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INTRODUCTION

REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

ACKNOWLEDGMENTS

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APPENDIX/ANNEXURE

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- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

UNPUBLISHED DISSERTATIONS AND THESES

- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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WEBSITES

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

ENERGY USES IN INDIA: A CASE OF ELECTRICITY

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ABSTRACT

The global economy is set to grow four-fold between now and 2050 and growth could approach ten-fold in developing countries such as India and China. This promises economic benefits and huge improvements in people's standard of living, but it implies a much greater use of energy. Indian electricity supply and demand is projected to increase four to five-fold between now and 2050 (IEA-2008). This development requires massive investments, but it also creates unique opportunities to dramatically change the CO_2 intensity of Indian electricity supply. However, the expansion of the power sector in India faces many barriers such as a spatially uneven distribution of natural resources, financial constraints and high system losses. Accelerated development of natural resources and more transmission and distribution (T&D) capacity are needed in order to overcome the current problems. Increased competition, additional equipment supply capacity and other actions to increase the private sector interest can help to accelerate investments (Dolf Gielen et al, 2009). Hence, Government of India is giving the highest priority to the development of power sector. Initiatives are being taken to bring about comprehensive reforms in the power sector to facilitate and attract investments and bring about improvements in the efficiency of delivery systems. Energy demand, in particular electricity production has resulted in creation of fossil fuel based power plants that let out substantial green house gas, carbon emission into the atmosphere causing climate change and global warming. Further, shortages and constraints in availability of fossil fuels, also necessitates concentrating on the renewable energy in order to bring down the gap between demand and supply. The energy sector is merging 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. This is likely to happen through a combination of Public Private Partnerships, private sector investments as well as through Government investment in the Public Sector. The growth would be across a wide spectrum of technologies, with significant capacity addition expected in both hydro as well as coal based thermal sectors. With the civil nuclear co-operation deal a reality, there would be capacity additions in the nuclear energy sector. New initiatives on gas based power plants are expected. Most importantly, new and renewable energy, including wind power, bio-mass and solar power would play an important part. As a result, the power scenario in different states is likely to change significantly. This study attempts to look at the power crisis situation in southern region states in India, and demand supply gap to look at alternative opportunities, policies and strategies.

KEYWORDS
Indian electricity, energy uses.

INTRODUCTION

Electricity power is a critical components as well as determinant of a nation's development. It is the most widely used industry, agriculture, domestic and commercial sector. It has become an inevitable necessity influencing every aspect of life and forming an increasing proposition of consumption, particularly in developing countries. As a key infrastructure component, it provides access to communication across the world, and creates externalities in production, distribution and exchange activities both as an intermediate input and as a component of final demand. It is the most economical and therefore essential form of energy for industrial and agriculture growth. The electricity sector in India had an installed capacity of 207.85 GW as of September 2012, the world's fifth largest. Captive power plants generate an additional 31.5 GW. Thermal power plants constitute 66.0 per cent of the installed capacity, hydroelectric about 19.0 per cent and rest being a combination of wind, small hydro, biomass, waste-to-electricity, and nuclear. In terms of fuel, coal-fired plants account for 56.0 per cent of India's installed electricity capacity, compared to South Africa's 92.0 per cent; China's 77.0 per cent; and Australia's 76.0 per cent. After coal, renewal hydropower accounts for 19.0 per cent, renewable energy for 12.0 per cent and natural gas for about 9 per cent. As December 2011, over 300 million Indian citizens had no access to electricity. Over one third of India's rural population lacked electricity, as did 6 per cent of the urban population. Of those who did have access to electricity in India, the supply was intermittent and unreliable. In 2010, blackouts and power shedding interrupted irrigation and manufacturing across the country. The per capita average annual domestic electricity consumption in India in 2009 was 96 kWh in rural areas and 288 kWh in urban areas for those with access to electricity, in contrast to the worldwide per capita annual average of 2600 kWh and 6200 kWh in the European Union. India's total domestic, agricultural and industrial per capita energy consumption estimates vary depending on the source. Two sources place it between 400 to 700 kWh in 2008–2009. As of January 2012, one report found the per capita total consumption of electricity in India to be 778 kWh. India currently suffers from a major shortage of electricity generation capacity, even though it is the world's fourth largest energy consumer after United States, China and Russia. The International Energy Agency (IEA) estimates that India needs an investment of at least $135 billion to provide universal access of electricity to its population.

The IEA estimates that India will add between 600 GW to 1200 GW of additional new power generation capacity before 2050. This added new capacity is equivalent to the 740 GW of total power generation capacity of European Union (EU-27) in 2005. The technologies and fuel sources India adopts, as it adds this electricity generation capacity, may make significant impact to global resource usage and environmental issues. India's electricity sector is amongst the world's most active players in renewable energy utilization, especially wind energy. As of December 2011, India had an installed capacity of about 22.4 GW of renewal technologies-based electricity. India's network losses exceeded 32 per cent in 2010 including non-technical losses, compared to world average of less than 15 per cent. Both technical and non-technical factors contribute to these losses, but quantifying their proportions is difficult. But the Government pegs the national T&D losses at around 24 per cent for the year 2011 and has set a target of reducing it to 17.1 per cent by 2017 to 14.1 per cent by 2022. Some experts estimate that technical losses are about 15 per cent to 20 per cent, a high proportion of non-technical losses are caused by illegal tapping of lines, but faulty electric meters that underestimate actual consumption also contribute to reduce payment collection. Key implementation challenges for India's electricity sector include new project management and execution, ensuring availability of fuel quantities and qualities, lack of initiative to develop large coal and natural gas resources present in India, land acquisition, environmental clearances at state and central government level, and training of skilled manpower to prevent talent shortages for operating latest technology plants.

POOR ACCESS OF ELECTRICITY

Energy-as a driver of development-plays a central role in both fighting poverty and addressing climate change. World as whole 1.4 billion people of the no access to electricity and India accounts for over 300 million, besides Some 800 million Indians use traditional fuels – fuelwood, agricultural waste and biomass cakes – for cooking and general heating needs. These traditional fuels are burnt in cook stoves, known as chulah or traditional chulha in some parts of India. According to WHO, claim 300,000 to 400,000 people in India die of indoor air pollution and carbon monoxide poisoning every year because of biomass burning and use of traditional in efficient chullahs. Traditional fuel burning in conventional cook stoves releases unnecessarily large amounts of pollutants, between 5 to 15 times higher than industrial combustion of coal, thereby affecting outdoor air quality, haze and smog, chronic health problems, damage to forests, ecosystems and global climate. Burning of biomass and firewood will not stop, these reports claim, unless electricity or clean burning fuel and combustion technologies become reliably available and widely adopted in rural and urban India. The growth of electricity sector in India may help find a sustainable alternative to traditional fuel burning. To ensure that everyone has access to quality power and a planet that can sustain future life on it. Energy poverty is one of the most serious problems that the country faces today. While the government has set a timeline of 2012 for providing "electricity to all", 78 million households still lack access to electricity and many more millions have access only in principle and not in reality. India is yet to develop the energy infrastructure to power the entire country and therefore has an opportunity to build the infrastructure of the future.

ELECTRICITY DEMAND

As in previous years, during the year 2010–11, demand for electricity in India far outstripped availability, both in terms of base load energy and peak availability. Base load requirement was 861,591 MU against availability of 788,355 MU, a 8.5 per cent deficit. During peak loads, the demand was for 122 GW against availability of 110 GW, a 9.8 per cent shortfall. (Central Electricity Authority -2011) expected, for 2011–12 year, a base load energy deficit and peaking shortage to be 10.3 per cent and 12.9 per cent respectively. The peaking shortage would prevail in all regions of the country, varying from 5.9 per cent in the North-Eastern region to 14.5 per cent in the Southern Region. India also expects all regions to face energy shortage varying from 0.3 per cent in the North-Eastern region to 11.0 per cent in the Western region. India's Central Electricity Authority expects a surplus output in some of the states of Northern India, those with predominantly hydropower capacity, but only during the monsoon months. In these states, shortage conditions would prevail during winter season. According to this report, the five states with largest power demand and availability, as of May 2011, such as Maharashtra, Andhra Pradesh, Tamil Nadu, Uttar Pradesh and Gujarat. In 2011, Gujarat was declared a power surplus state, with about 2–3 GW more power available than its internal demand. The state was expecting more capacity to become available. It was expecting to find customers, sell excess capacity to meet power demand in other states of India, thereby generate revenues for the state (Ministry of Power, GOI).

According to Electric Power Survey Report 17th 2010–11, despite an ambitious rural electrification program, 80 per cent of Indian villages have at least an electricity line; just 52.5 per cent of rural households have access to electricity. In urban areas, the access to electricity is 93.1 per cent in 2008. The overall electrification rate in India is 64.5 per cent while 35.5 per cent of the populations still live without access to electricity. India's industrial demand accounted for 35.0 per cent of electrical power requirement, domestic household use accounted for 28.0 per cent, agriculture 21.0 per cent, commercial 9.0 per cent, public lighting and other miscellaneous applications accounted for the rest. The electrical energy demand for 2016–17 is expected to be at least 1392 Tera Watt Hours (TWh), with a peak electric demand of 218 GW. The electrical energy demand for 2021–22 is expected to be at least 1915 TWh, with a peak electric demand of 298 GW. If current average transmission and distribution average losses remain same 32.0 per cent, India needs to add about 135 GW of power generation capacity, before 2017, to satisfy the projected demand after losses.

RATIONALE OF THE STUDY

The development of power industry in India was started at the stage of 19th century, but it was fully recognized and evolved the full-fledged power policy only after independence. The power industry was nationalized and State Electricity Board was setup in each state. The Central Electricity Authority was established to evolve national power policy and ensure coordinated development of the power sector in India. It has great potentiality in the field of power generation through its number of hydro, Thermal, Gas turbine and Wind Sources. Power industry has played a vital role in the economic development of a country. The plus of the economy can be felt through the health of the power industry. When power industry is prospered, in turn it will encourage the all round development of the economy. Similarly, if the power industry is crippled it will in turn arrest the running wheels of the economy. Therefore, power is the be all and end all of socio economic change. Electricity power is a critical component as well as determinant of national and international development. It has become an inevitable necessity, which influences every aspect of life, farming, industry and increasing profession of consumption activities particularly in developing countries. Power is as a key infrastructure component, it provides access to communication across the world, and creates externalities in production, distribution and exchange activities both as an intermediate input and as a component of final demand. It is the most economical and therefore essential form of energy for industrial and agriculture growth.

OBJECTIVES OF THE STUDY

» To study the overall growth of Electricity consumption of different sectors in India
» To analysis of supply and demand gap between southern regions in India
» To suggest ways means and means to improve the performance of Power Sector In Indian Economy

METHODOLOGY

The present study is an empirical and analytical exercise based on the secondary data. The overall financial performance of southern region and evaluated on the basis of the availability of a comprehensive set of data from the various published and unpublished sources, the data are collected from the administrative report, statistical at a glance of the Ministry of Power, Energy Statistics. The main aim of the study is to analysis the performance appraisal Ministry of Power and Southern regions and TNEB.

ANALYSIS OF THE STUDY

The study used only Secondary data for analytical purpose. Secondary data are obtained from published and unpublished sources such as Energy statistics, Ministry of Power Statistical report, TNEB Statistical Hand book, Central Electricity Authority, Electric Power Survey Report and various annual reports. The Statistical tools used in the study were percentages, Simple linear regression and Growth model.

INSTALLED GENERATING CAPACITY OF ELECTRICITY

The geographical distribution of Installed generating capacity of electricity as on 2011; Western Region (both central and state sector) accounted for the highest share 30.98 per cent followed by Southern Region 27.35 per cent, Northern Region 26.88 per cent, Eastern Region 13.45 per cent and North Eastern Region 1.35 per cent. Region wise growth in the installed capacity during 2010-11 reveals that Eastern Region registered the highest growth of about 18.21 per cent, followed by Northern Region 10.1 per cent and Western Region 6.65 per cent. Among the States in the Eastern Region that accounted for the highest growth of 18 per cent, Odisha registered the highest 47.7 per cent followed by Jharkhand 27.1 per cent. Among all the states Delhi registered highest growth 105.1 per cent in the installed capacity followed by Odisha 48 per cent and Jharkhand 27 per cent.

TABLE -1: TRENDS IN INSTALLED GENERATING CAPACITY OF ELECTRICITY UTILITIES AND NON-UTILITIES IN INDIA (In MW)

Year	Utilities			Total	Non –Utilities		Total	Grand Total
	Thermal	Hydro	Nuclear		Railways	Self Generating Industries		
1971	7,906	6,383	420	14,709	45	1,517	1,562	16,271
1981	17,563	11,791	860	30,214	60	3,041	3,101	33,315
1991	45,768	18,753	1,565	66,086	111	8,502	8,613	74,699
2001	73,613	25,153	2,860	101,626	-	16,157	16,157	117,783
2011	131,279	37,567	4,780	173,626	-	32,900	32,900	206,526
Growth rate of 2010-11	11.28	1.91	4.82	8.93	-	15.54	15.54	9.93
CAGR 1970-2011	7.09	4.42	6.11	6.21	-	7.79	7.72	6.39

Source: Central Electricity Authority-2012

The total installed capacity for electricity generation in the country has increased from 16,271 MW 1971 to 206,526 MW as on 2011, registering a compound annual growth rate (CAGR) of 6.4 per cent **(Table-1)**. There has been an increase in generating capacity of 18654 MW over the last one year, which is 10 per cent more than the capacity of last year. The highest rate of annual growth (11.3 per cent) from 2009-10 to 2010-11 in installed capacity was for Thermal power followed by Nuclear Power (4.8 per cent). The total Installed capacity of power utilities in the country increased from 14,709 MW in 1970-71 to 173,626 MW as on 2011, with a CAGR of 6.2 per cent over the period. The highest CAGR 7.1 per cent was in case of Thermal utilities followed by Nuclear 6.1 per cent and Hydro 4.4 per cent. At the end of March 2011, thermal power plants accounted for an overwhelming 64 per cent of the total installed capacity in the country, with an installed capacity of 131.2 thousand MW. Hydro power plants come next with an installed capacity of 37.6 thousand MW, accounting for 18.2 per cent of the total installed Capacity. Besides, non-utilities accounted for 15.9 per cent (32.9 Thousand MW) of the total installed generation capacity. The share of Nuclear energy was only 2.31 per cent (4.78 MW).

FIGURE-1

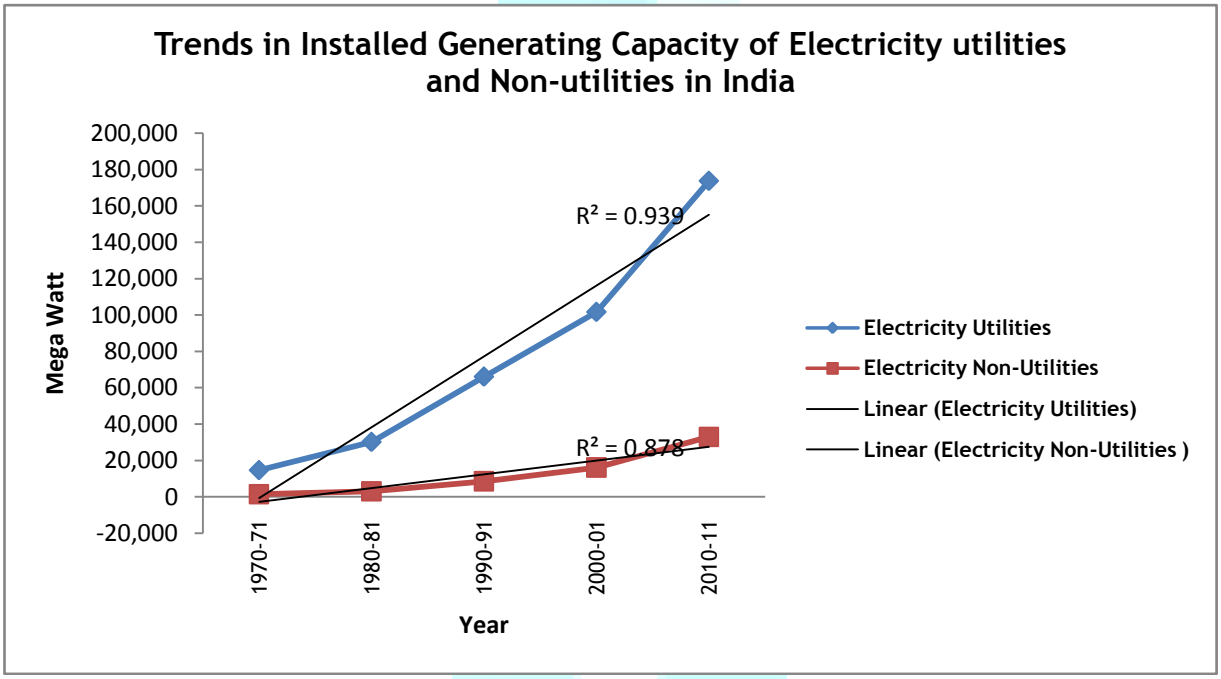


TABLE -2: TRENDS IN AVAILABILITY OF PRIMARY SOURCES OF CONVENTIONAL ENERGY IN INDIA

Year	Crude Petroleum (MT)	Electricity (GWh)	Electricity in %
1970-71	18.51	27666	7.15
1980-81	26.76	49543	12.80
1990-91	53.72	77782	20.11
2000-01	103.44	91264	23.59
2010-11	206.15	140524	36.33
Growth rate of 2010-11 over	6.94	12.14	-
CAGR 1970-71 to 2010-11(%)	6.06	4.04	-

Source: Central Electricity Authority 2012

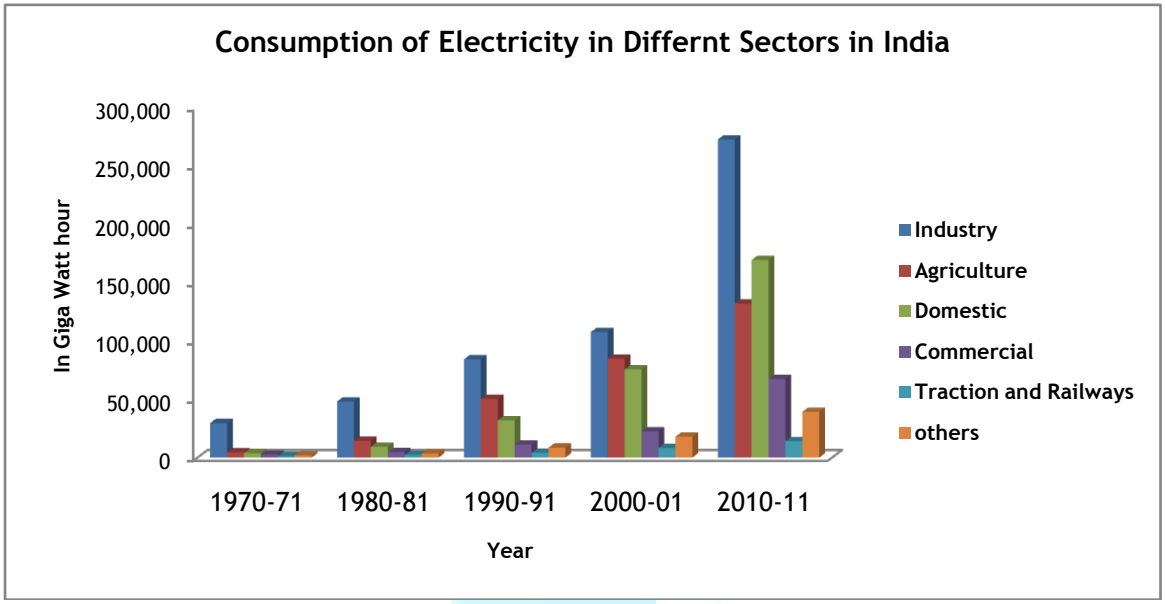
Since thermal electricity is not a primary source of energy, being produced either from coal or natural gas in India, electricity availability is considered only for that electricity which is generated from Hydro and Nuclear sources. Without taking into account the transmission and distribution losses, the total availability is equal to the total generation, and this figure increased from 27,666 GWh during 1970-71 to 1,40,524 GWh during 2010-11, registering a CAGR of 4.0 per cent over the period (Table-2)

TABLE-3: CONSUMPTION OF ELECTRICITY (FROM UTILITIES) BY SECTORS IN INDIA (In GWh)

Year	Industry	Agriculture	Domestic	Commercial	Traction and Railways	Others	Total Electricity Consumed
1970-71	29,579	4,470	3,840	2,573	1,364	1,898	43,724
1980-81	48,069	14,489	9,246	4,682	2,266	3,615	82,367
1990-91	84,209	50,321	31,982	11,181	4,112	8,552	190,357
2000-01	107,622	84,729	75,629	22,545	8,213	17,862	316,600
2010-11	272,589	131,967	169,326	67,289	14,003	39,218	694,392
Growth rate of 2010-11	15.14	9.78	15.91	11.04	12.85	7.17	13.34
CAGR 1970-71 to 2010-11	5.57	8.61	9.67	8.29	5.84	7.67	6.98

Source: Central Electricity Authority 2012

FIGURE -2



The estimated electricity consumption increased from 43,724 GWh during 1970-71 to 6,94,392 GWh during 2010-11, showing a CAGR of 6.98 per cent (Table-3). The increase in electricity consumption is 13.34 per cent from 2009-10 (6,12,645 GWh) to 2010-11 (6,94,392 GWh). In the case of total electricity sales in 2010-11, industry sector accounted for the largest share (38.6 per cent), followed by domestic (23.8 per cent), agriculture (19.6 per cent) and commercial sector (9.89 per cent). However, it is seen that electricity consumption in domestic sector and agriculture sector has increased at a much faster pace compared to other sectors during 1970-71 to 2010-11, with CAGRs of 9.67 per cent and 8.61 per cent respectively and loss of electricity due to transmission and distribution has increased from 17.55 per cent during 1970-71 to 32.86 per cent during 2000-01 and declined to 18.04 per cent during 2010-11.

SOUTHERN REGION IN INDIA

Tamil Nadu is facing power shortage due to inadequate tie-ups with long term sources of power generation and there is no possibility of bridging the huge gap between demand and supply through short or medium term purchases (Ministry of Power-2012). The ministry also referred to the delay in commissioning of 12 power generation projects (Six under Central Sector, four in State sector and two In Private sector) in the State due to reason such as slow progress of civil works, non availability of labour and delayed supplies of Plant equipment.

TABLE -4: POWER SUPPLY POSITION IN THE SOUTHERN REGION 2011-12

State	Requirement	Availability	Surplus/Deficit(-)		Peak Demand	Peak Met	Surplus/Deficit(-)	
	MU	MU	MU	In %	MW	MW	MW	In %
Andhra Pradesh	91730	85149	-6581	-7.2	14054	11972	-2082	-14.8
Karnataka	60830	54023	-6807	-11.2	10545	8549	-1996	-18.9
Kerala	19890	19467	-473	-2.1	3516	3337	-179	-5.1
Tamil Nadu	85685	76705	-8980	-10.5	12813	10566	-2247	-17.5
Puducherry	2167	2136	-31	-1.4	335	320	-15	-4.5
Lakshadweep	37	37	0	0	8	8	0	0
Southern Region	**260302**	**237480**	**-22822**	**-8.8**	**37599**	**32188**	**-5411**	**-14.4**

Source: The Hindu 2012

FIGURE -3

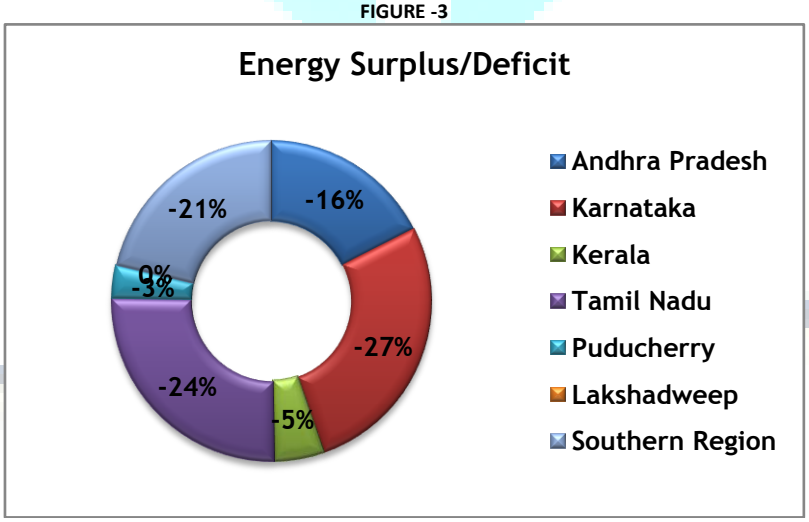
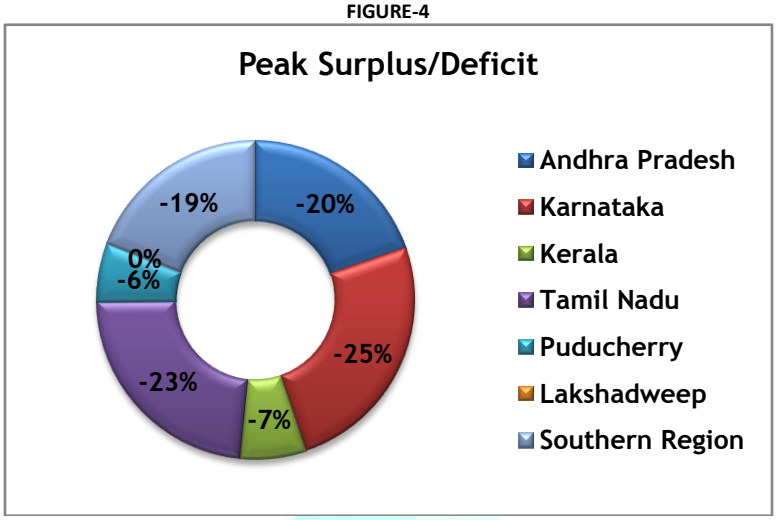


FIGURE-4



According to the Ministry, Tamil Nadu was not the only state to be reeling under power shortage as Andhra Pradesh, Karnataka, Kerala as well as Puducherry were also facing similar problems. Lakshadweep was the only place in the southern region where the supply met the demand (table-4 and figures 3 and 4). Electricity being a concurrent subject, supply and distribution of electricity is the responsibility of the State government concerned or Power Utilities of the State. GoI supplement the efforts of the State Governments by setting up Power Plants and bulk Transmissions systems (The Hindu -2012). Energy Shortage of Andhra Pradesh was 3.0 per cent in April-September during 2011, where as it was 16.3 per cent during the corresponding period this year. The figures of Tamil Nadu were 5.5 per cent to 15. Another southern State reeling under power shortage is Karnataka, whose energy shortage went up from 8.1 per cent to 13.6 per cent. To compound the matter, the southern region is not inter connected with other regions in the country and going by present indications, work on interconnectivity will be over only by early 2014 (CEA-2012).

A NOTE ON ENERGY CRISIS IN TAMIL NADU

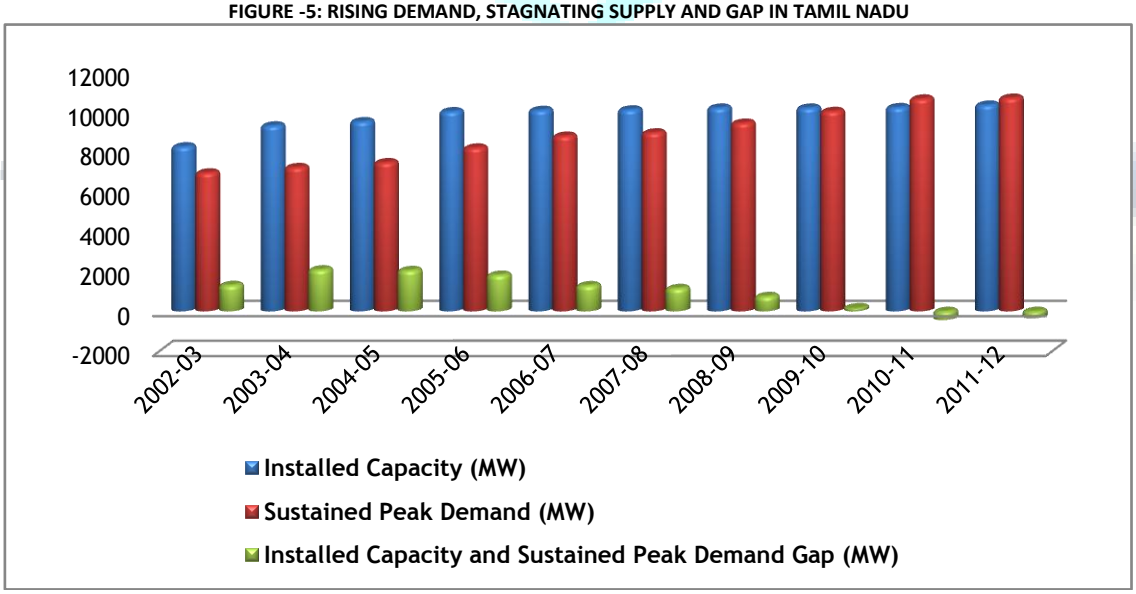
Electricity is a critical infrastructure for the socio economic development of the State. The State has a total installed capacity of 10,237 MW from conventional sources and 6,007 Mega Watts (MW) from renewable sources. In spite of having such a huge capacity, the State is facing severe power shortage of about 3500-4000 MW due to the rapid industrialization and the demand for power is growing at the rate of 10.0 per cent per annum. The State Government is planning to launch large scale installation of captive solar power plants to the tune of 3,000 MW in order to reduce the pressure on conventional sources of energy. Focus on production of energy from renewable sources like wind and solar and non-conventional sources like bio-mass would be encouraged in over the plan period (GoT, 2012)

TABLE -5: RISING DEMAND, STAGNATING SUPPLY AND GAP IN TAMIL NADU

Year	Installed Capacity (MW)	Sustained Peak Demand (MW)	Installed Capacity and Sustained Peak Demand Gap (MW)	Maximum Daily Consumption (MU)
2002-03	8268	6957	**1311**	139.8
2003-04	9319	7228	**2091**	146.2
2004-05	9531	7473	**2058**	159.1
2005-06	10031	8209	**1822**	172.4
2006-07	10098	8803	**1295**	191.3
2007-08	10122	8969	**1153**	190.1
2008-09	10214	9459	**755**	202.7
2009-10	10214	10046	**168**	223.9
2010-11	10237	10670	**-433**	233.9
2011-12	10364	10713	**-349**	238

Source: The Hindu 2012

FIGURE -5: RISING DEMAND, STAGNATING SUPPLY AND GAP IN TAMIL NADU



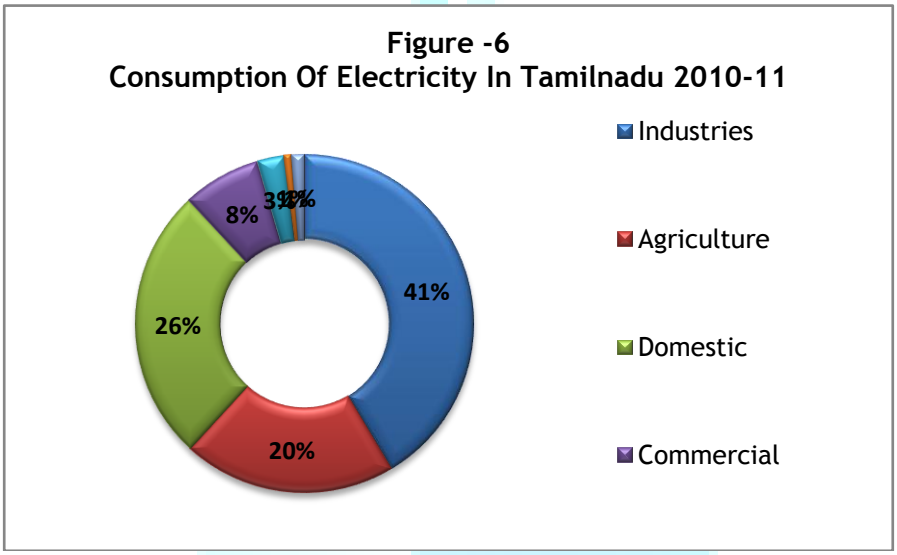
The table-5 found that the fundamental problem is the widening gap between demand and supply. A capacity addition has not been in tune with increase in demand. The rise in demand could be attributed directly to the high growth rates that the state posted in last three years 8.96 per cent in 2009-10; 11.3 per cent

in 2010-11 and 9.39 per cent in 2011-12. Given the fact that, services sector witnessed two digit growth rate since 2008, it was possible that there had been perceptible changes in the lifestyle of people which, in turn, led to the hike in demand. This was apart from industrial growth which varied from 6.8 to 6 per cent in the three years (The Hindu-2012).

TABLE -6: CONSUMPTION OF ELECTRICITY IN TAMILNADU 2010-11

Category	Consumption (M.U)	In %
Industries	25622	41.4
Agriculture	12625	20.4
Domestic	16312	26.3
Commercial	4586	7.4
Public Lighting and Water Works	1592	2.6
Sales of Licensees and Sales to Other States	429	0.7
Miscellaneous	731	1.2
Total	61897	100

Source: The Chief Engineer (Planning) Tamil Nadu Generation and Distribution Corporation Ltd, Chennai



Tamil Nadu ranks third in terms of volume of energy sold and power generating capacity. It has the highest capacity of wind power and has been in the forefront of rural electrification. Its aggregate technical and commercial loss of 18.5 percent which is one of the lowest in the country. The state witnesses a power shortfall, ranging 3500-4000MW. The gross energy consumption has grown at 6.2 percent per annum during 2004-05 to 2010-11 and the state electricity consumption (Million units) in per cent share of during periods 2011 are: industries (41.4), agriculture (20.4), domestic (26.3), commercial (7.4), Public Lighting and Water works (2.6), Sales of Licensees and Sales to Other States (0.7) and Miscellaneous (1.2) (Table-6 and Figure-6) Unless the state becomes power surplus, it will be difficult to attract of industrial investments and accelerate the growth. Currently, the share of renewable energy is 40 percent of the total grid capacity. The capacity addition made in 2010-11 was 1315 WM. Tamil Nadu still has rich potential of tapping renewable energy. Many global players already build their plants in Tamil Nadu, the also generating third largest amount of biomass energy. With these, Tamil Nadu becomes the biggest renewable energy state in the country.

PROBLEMS WITH INDIA'S POWER SECTOR

India's electricity sector faces many issues and problems some of them are:

- Government giveaways such as free electricity for farmers, partly due to political favor, have depleted the cash reserves of state-run electricity-distribution system. This has financially crippled the distribution network, and its ability to pay for power to meet the demand. This situation has been worsened by government departments that do not pay their bills.
- Despite abundant reserves of coal, India is facing a severe shortage of coal. The country isn't producing enough to feed its power plants. Some plants do not have reserve coal supplies to last a day of operations. India's monopoly coal producer, state-controlled Coal India, is constrained by primitive mining techniques. Coal India has consistently missed production targets and growth targets. Poor coal transport infrastructure has worsened these problems. To expand its coal production capacity, Coal India needs to mine new deposits. However, most of India's coal lies under protected forests or designated tribal lands. Any mining activity or land acquisition for infrastructure in these coal-rich areas of India has been rife with political demonstrations, social activism and public interest litigations.
- Poor pipeline connectivity and infrastructure to harness India's abundant coal bed methane and shale gas potential.
- The giant new offshore natural gas field has delivered less fuel than projected. India faces a shortage of natural gas.
- Hydroelectric power projects in India's mountainous north and northeast regions have been slowed down by ecological, environmental and rehabilitation controversies, coupled with public interest litigations.
- Average transmission, distribution and consumer-level losses exceeding 30 per cent.
- Over 300 million people in India have no access to electricity. Of those who do, almost all find electricity supply intermittent and unreliable.
- Lack of clean and reliable energy sources such as electricity is, in part, causing about 800 million people in India to continue using traditional biomass energy sources – namely fuelwood, agricultural waste and livestock dung – for cooking and other domestic needs. Traditional fuel combustion is the primary source of indoor air pollution in India, causes between 300,000 to 400,000 deaths per year and other chronic health issues.
- India's coal-fired, oil-fired and natural gas-fired thermal power plants are inefficient and offer significant potential for greenhouse gas (CO_2) emission reduction through better technology. Compared to the average emissions from coal-fired, oil-fired and natural gas-fired thermal power plants in European Union (EU-27) countries, India's thermal power plants emit 50 to 120 percent more CO_2 per kWh produced.

POLICIES AND STRATEGIES

India's Ministry of Power launched Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) as one of its flagship programme in March 2005 with the objective of electrifying over one lakh (100,000) un-electrified villages and to provide free electricity connections to 2.34 Cr (23.4 million) rural households. This free

electricity program promises energy access to India's rural areas, but is in part creating problems for India's electricity sector. The following strategies are essentials to achieve the target solve the electricity problems.

(i) Renewable Energy Policy : To address all issues relating to renewable energy; Policy reforms to further unbundling of distribution at more decentralized way; Solar Power Policy; Sustainable Energy Security Policy in villages. **(ii) Capacity Addition;**(a)Taking up new projects; example Thermal power and Ultra Mega Power project etc., Speeding up and expediting the completion of all ongoing projects. (b) Exploring the possibility of adding 10000 MW wind energy through various promoters; Setting up offshore wind power plants; (c) Setting up of Solar Parks;(d) Attract private investments on a commensurate scale.**(iii) Transmission and Distribution:** (a) Enhancing transformer capacities in the existing sub stations; (b) divergence of high tension overloaded feeders and installation of capacitor banks at distribution transformers for injection of reactive power; (c) Conversion of low voltage lines to high voltage lines along with feeder separation to reduce the distribution line losses;(d) separation of agricultural loads from industrial, commercial, and domestic loads; (e) Adequate transmission network to evacuate the power generated from new plants and to distribute the customers; **(iv) Energy Conservation:** (a) Implementing Bachat Lamp Yojana (BLY) scheme to increase energy efficiency in domestic sector; (b) Improve the efficiency of the agricultural pump sets using appropriate incentive scheme; (c) Solar powered home lighting in 3 lakh Green houses; 1 lakh street lights through solar power; (d) Energy conservation building code; Energy Star Labeling in Equipments **(v) Fiscal Health of Power Sector:** Make the distribution system financially viable during the Twelfth Plan by rational pricing, bringing modern systems of management, use of IT, enforcement of accountability and privatization or franchising.

CONCLUSION

Energy sector in India particularly power sector faces number of issues and problems and they are: **shortage of power due to excess demand over supply** caused by industrialization, urbanization, mechanization and modernization. More over governments initiatives in inviting MNCs to put up their production centres and guarantee them to provide uninterrupted power supply; **Population explosion** causing more number of households related to increasing demand for electricity; **T&D losses** caused by problems and grid; over staffing in SEBs related to heavy wage bill; **Theft of electricity** by industries; subsidies in providing electricity particularly to agriculture, some time free of cost; **Nonpayment of electricity** bill by public sector under takings; **Corruptions** from top to bottom of SEBs; **Lack of poor encouragement** of government to provide sector for captive power generation; **Lack of modernization** of thermal power station by the governments. Poor awareness on energy education etc, above issues and problems can be solved with concerted efforts in formulating and implementing power sector reforms that form part of economic reforms of Indian economy

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