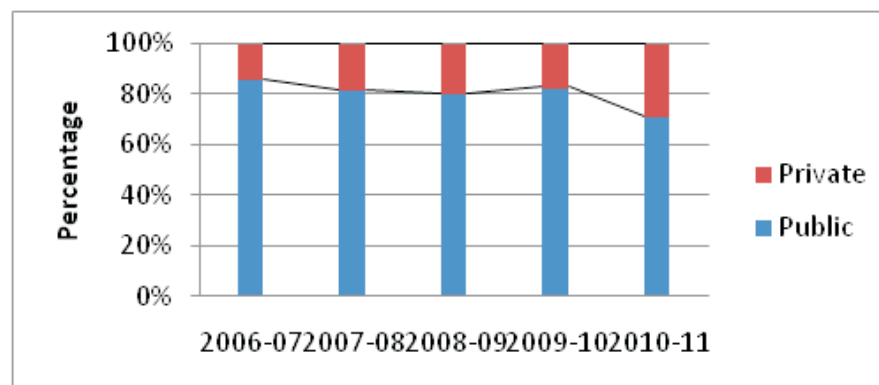
Table: 4.1
Status of Electricity Supply in Karnataka (MU) 2002-03 to 2012-13

SL.No	Year	Electricity Generation	Electricity Imports	Total Electricity supply	AGR
1	2002-03	19014 (67.8)	9043 (32.2)	28057	
2	2003-04	23585 (69.8)	10220 (30.2)	33805	20.5
3	2004-05	26457 (73.8)	9380 (26.2)	35837	6.0
4	2005-06	24070 (67.8)	11453 (32.2)	35523	-0.9
5	2006-07	30719 (73.3)	11174 (26.7)	41893	17.9
6	2007-08	31229 (69.8)	13527 (30.2)	44756	6.8
7	2008-09	30188 (72.2)	11600 (27.8)	41788	-6.6
8	2009-10	31566 (74.1)	11009 (25.9)	42575	1.9
9	2010-11	30474 (64.5)	16798 (35.5)	47272	11.0
10	2011-12	43726 (76.8)	13202 (23.2)	56928	20.4
11	2012-13	39884 (69.5)	17489 (30.5)	57373	0.8
CAGR		7.0	6.2	6.7	

Source: Karnataka Economic Survey 2013-14

In Karnataka power produced in hands of both public and private sectors. Karnataka Power Corporation Limited is the main electricity generation corporation in public sector the figure 4.1 presented in the hands of public sector electricity generation is decreasing, but it is still acquired around 70 per cent of total electricity generation.

Figure: 4.1
Sector wise Electricity Generation in Karnataka: 2006-07 to 2010-11

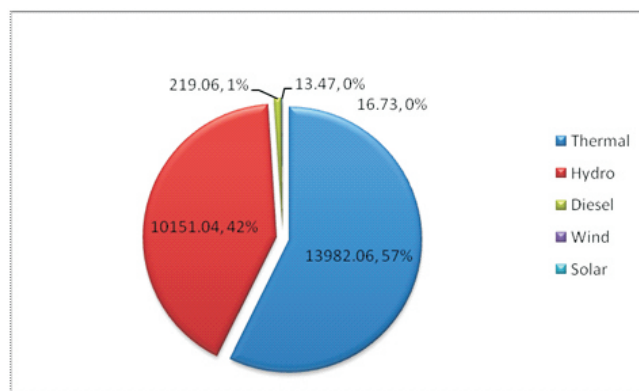


Source: Karnatak Economic Survey 2013-14

Karnataka has failed to attract substantial domestic or foreign private investments. The public sector still generates over 70 per cent of the 30.474 million units in 2010-11. The basic reason for poor private investment inflow into the sector is that of uncertainty over minimum returns and a politicized decision making process. In the above figure 3.1 we observed that the public sector getting downward from 85 per cent to 70 per cent, this is good sign for Karnataka power sector.

Interestingly Karnataka coal producing is zero because there is no coal reserves, but Thermal is the main source for electricity generation in Karnataka, during 2012-13 13982 MU was produced out of total 24382 MU by thermal source only its around 57% contribute to total electricity generation and Hydro is second source of electricity generation in the state, hydro source contribute around 42% (10151 MU), then diesel, wind and solar are contribute very little 1%(219MU), 0.4%(13.47 MU), 0.6%(16.73 MU) respectively is provide figure 4.2

Figure: 4.2
Source Wise Electricity Generation in MU: 2012-13



Source: KPCL Annual Report 2012-13

V. ELECTRICITY SHORTAGE IN KARNATAKA:

Karnataka is one of the progressive state, but power shortages erode the state efforts for the development. Due to growing population create power shortage. In power shortage compare with southern region Karnataka having highest power shortage. During 2013-14 7 per cent power shortage recorded in southern region, in the same duration in Karnataka 10 per cent power supply shortage recorded and all our neighboring state having bellow the 7% per cent this is alarming for Karnataka power sector. In the sense the Karnataka State Government has been planning through various means for capacity addition for adding more power to the grid to meet the growing demand.

Indian power sector divided in to five region namely Northern region, Western region, Southern region, Eastern region and North eastern region, Karnataka come under Southern region the southern region is one of the highest electricity generator and consumer region in the country.

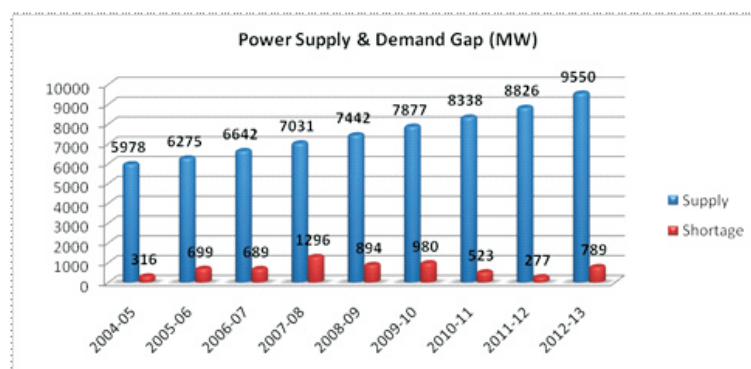
Table: 5.1
Power Supply Position in terms of Requirement & Availability
In Southern Region: 2013-14.

States	Requirement	Availability	Surplus(+) / Deficit(-)	
			MU	%
Karnataka	64150	58052	-6098	-9.5
Andhra Pradesh	95662	89036	-6626	-6.9
Kerala	21577	21052	-525	-2.4
Tamil Nadu	93508	87980	-5528	-5.9
Pondicherry	2344	2320	-24	-1
Lakshadweep	48	48	0	0
Southern Region	277245	258444	-18801	-6.8
India	1002257	959829	-42428	-4.2

Source: CEA load Generation Balance Report 2014-15

Four states and two union territories are come under southern region. About 4.2 per cent electricity shortage in India, in Karnataka power requirement about 64150 MU but availability 58052 MU is around 9.5 power shortage in Karnataka during 2013-14, in southern region except Lakshadweep all other state and U.T is having power shortage and Karnataka having more than the southern region (6.8) is provide in table 5.1.

Figure: 5.1
The Status of Power Shortage in Karnataka (MU): 2004-05 to 2012-13



Source: Karnataka Economic Survey 2013-14

The center issue in power supply in Karnataka is the status of demand & supply to ensure that there is shortage in supply accrued because of growing population create more demand for electricity and state having good record about power supply. The State has been increasing year on year from 5978 MW in 2004-05 to 9550 MW in 2012-13 in same power shortage also moving in same way during 2007-08 highest power shortage recorded about 1296 MW now it's come down to 789 MW in 2012-13 is presented in figure 5.1

This is good sign for Karnataka power sector. The State Government has been planning through various means for capacity addition for adding more power to the grid to meet the growing demand.

VI. Electricity distribution and consumption:

Power distribution is the final and most crucial link in the electricity supply chain. In Karnataka Electricity supply function carried by five electricity supply companies namely HESCOM, BESCOM, MESCOM, GESCOM, and CHESOM, these companies are supplying electricity to different consumer on different tariff rates determined by KERC,

Table: 6.1
Status of Power Consumption in Karnataka (Mu):2000-01 to 2012-13

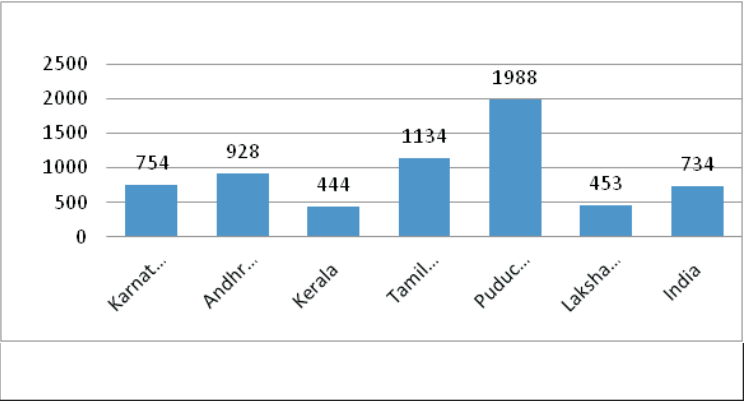
Year	Power Consumption in MU	AGR
2000-01	17867	-
2001-02	18639	4.3
2002-03	19888	6.7
2003-04	21526	8.2
2004-05	23173	7.7
2005-06	24463	5.6
2006-07	28454	16.3
2007-08	29988	5.4
2008-09	32020	6.8
2009-10	33810	5.6
2010-11	37216	10.1
2011-12	42356	13.8
2012-13	45657	7.8
CAGR	7.5	

Source: Karnataka Economic Survey 2013-14

Karnataka is one of the developing economy state in India as same in power sector, in Karnataka power consumption has been increasing from 17867 MU in 2000-01 to 45657 MU in 2012-13 with 7.5 per cent compound annual growth rate, in the during 2006-07(16.3) the highest annual growth rate was recorded is provide table 6.1.

The table 4.2 shows that in Karnataka electricity consumption has been increasing year on year in other side the electricity shortage or demand and supply gap also increasing still 9.5 per cent power shortage is there, this is alarming to Karnataka power sector and Government of Karnataka because power shortage suffering states can't achieve goal of development.

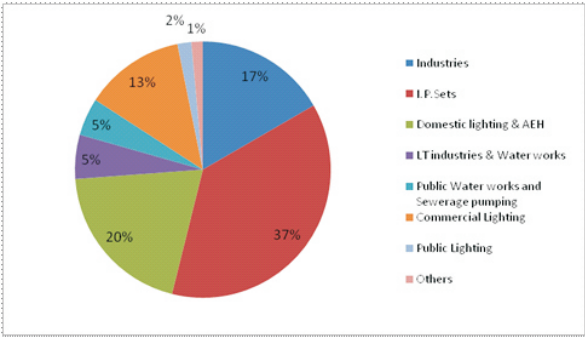
Figure: 6.1
Per Capita Consumption of Electricity (kwh) in Karnataka: 2008-09



Source: Annual Report of Central Electricity Authority 2011-12

Per capita consumption of electricity is 754 kwh in 2008-09 is little more than the all over India per capita consumption is about 734 kwh, but it is still very low as compared to per capita consumption with neighboring states, Andhra Pradesh 928 kwh , Tamil Nadu 1134 kwh and Pondicherry 1988 kwh these states having more than us is provide in the figure 6.1.

Figure: 6.2
Pattern of Power Consumption in Karnataka: 2012-13



Source: Karnataka Economic Survey 2013-14

In the state agriculture accounted for highest share of electricity consumed proved by the figure 6.2 with a share of 37 per cent then followed by domestic lighting with a share about 20 per cent these two categories consumed more than 50 per cent. Industries consumed around 17 per cent and commercial lighting, LT industries and water works, public water works and sewerage pumping, public lighting and others electricity consumed with share of 13%, 5%, 5%, 2% and 1% respectively.

In Karnataka five electricity distribution companies are supplying electricity to various categories of customers at different price slabs, during 2012-13 total revenue collected 21039.02 lacks from all categories of customers. Details of revenue realized from the different categories of customers are given in Table 6.2.

Table: 6.2
Category Wise Electricity sales and revenue: 2012-13

SL.No	Category	Sales (MU)	Revenue (Rs. Lakh)
1	BJ/KJ 487	487 (1.07)	233.08 (1.11)
2	AEH	8716 (19.09)	3519.97 (16.73)
3	Commercial	2538 (5.56)	1888 (8.97)
4	Irrigation Pump sets	16849 (36.90)	5054.86 (24.03)
5	Industries	1844 (4.04)	1051.33 (5.00)
6	Street lights and water supply	1802 (3.95)	942.53 (4.48)
7	Temporary Installations	210 (0.46)	242.94 (1.15)
8	Total LT	32446 (71.06)	12932.71 (61.47)
9	Total HT	13212 (28.94)	8106.31 (38.53)
Grand Total		45658	21039.02

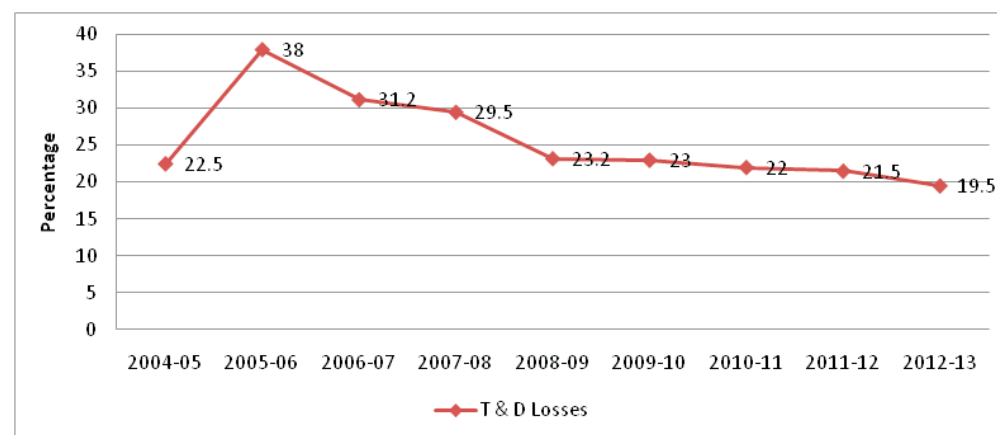
Source: Karnataka Economic Survey 2013-14

The table 6.2 shows that nearly 61.47 per cent of the ESCOMs revenue arises from LT category customers even though they account for about 71.06 per cent of the electricity consumption. The HT industrial sector while accounting for only 28.94 per cent of the electricity sales contributes 38.53 per cent of the total revenue earned in 2012-13. Around 10 per cent cross subsidy is happening in Karnataka, Electricity supplied for irrigation pump sets 36.9 per cent and 24 per cent revenue earned around 13 percent difference in cost and revenue is there, lift Irrigation fetches the lowest average revenue of Rs. 1.89/kWh where as the LT commercial category Provides highest revenue realisation of Rs. 7.44/kWh. Other than temporary installations, commercial LT customers and HT industrial and commercial customers pay higher prices for electricity consumed.

In the above table we observed that in the state power sector is not fare because electricity supply companies are suffering weak financial condition and ESCOMs sales electricity at lower price per unit with compares cost of electricity

One unit of power save is equal to two unit of power production. Because power production is very high, so Energy conservation is as important as energy production.

Figure: 6.3
Trends in Transmission & Distribution losses of Karnataka State



Source: Karnataka Economic Survey 2013-14.

However certain amount of power is bound to be lost in the process of its transmission and distribution across the State due to unaccounted electricity supply and electricity theft, there has been a consistent reduction in the transmission and distribution losses in the state. T&D losses which accounted for as much as 38% in 1999-00 came down to about 19.5% in 2012-13. The above figure 6.3 presents except 2005-06 the T & D losses has been decreasing 38% in 2005-06 to 19.5 in 2012-13 then after 2008-09 it decreasing at lower rate still it is very high compare with north states and in advanced countres it's below the 5 per cent. The Karnataka power sector have to improve the quality of electricity supply system to providing meter removing old transforms and find out the electricity theft and punished.

VII. MAIN FINDINGS OF THE STUDY:

Electricity installed generation capacity has been increasing with 9.5 per cent Compound Annual Growth Rate (CAGR) in Karnataka

To meet growing electricity demand the Karnataka power sector around 30 per cent depend on import from center and neighboring states.

Even though there is no coal reserves in Karnataka, but thermal is the main source for electricity generation and it's contribute around 57 per cent in total electricity generation in Karnataka.

During 2006-07 highest power shortage was recorded about 1296 MU now it is decreasing to 789 MU and in southern region Karnataka having high power shortage about 9.5 per cent compared with neighboring state.

Power consumption has been increasing about 7.5 per cent CAGR and per capita electricity consumption 754 kwh is little more than over all Indian per capita electricity consumption 734 kwh, but it is very low as compared per capita consumption with neighboring states.

Agriculture accounted for highest share of electricity consumed about 37 per cent and followed by domestic lighting with a share about 20 per cent these two categories consumed more than 50 per cent in Karnataka.

61.47 per cent of the ESCOMs revenue arises from LT category customers even though they account for about 71.06 per cent of the electricity consumption. The HT industrial sector while accounting for only

28.94 per cent of the electricity sales contributes 38.53 per cent of the total revenue earned in 2012-13 around 10 per cent cross subsidy is occurrence in Karnataka.

VIII. POLICY IMPLICATIONS:

The government should take an effective strategies to increasing the Electricity installed generation capacity overall in the country in future.

The governments should provide infrastructure to attract private investors in power sector like providing land, tax consation, raw materials, financial support, ect.

To reduce import electricity from central and states the government should give promote to electricity generation in renewable energy resources lake water, wind and solar etc.

Encouraging the private sector to identify and develop small capacity projects in Wind, Mini Hydro, Bio mass, co generation then only we can achieve self sufficient in power.

Except MESCOM all other electricity distribution companies having weak financial losses in Karnataka, the governments should take urgent steps to improve the financial health of DISCOMs by determine market price for electricity.

Central government should be distributing the power sector coal shortage and Need to improve availability of domestic coal for power stations.

IX. CONCLUSION:

The present study found that Karnataka has suffering power shortage due to ever growing demand for power influenced by the growing population and rapid economic progress. To meet power shortage a number of opportunities are there in Karnataka by using renewable energy resources. So central and state governments should take care of all these things to overcome from these aspects in future to developing the power sector in Karnataka state.

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