

# Statistical Ratio Analysis and Overview of Growth in Power Energy System in India

T. Sundar<sup>1</sup>, Dr. K. Umapathy<sup>2</sup>

<sup>1</sup>Research Scholar, Department of EIE, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya, Kanchipuram, Tamil Nadu, India

<sup>2</sup>Associate Professor, Department of ECE, Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya, Kanchipuram, Tamil Nadu, India

## ABSTRACT

An analysis of statistical ratio, overview of growth in power energy system in India is done here. An installed capacity of 330.86 GW as on 2017 in utility electricity sector has one National Grid. In power generation of the country has various aspects using coal, gas and diesel in thermal power plant. The renewable energy system has been generated using the power of hydro, solar and wind sources. Using the source of uranium the nuclear power generation system is also produced. By applying the five year plan customized in the country a new power generating system are installed. The generated power was consumed for various purposes such as domestic, commercial, industrial, traction, agriculture and others. An average statistical study of increase in power system in the last few decades is represented by the graphical form.

**Keywords:** Power Sector, Energy Audit, Restructuring, Deregulation, Distributed Generation, Non conventional renewable energy, Central Electricity Authority (CEA).

## I. INTRODUCTION

The total capacity of power plant installed can be categorized as non-renewable energy and renewable energy. The power plant of renewable energy contributes 32% in the generation of total power system. Recently renewable energy systems are gradually used for electricity generation. A renewable energy technology does not demand any fossil fuel. Their action is only based on the utilizing of natural resources such as wind, solar, hydro power, biomass and geothermal. The consumption and generation of the energy using renewable sources are applied in many places such as industries, home and offices. The generation of renewable energy mainly depends on the nature resources availability of the country. The need of generation of power supply using renewable

energy system is an emergency growth to reduce the environmentally pollution done by non-renewable power system.

The progress in power generation sector of the country is extraordinary after independence. At present the whole capacity of the generated power system is about 1,236.39 TWh were it was only 1362 MW at the time of independence. A rapid increase in the generation of the power system due to increase in the consumption of the power source. The development of the country also depends on the production of power sources so as to satisfy the total consumption of the population. The following various corporations sectors were involved in the power system generation as State Electricity Boards (SEB), National Thermal Power Corporation (NTPC),

National Hydro-Electric Power Corporation (NHPC) and Power Grid Corporation Limited (PGCL) etc.

The installed Capacity by source as on 31<sup>st</sup> November 2017 as shown in Figure 1

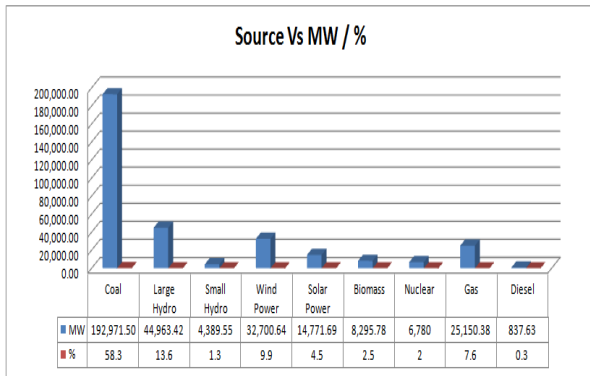


Figure 1. Source Vs Mega Watts and Percentage of source

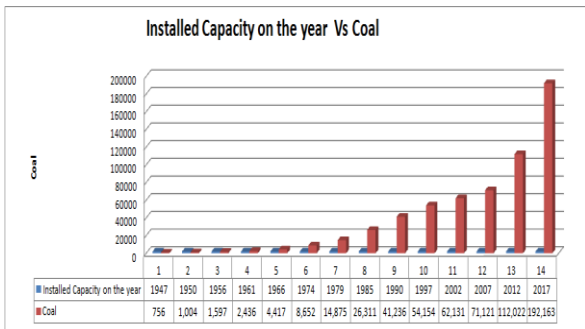


Figure 2. Installed Capacity on the year Vs Coal

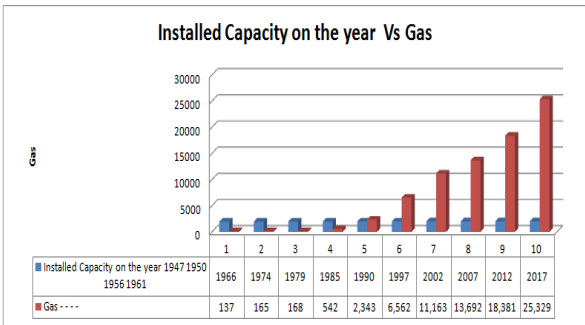


Figure 3. Installed Capacity on the year Vs Gas

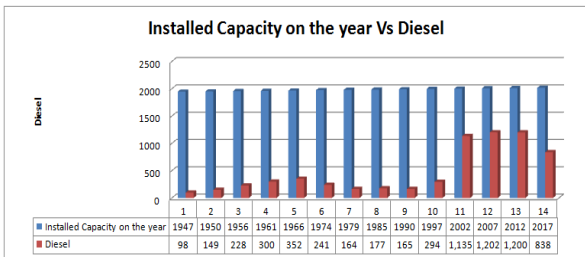


Figure 4. Installed Capacity on the year Vs Diesel

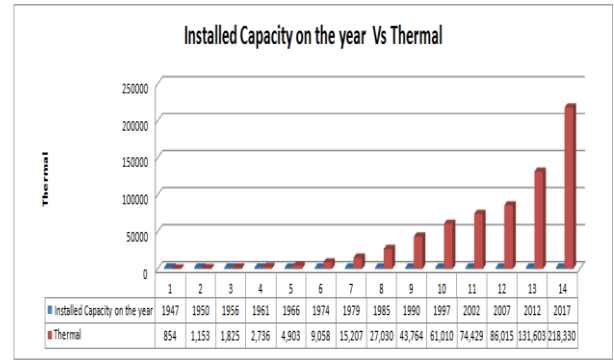


Figure 5. Installed Capacity on the year Vs Thermal

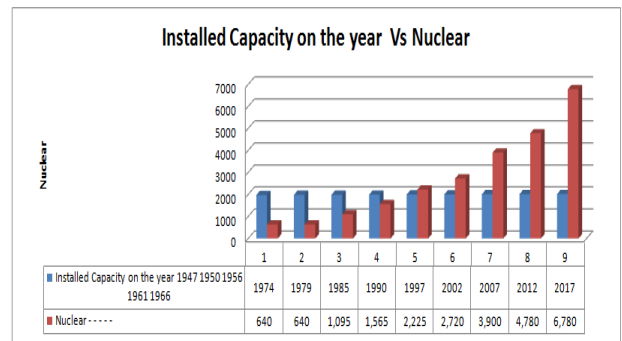


Figure 6. Installed Capacity on the year Vs Nuclear

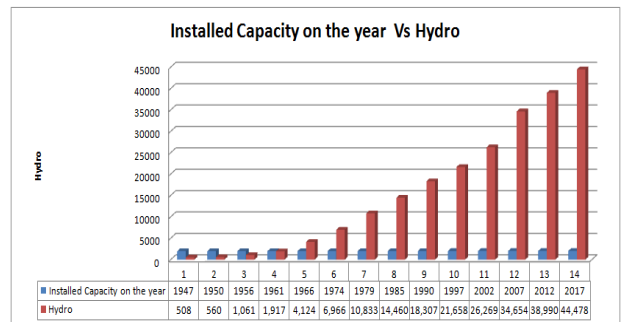


Figure 7. Installed Capacity on the year Vs Hydro

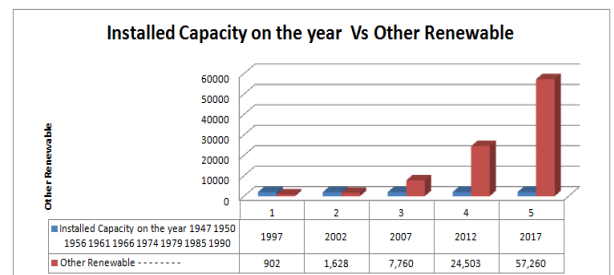


Figure 8. Installed Capacity on the year Vs Other Renewable

The Table 1 is shows the growth of installed capacity in our country.

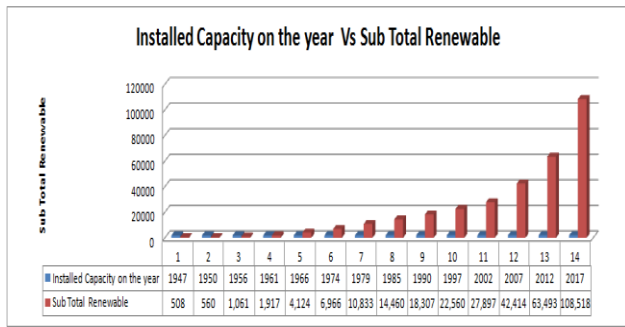
**Table 1.** Growth of Installed Capacity in our country

Installed Capacity as on	Thermal (MW)				Nuclear (MW)	Renewable (MW)			Total (MW)	% Growth (on yearly basis)
	Coal	Gas	Diesel	Sub – Total Thermal		Hydro	Other Renewable	Sub-Total Renewable		
31-Dec-1947	756	-	98	854	-	508	-	508	1,362	-
31-Dec-1950	1,004	-	149	1,153	-	560	-	560	1,713	8.59%
31-Mar-1956	1,597	-	228	1,825	-	1,061	-	1,061	2,886	13.04%
31-Mar-1961	2,436	-	300	2,736	-	1,917	-	1,917	4,653	12.25%
31-Mar-1966	4,417	137	352	4,903	-	4,124	-	4,124	9,027	18.80%
31-Mar-1974	8,652	165	241	9,058	640	6,966	-	6,966	16,664	10.58%
31-Mar-1979	14,875	168	164	15,207	640	10,833	-	10,833	26,680	12.02%
31-Mar-1985	26,311	542	177	27,030	1,095	14,460	-	14,460	42,585	9.94%
31-Mar-1990	41,236	2,343	165	43,764	1,565	18,307	-	18,307	63,636	9.89%

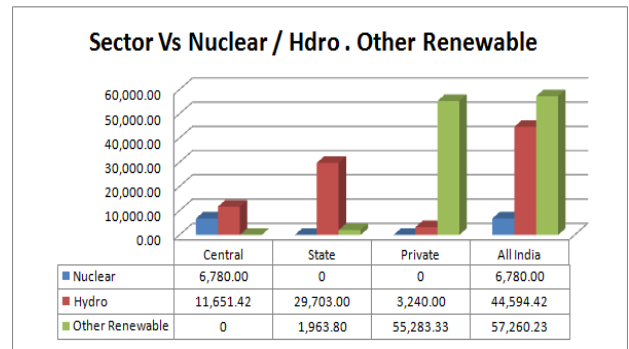
The Table –II is shown the Total installed utility power generation capacity as on 2017 with sector wise & type wise break up

**Table 2.** (Total installed utility power generation capacity as on 2017 with sector wise & type wise break up)

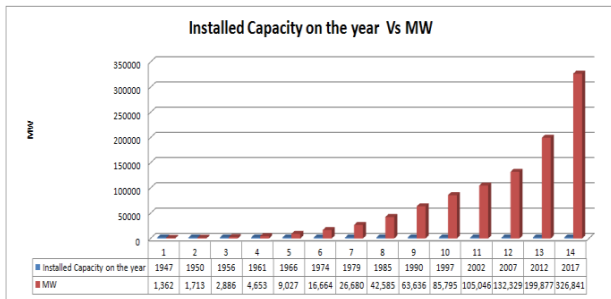
Sector	Thermal (MW)				Nuclear (MW)	Renewable (MW)		Total (MW)	%
	Coal	Gas	Diesel	Sub-Total Thermal		Hydro	Other Renewable		
Central	55,245.00	7,490.83	0.00	62,735.83	6,780.00	11,651.42	0.00	81,167.25	25
State	65,145.50	7,257.95	363.93	72,767.38	0.00	29,703.00	1,963.80	104,447.28	32
Private	74,012.38	10,580.60	473.70	85,066.68	0.00	3,240.00	55,283.33	143,590.01	43
All India	194,402.88	25,329.38	837.63	220,569.88	6,780.00	44,594.42	57,260.23	329,204.53	100



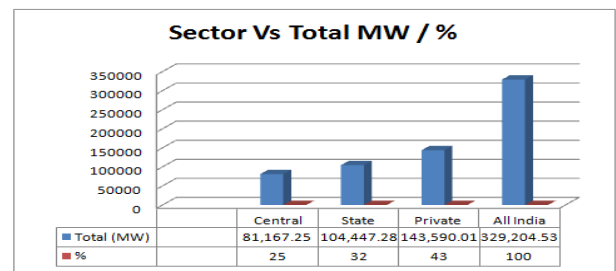
**Figure 9.** Installed Capacity on the year Vs Sub Total Renewable



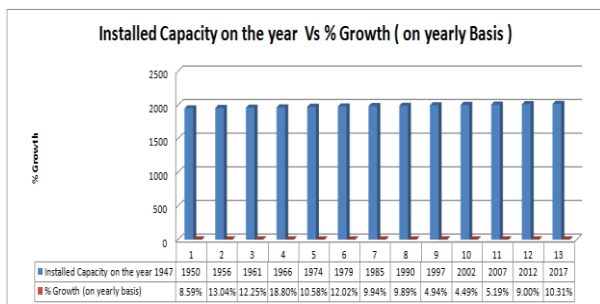
**Figure 13.** Sector Vs Nuclear / Hydro / Other Renewable



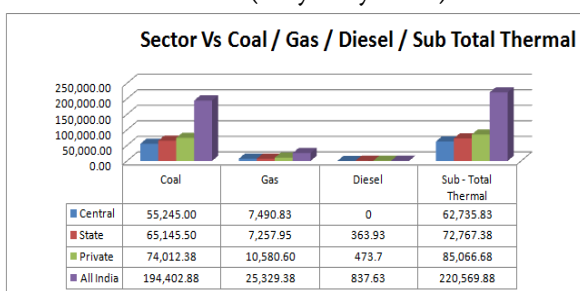
**Figure 10.** Installed Capacity on the year Vs MW



**Figure 14.** Sector Vs Total MW / Percentage (%)



**Figure 11.** Installed Capacity on the year Vs % Growth (on yearly basis)



**Figure 12.** Sector Vs Coal / Gas / Diesel / Sub Total Thermal

## II. CONCLUSION

A discussion of power system generation are tabulated and represented in the graphical form starting from the year of independence till 2017. By analyzing the graphical representation we can infer that there is a rapid and extraordinary growth in generation of power system in the country. But there is the shortage still present in consumption of power system produced in the country. The main motivation is to increase the generation of the power system so as to satisfy the need of the consumption. In future the needed power supply can be produced by using renewable energy system. Since the renewable energy systems reduced the pollution.

## III. REFERENCES

- [1]. Dr. Tarlochan Kaur, "The Indian Power Sector-A Sustainable Way Forward", IPEC2010, pp. 666-669
- [2]. National Electricity Plan, 2011. (Vol.1&2), Central Electricity Authority, Govt. of India, 2012.

- [3]. Neerja Mathur, "Power Development in India", Water and Energy International, CBIP, Vol. 66, No. 1, pp. 11-25, January-March 2009.
- [4]. Report on Seventeenth Electric Power Survey of India, Central Electricity Authority, Govt. of India, March, 2007.
- [5]. Saifur Rahman and Arnulfo deCastro, " Environmental Impacts of Electricity Generation: A Global Perspective," IEEE Trans. On Energy Conversion, Vol.10, Issue .2, pp 307-314, June 1995.
- [6]. R. G. Yadav, Anjan Roy, S. A. Kharparde, and P. Pentayya, "India's fast-growing power sector- from regional development to the growth of a national grid", IEEE Power and Energy Magazine, July- August 2005.
- [7]. Philip D. Baumann,, "Energy Conservation and Environmental Benefits that may be realized from Super Conducting Magnetic Energy Storage," IEEE Trans. On Energy Conversion, vol.7, No.2, pp. 253-259, June 1992.
- [8]. A. Srivastava, M. Shahidehpour, "Restructuring choices for the Indian power sector", IEEE Power Engineering Review, Vol. 22, Issue 11, ,pp. 25-29, Nov. 2002.
- [9]. J.T. Cain, "Power System Restructuring Asian and Australian Power Policy]", IEEE Power Engineering Review, Vol. 16, Issue 2, pp. 9, Feb.1996.
- [10]. IEA Key World Energy Statistics 2015.
- [11]. O. Erdinc, M. Uzunoglu, "Optimum design of hybrid renewable energy systems: overview of different approaches," Renewable Sustainable Energy Rev., Vol. 16, pp. 1412-25, 2012.
- [12]. M. Fadaee, Radzi MAM, "Multi-objective optimization of a stand-alone hybrid renewable energy system by using evolutionary algorithms: a review," Renewable Sustainable Energy Rev., Vol. 16, pp. 3364-9,2012.
- [13]. Ankur Omer, Smarajit Ghosh, Rajnish Kaushik, "Indian power system: Issues and Opportunities", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 3, PP. 1089-94 March 2013.