



भारत के विद्युत क्षेत्र का 1947 से 2017 तक को संवर्धन
GROWTH OF ELECTRICITY SECTOR IN INDIA FROM 1947-2017

भारत सरकार
GOVERNMENT OF INDIA

विद्युत मंत्रालय
MINISTRY OF POWER

केन्द्रीय विद्युत प्राधिकरण
CENTRAL ELECTRICITY AUTHORITY

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रविन्द्र कुमार वर्मा
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प्राक्कथन

केन्द्रीय विद्युत प्राधिकरण द्वारा वार्षिक रूप से प्रकाशित पुस्तिका "भारत में विद्युत क्षेत्र की संवृद्धि" विभिन्न वर्षों में भारतीय विद्युत क्षेत्र की संवृद्धि का विस्तृत परिदृश्य उपलब्ध कराती है। प्रासंगिक सूचना और सांख्यिकी आलेखों, पाई-चार्ट, मानचित्रों और सारणियों के रूप में प्रस्तुत की गई हैं। पंचवर्षीय योजनावार विकास के आरंभ होने के बाद से भारतीय विद्युत क्षेत्र ने बहुत प्रगति की है। यह प्रकाशन महत्वपूर्ण विकास संकेतकों जैसे स्थापित विद्युत उत्पादक क्षमता, विद्युत ऊर्जा उत्पादन, पारेषण और संवितरण नेटवर्क, कैप्टिव विद्युत संयंत्रों और विद्युत खपत के पैटर्न आदि की संवृद्धि के विवरण उपलब्ध कराता है।

इस प्रकाशन के लिए आंकड़े सभी युटिलिटीयों और गैर-युटिलिटीयों से प्राप्त किए गए हैं। प्रति व्यक्ति विद्युत खपत, खपत की विभिन्न श्रेणियों का प्रतिशतांक हिस्सा, पारेषण और संवितरण हानि आदि जैसी महत्वपूर्ण सांख्यिकी की कुछ विकसित और विकासशील राष्ट्रों के आंकड़ों के साथ तुलना की गई है। आशा है कि यह पुस्तिका भारतीय विद्युत क्षेत्र पर संक्षिप्त और लाभदायक सूचना उपलब्ध कराने में बहुत उपयोगी सिद्ध होगी।

मई, 2017


(रविन्द्र कुमार वर्मा)



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FOREWORD

The booklet “Growth of Electricity Sector in India” published annually by Central Electricity Authority provides panoramic view of growth of the Indian Power Sector over the years. The relevant information and statistics have been presented in the form of graphs, pie-charts, maps and tables. The Indian Electricity sector has come a long way ever since 5 year plan wise development was initiated. This publication provides details of the growth of vital development indicators like installed electricity generating capacity, electrical energy generation, transmission and distribution network, captive power plants and pattern of electricity consumption etc.

The data for this publication has been sourced from all utilities and non-utilities. The important statistics like per capita electricity consumption, percentage share of different categories of consumption, transmission and distribution losses etc., have been compared with the data of some of the developed and developing nations. I hope that this booklet will be very helpful in providing concise & useful information on the Indian Electricity Sector.

May, 2017


(Ravindra Kumar Verma)



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सत्यमेव जयते

प्रस्तावना

स्वतंत्रता के पश्चात से भारत में विद्युत क्षेत्र में स्थापित विद्युत उत्पादन क्षमता और पारेषण व वितरण (टी एंड डी) प्रणाली दोनों में उल्लेखनीय वृद्धि हुई है। कुल विद्युत उत्पादन क्षमता (यूटिलिटी और गैर-यूटिलिटी की) 1947 में मात्र 1362 मेगावाट से बढ़कर मार्च अंत, 2017 में लगभग 377 गीगा वाट हो गई। प्रतिव्यक्ति बिजली की खपत जो 1947 में केवल 16.3 यूनिट थी, 2016-17 में बढ़कर 1122 यूनिट हो गई है। इसके बावजूद, बिजली की मांग में वृद्धि विद्युत आपूर्ति से ज्यादा बढ़ गई है और हमारा देश विगत वर्षों से हुई विद्युत उत्पादन क्षमता में कई गुना वृद्धि के बावजूद, अधिकतम विद्युत मांग के दौरान विद्युत की कमी का सामना कर रहा है। पिछले तीन वर्षों में यद्यपि विद्युत कमी काफी हद तक कम हुई है। आजकल हमारे पास अतिरिक्त उत्पादन क्षमता है। यह मुख्य रूप से कुछ राज्यों के उप-पारेषण एवं वितरण प्रणाली में बाधताओं तथा उनकी प्रतिकूल वित्तीय स्थिति के कारण है। इसको ध्यान में रखते हुए भारत सरकार ने राज्य विद्युत वितरण यूटिलिटी के वित्तीय टर्नअराउंड के लिए उज्ज्वल डिस्कोम एश्योरेंस योजना (उदय) का शुभारम्भ किया है, जहाँ वित्तीय घाटे को कम करने के लिए राज्य सरकारें जिम्मेवार होंगी। कुछ लक्ष्य निर्धारित किए गए हैं जिनके पूर्ण होने पर राज्य सरकारें भविष्य में केंद्र सरकार से लाम के लिए हकदार होंगी। भारत सरकार ने टी एंड डी हानि में कमी तथा संसाधनों के इष्टतम उपयोग के लिए मांग पक्ष प्रबंधन पर विशेष बल दिया है। सभी के लिए विद्युत उपलब्ध करवाने के लिए टैरिफ आधारित बोली पर विद्युत परियोजनाओं का विकास, पारेषण क्षेत्र में निजी क्षेत्र की भागीदारी, ऊर्जा दक्षता बढ़ाने पर राष्ट्रीय अभियान, नवीकरणीय ऊर्जा स्रोतों (आर. ई. एस.) और अल्ट्रा मेगा विद्युत परियोजनाओं (यूएमपीपी) के विकास पर संकेंद्रण, बिजली की कीमत कम करने के लिए कोयला संबंधों की अदला बदली एवं कुशल विद्युत संयंत्रों के उपयोग जैसी योजनाओं के माध्यम से संयुक्त प्रयास जारी है।

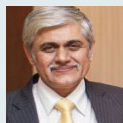
के.वि.प्रा. ने इस संबंध में अग्रणी भूमिका निभाई है तथा विद्युत क्षेत्र के विभिन्न विशिष्ट क्षेत्रों में जैसे कि नई प्रौद्योगिकियों को आरंभ करना, परियोजनाओं को तकनीकी-आर्थिक स्वीकृति प्रदान करने (पहले) हाईड्रो योजनाओं पर सहमति (बाद में), हरित ऊर्जा कॉरिडोर सहित उत्पादन और पारेषण योजना तथा परियोजनाओं के प्रचालन और निर्माण की मॉनिटरिंग करना, डिजाइन तथा इंजीनियरिंग एवं डाटा व सूचना का प्रसार द्वारा विकास के राष्ट्रीय प्रयास में अत्यधिक योगदान दिया है।

के.वि.प्रा. द्वारा प्रकाशित वर्तमान पुस्तिका एक नियमित प्रस्तुति है जिसमें ग्राफ, पाई-चार्ट, नक्शों और सारणियों के रूप में महत्वपूर्ण सूचना अंतर्निहित है। सूचना में विभिन्न महत्वपूर्ण संकेतकों जैसे संस्थापित विद्युत उत्पादक क्षमता, जल विद्युत क्षमता, देश की बिजली की मांग की राज्यवार पूर्वानुमान, बिजली ऊर्जा उत्पादन पारेषण व संचितरण नेटवर्क, विद्युत आपूर्ति की स्थिति, कैप्टिव पॉवर प्लांट्स, देश की बिजली की खपत तथा प्रति व्यक्ति उपभोग पैटर्न के लिए निष्पादित वृद्धि का पंच वर्षीय योजनावार (पहले योजना अवधि कहलाता था) पैटर्न शामिल है। पुस्तिका में राज्यवार स्थापित विद्युत उत्पादन क्षमता को दर्शाने वाले नक्शे भी सम्मिलित हैं, इस प्रकार यह हमारे देश का एक विशाल परिदृश्य प्रस्तुत करती है।

आशा है कि यह लघु पुस्तिका सभी हितधारकों के लिए उपयोगी सिद्ध होगी।

मई, 2017

प. बत्रा
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PREFACE

Power Sector in India has grown significantly since independence, both in the installed electricity generating capacity and transmission & distribution (T&D) system. The total power generating capacity of (utilities & non utilities) has increased from a meagre 1362 MW in 1947 to about 377 GW at the end of March, 2017. The per capita electricity consumption which was a mere 16.3 units in 1947, has increased to 1122 units in 2016-17. Despite this, the growth of electricity demand has been surpassing the power supply and our country has been facing power shortages during peak electricity demand, in spite of the manifold growth in Installed Capacity over the years. In the last 3 years, however, the shortages have reduced substantially. At present, we have unutilized generating capacity. This is mainly because of constraints in the sub-transmission and distribution system in some of the States, as well as adverse financial position of many of the States. Taking this into account, the Government of India has launched the Ujwal Discom Assurance Yojna (UDAY) Scheme for financial turnaround of the State Distribution utilities, where the State Government has been made responsible for reduction of financial losses. Certain targets have been set, which, if achieved, would entitle the State Government to further benefits from the Central Government. Government of India lays special emphasis on reduction of T&D losses and demand side management to optimally utilize the resources. Concerted efforts are going on to make power available to all through policy initiatives, such as Development of Power Projects through Tariff based bidding, Private Sector Participation in Transmission sector, National Mission on Enhanced Energy Efficiency, Focus on development of Renewable Energy Sources (RES), development of the Ultra Mega Power Projects (UMPP), swapping of coal linkages to reduce the cost of power and flexible use of most efficient plants to reduce cost of power.

CEA has taken a lead and immensely contributed in the national endeavour of development of power sector in various specific areas such as introduction of new technologies, techno-economic clearance of projects earlier and later concurrence of hydro projects, generation & transmission planning including green energy corridors and operation & construction monitoring of projects, design & engineering and dissemination of data & information.

The present booklet brought out by CEA is a regular feature, which contains vital information in the form of graphs, pie charts, maps and tables. The information covers 5 yearly (earlier called Plan period) pattern of growth accomplished for various important indicators like installed generating capacity, hydroelectric potential, state wise forecast of electricity demand of the country, electrical energy generation, transmission & distribution network, power supply position, captive power plants, pattern of electricity consumption of the country as well as per capita consumption. The booklet also contains maps showing state wise Installed Electricity Generating Capacity, thus affording a panoramic view of our country. I am hopeful that this handy booklet would prove to be useful to all stakeholders.

May, 2017

P. Batra
(Pankaj Batra)

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Table 1
Plan wise Growth of Electricity Sector in India
(Utilities)

Sl. No.	As on / during financial year ending with	Installed Capacity (MW)	No. of villages electrified	Length of T & D Lines (Ckt. kms.)(#)	Per Capita Consumption (\$) (kWh)
1	31.12.1947	1362	N.A.	23238	16
2	31.12.1950	1713	3061	29271	18
3	31.03.1956 (End of 1st Plan)	2886	7294	85427	31
4	31.03.1961 (End of 2nd Plan)	4653	21754	157887	46
5	31.03.1966 (End of 3rd Plan)	9027	45148	541704	74
6	31.03.1969 (End of 3 Annual Plans)	12957	73739	886301	98
7	31.03.1974 (End of 4th Plan)	16664	156729	1546097	126
8	31.03.1979 (End of 5th Plan)	26680	232770	2145919	172
9	31.03.1980 (End of Annual Plan)	28448	249799	2351609	172
10	31.03.1985 (End of 6th Plan)	42585	370332	3211956	229
11	31.03.1990 (End of 7th Plan)	63636	470838	4407501	329
12	31.03.1992 (End of 2 Annual Plans)	69065	487170	4574200	348
13	31.03.1997 (End of 8th Plan)	85795	498836	5141413	465
14	31.03.2002 (End of 9th Plan)	105046	512153	6030148	559
15	31.03.2007 (End of 10th Plan)	132329	482864	6939894	672
16	31.03.2012 (End of 11th Plan)	199877	556633	8726092	884
17	31.03.2013 (Ist yr of 12th Plan)	223344	560552	9080556	914
18	31.03.2014 (IInd yr of 12th Plan)	248554	575442	9312634	957
19	31.03.2015 (IIIrd yr of 12th Plan)	274904	578957	9972918	1010
20	31.03.2016 (IVth yr of 12th Plan)	305162	586065	10316547	1075
21	31.03.2017 (End of 12th Plan)	326833	592136@	10667859@	1122(*)

N.A. Not Available.

(*) Provisional.

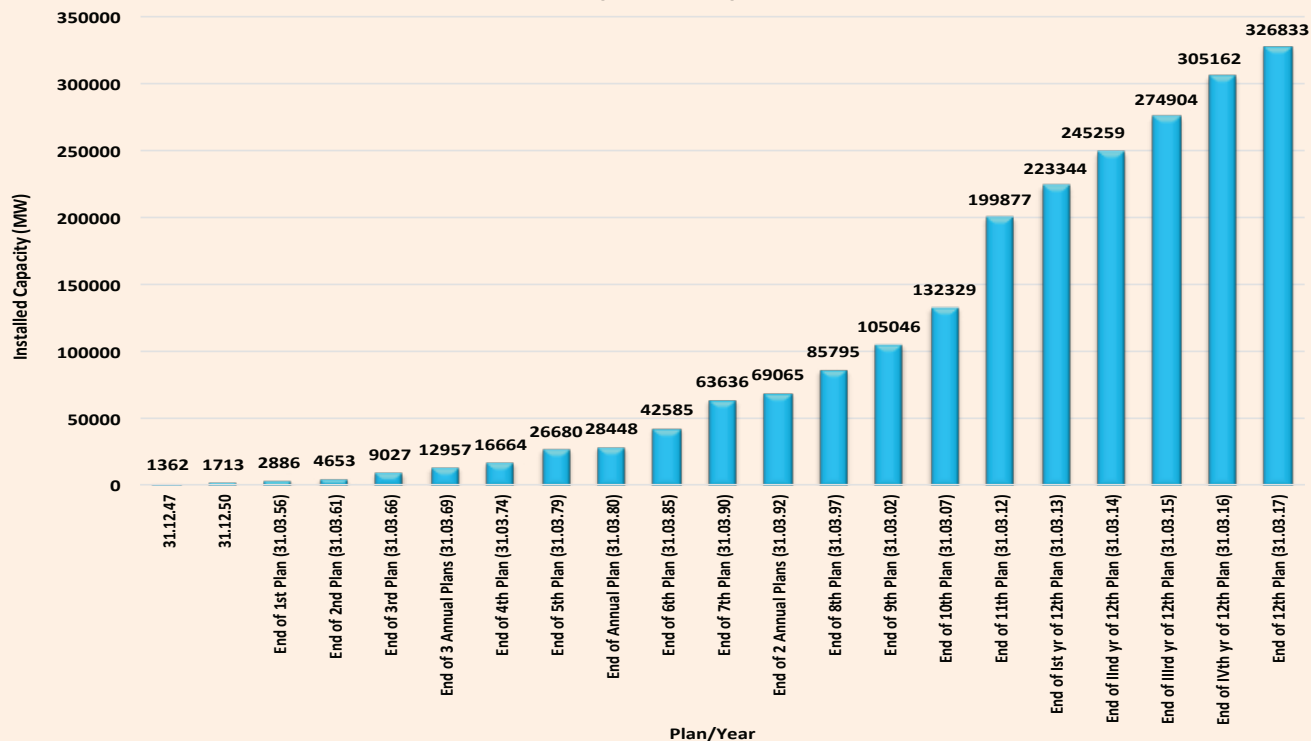
(@) Estimated

Rural electrification is based on revised definition of village electrification and 2011 Census.

(\$) Per Capita Consumption=Gross Electrical Energy Availability/Mid Year Population

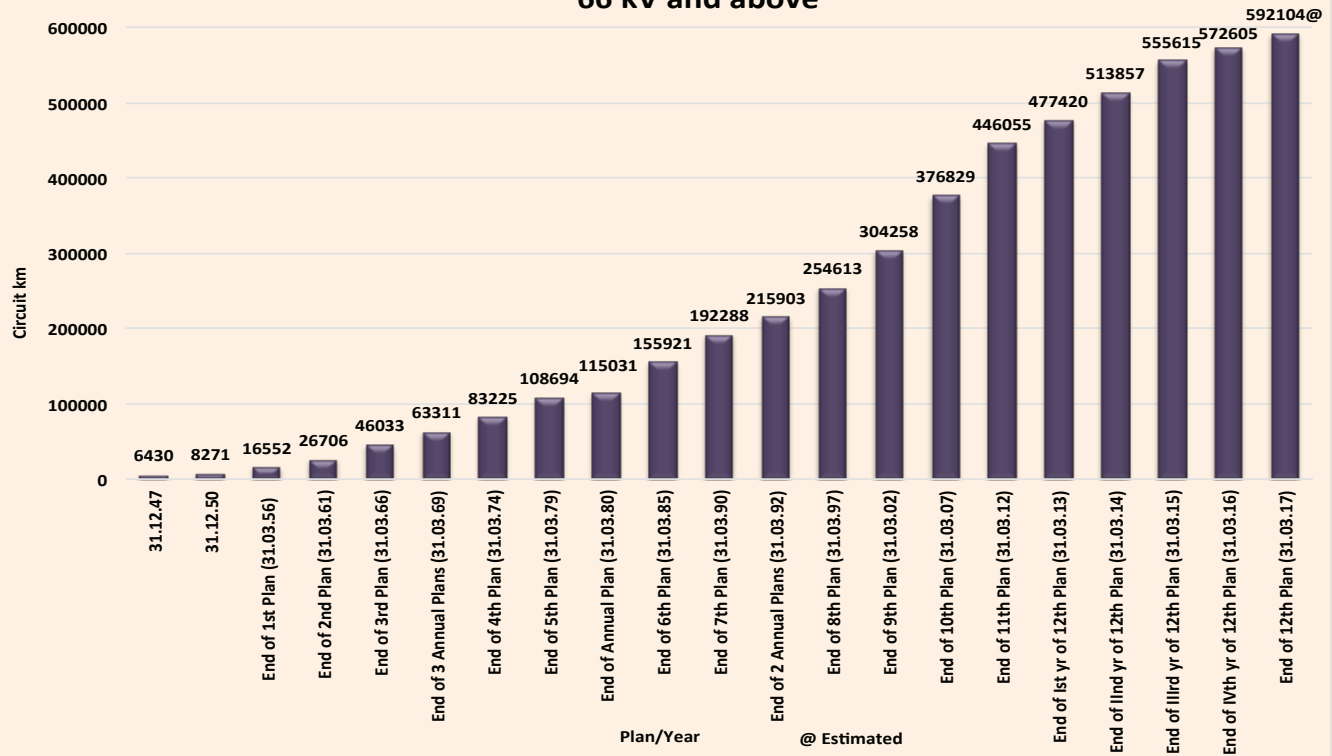
(#) Includes 440 Volts Distribution Lines.

Plan wise Growth of Installed Generating Capacity in the Country (Utilities) Chart : 1



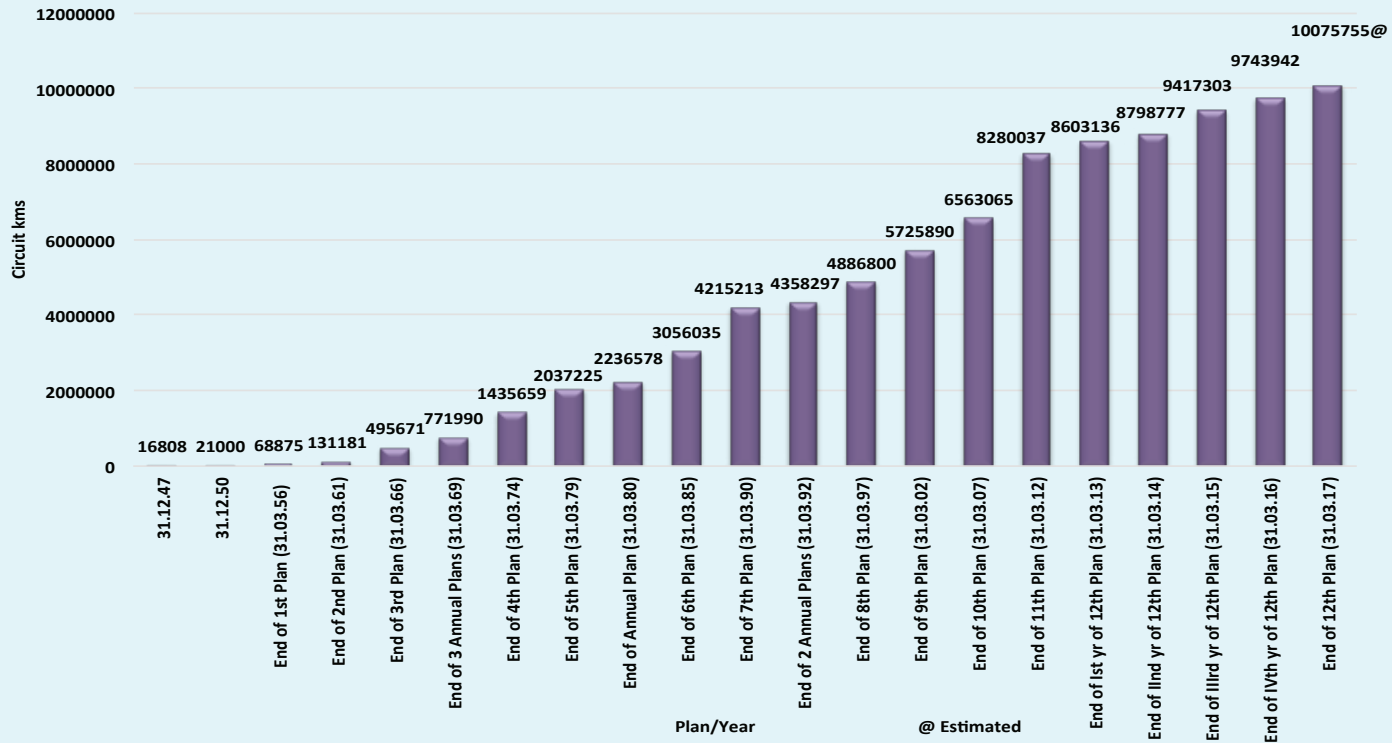
Plan wise Growth of Transmission Lines in the Country 66 kV and above

Chart : 2A



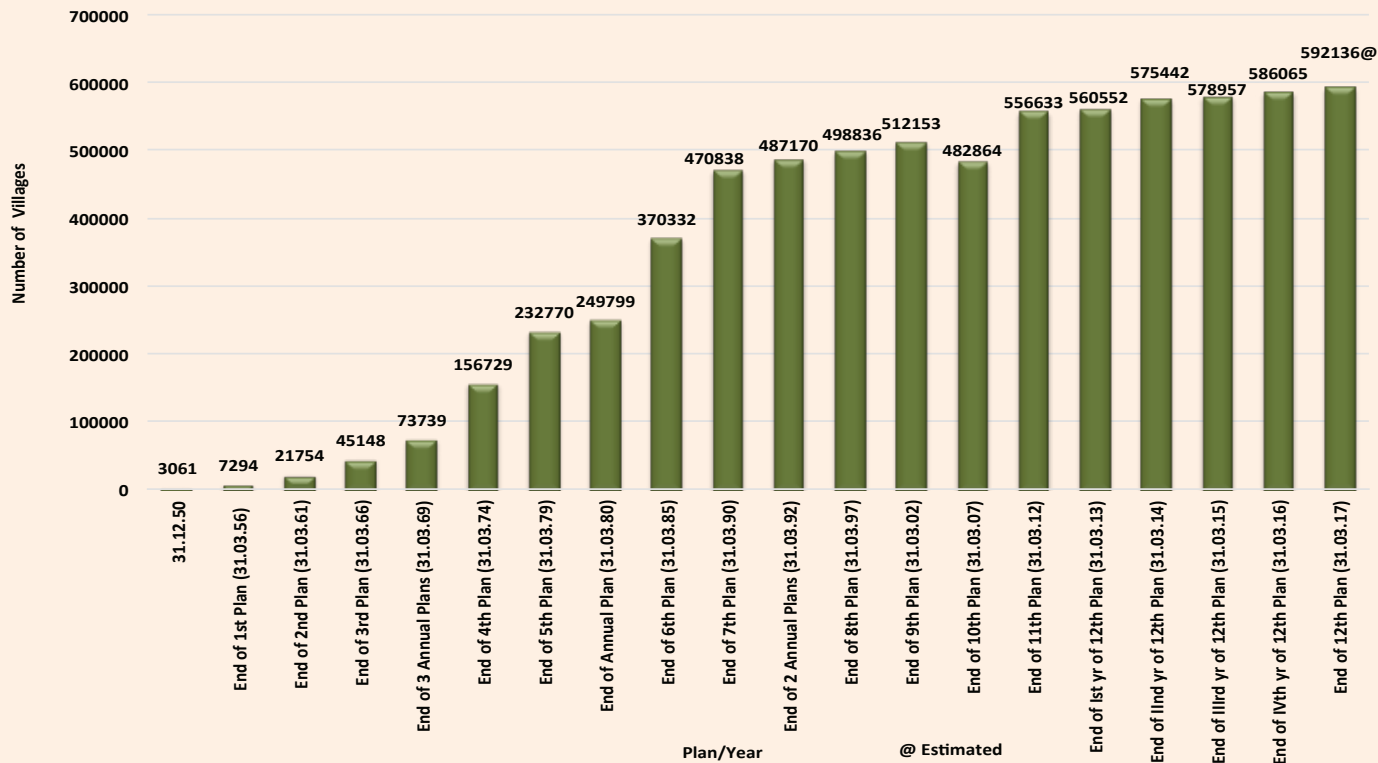
Plan wise Growth of Transmission Lines in the Country below 66 kV

Chart : 2B



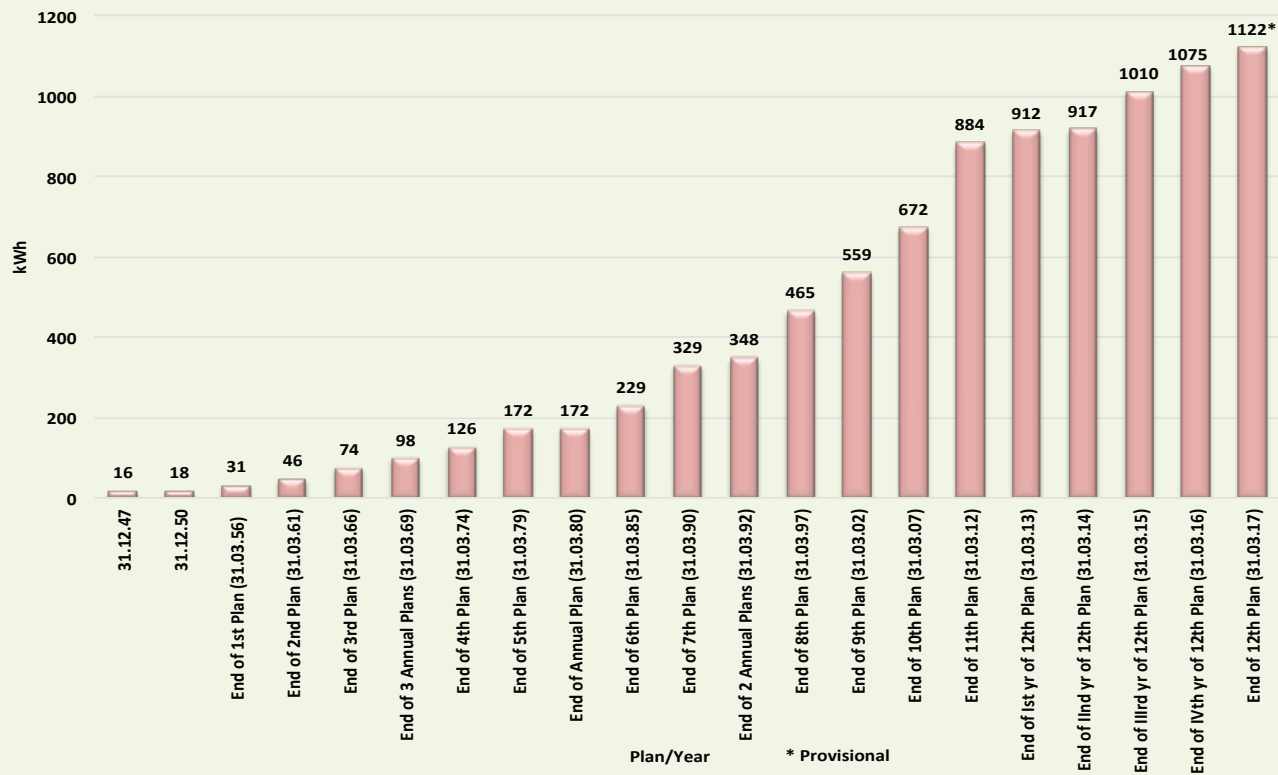
Plan wise Growth of Number of Villages Electrified in the Country

Chart : 3

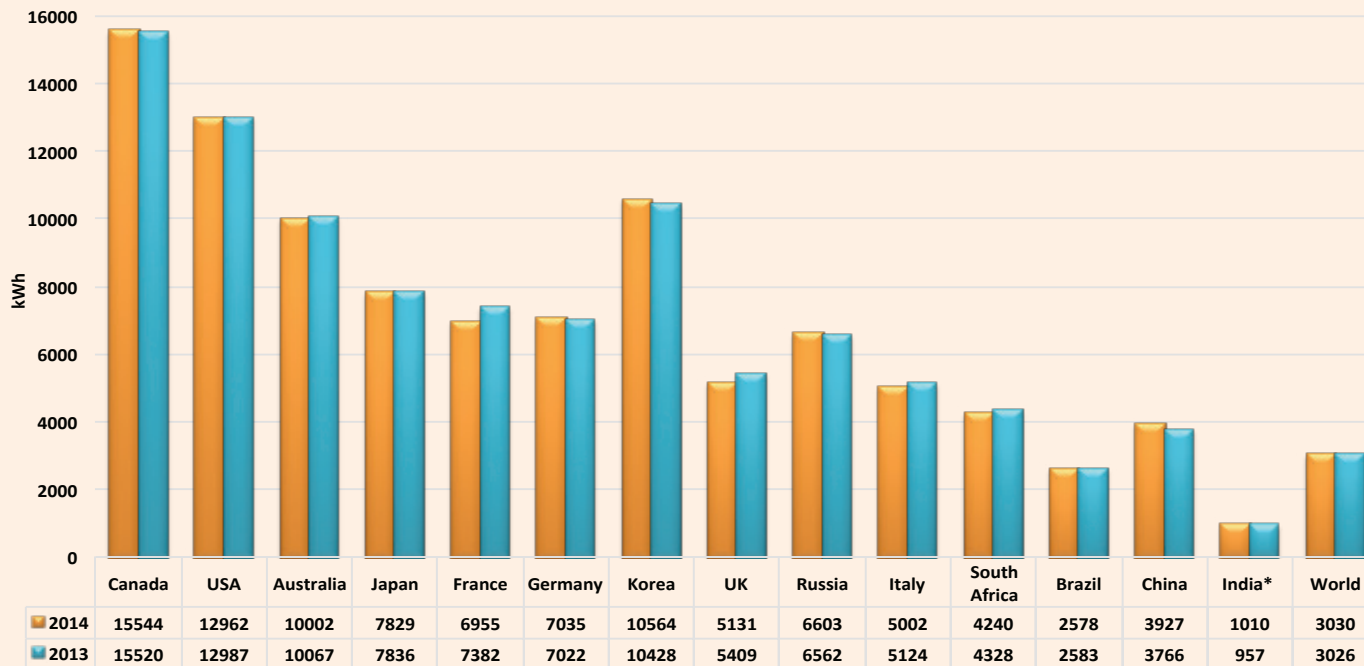


Plan wise Growth of Per Capita Consumption of Electricity in the Country

Chart : 4



Per Capita Electricity Consumption in Various Countries in 2013 & 2014 Chart : 5



Source : IEA publication 'Key World Energy Statistics 2014 website (other than India)

* Per capita consumption = (gross electrical energy availability / mid year population)

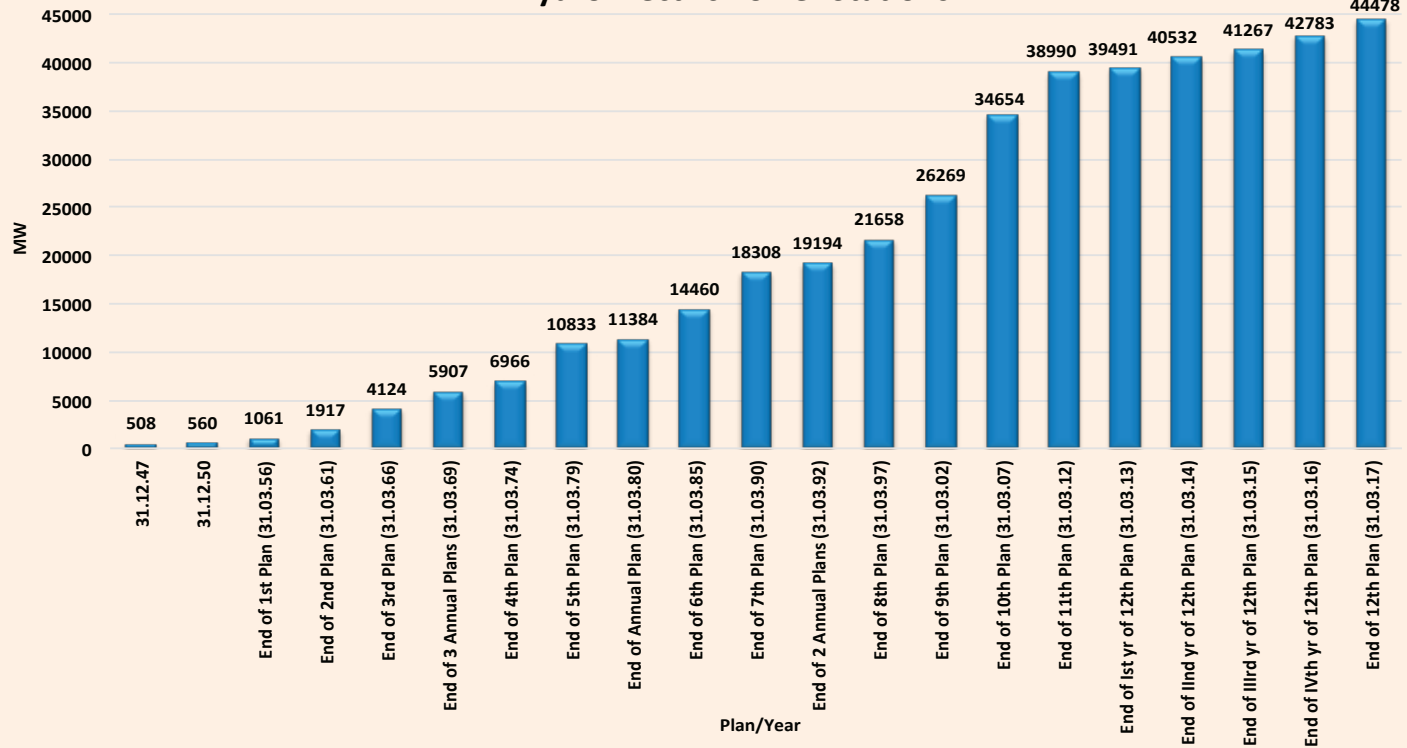
Table 2
Plan wise Growth of Installed Generating Capacity in India - Mode wise
(Utilities)

(MW)									
Sl. No.	As on	Hydro	Thermal				Nuclear	RES	Total
			Coal/Lignite	Gas	Diesel	Total			
1	31.12.47	508	756	0	98	854	0	0	1362
2	31.12.50	560	1004	0	149	1153	0	0	1713
3	31.03.56 (End of 1st Plan)	1061	1597	0	228	1825	0	0	2886
4	31.03.61 (End of 2nd Plan)	1917	2436	0	300	2736	0	0	4653
5	31.03.66 (End of 3rd Plan)	4124	4417	134	352	4903	0	0	9027
6	31.03.69 (End of 3 Annual Plans)	5907	6640	134	276	7050	0	0	12957
7	31.03.74 (End of 4th Plan)	6966	8652	165	241	9058	640	0	16664
8	31.03.79 (End of 5th Plan)	10833	14875	168	164	15207	640	0	26680
9	31.03.80 (End of Annual Plan)	11384	15991	268	165	16424	640	0	28448
10	31.03.85 (End of 6th Plan)	14460	26311	542	177	27030	1095	0	42585
11	31.03.90 (End of 7th Plan)	18308	41237	2343	165	43745	1565	18	63636
12	31.03.92 (End of 2 Annual Plans)	19194	44791	3095	168	48054	1785	32	69065
13	31.03.97 (End of 8th Plan)	21658	54154	6562	294	61010	2225	902	85795
14	31.03.02 (End of 9th Plan)	26269	62131	11163	1135	74429	2720	1628	105046
15	31.03.07 (End of 10th Plan)	34654	71121	13692	1202	86015	3900	7760	132329
16	31.03.12 (End of 11th Plan)	38990	112022	18381	1200	131603	4780	24504	199877
17	31.03.13 (End of Ist yr of 12th Plan)	39491	130221	20110	1200	151531	4780	27542	223344
18	31.03.14 (End of IIInd yr of 12th Plan)	40531	145273	21782	1200	168255	4780	34988	248554
19	31.03.15 (End of IIIrd yr of 12th Plan)	41267	164636	23062	1200	188898	5780	38959	274904
20	31.03.16 (End of IVth yr of 12th Plan)	42783	185173	24509	994	210675	5780	45924	305162
21	31.03.17 (End of 12th Plan)	44478	192163	25329	838	218330	6780	57244	326833

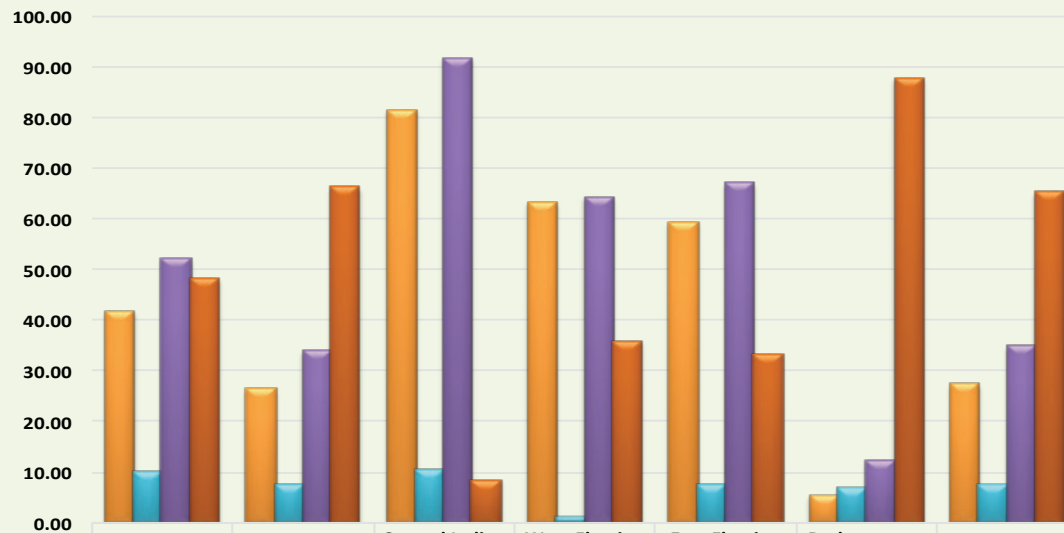
(#) RES:-Renewable Energy Sources also includes Hydro capacity of 25.00 MW and below as reported by MNRE.

Plan wise Growth of Installed Generating Capacity in India Hydro Electric Power Stations

Chart : 6



Basinwise Status of Hydro Electric Potential Development Chart : 6A
in terms of Installed Capacity above 25 MW
% wise (As on 31.03.2017)

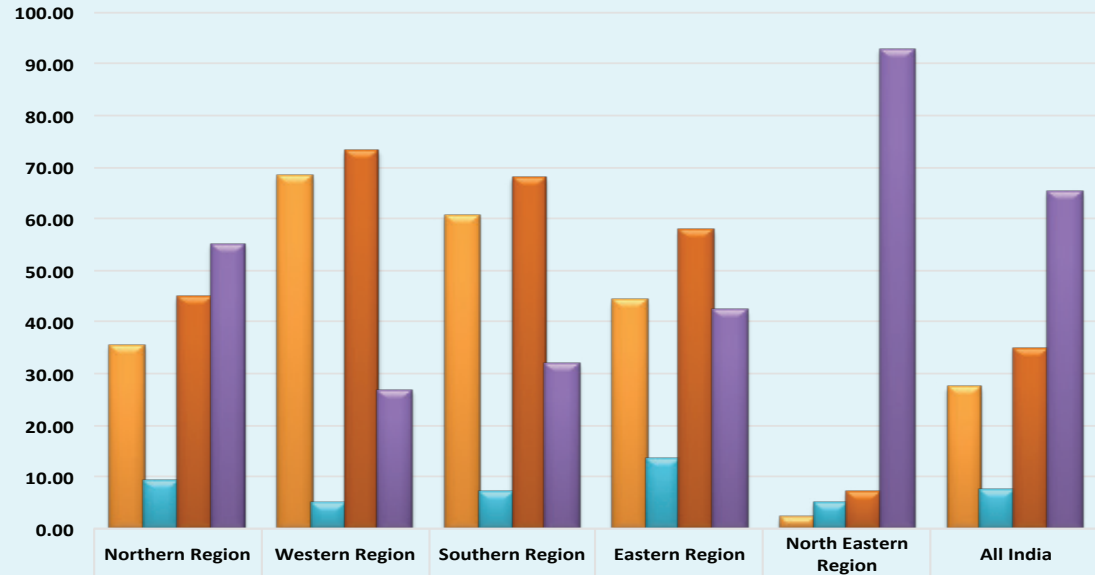


■ % Capacity Developed /Under Operation
■ % Cap. Under Construction
■ % Cap. Dev. + Under Con.
■ % Balance Potential

	Indus	Ganga	Central Indian Rivers	West Flowing Rivers	East Flowing Rivers	Brahmaputra Basin	All India
% Capacity Developed /Under Operation	41.78	26.26	81.37	63.15	59.26	5.48	27.31
% Cap. Under Construction	10.17	7.61	10.34	1.11	7.62	6.73	7.47
% Cap. Dev. + Under Con.	51.94	33.86	91.71	64.26	66.88	12.21	34.78
% Balance Potential	48.06	66.14	8.29	35.74	33.12	87.79	65.22

**Region wise Status of Hydro Electric Potential Development
in terms of Installed Capacity above 25 MW
% wise (As on 31.03.2017)**

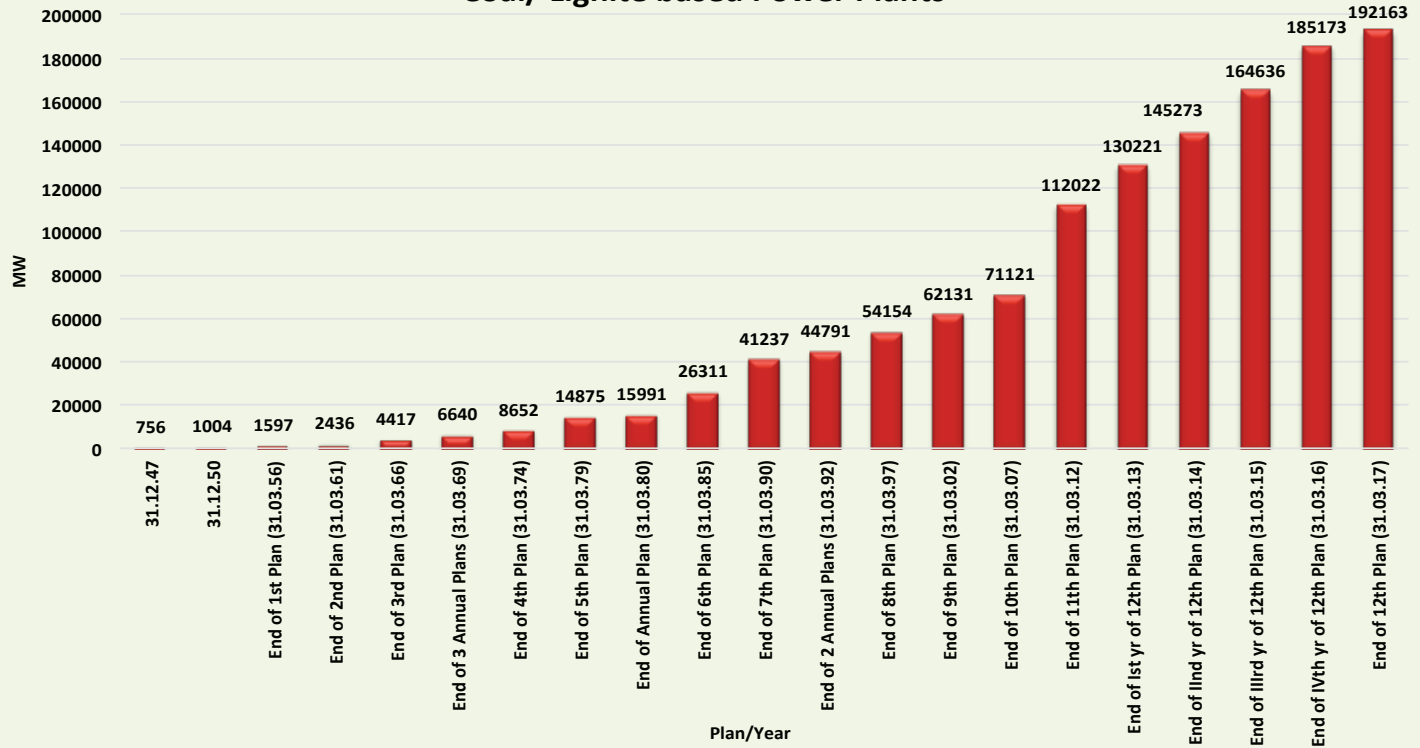
Chart : 6B



% Capacity Developed /Under Operation	35.45	68.28	60.75	44.18	2.13	27.31
%Cap. Under Construction	9.37	4.92	7.24	13.54	5.06	7.47
%Cap. Dev. +Under Construction	44.82	73.20	67.99	57.72	7.19	34.78
% Capacity yet to be Developed	55.18	26.80	32.01	42.28	92.81	65.22

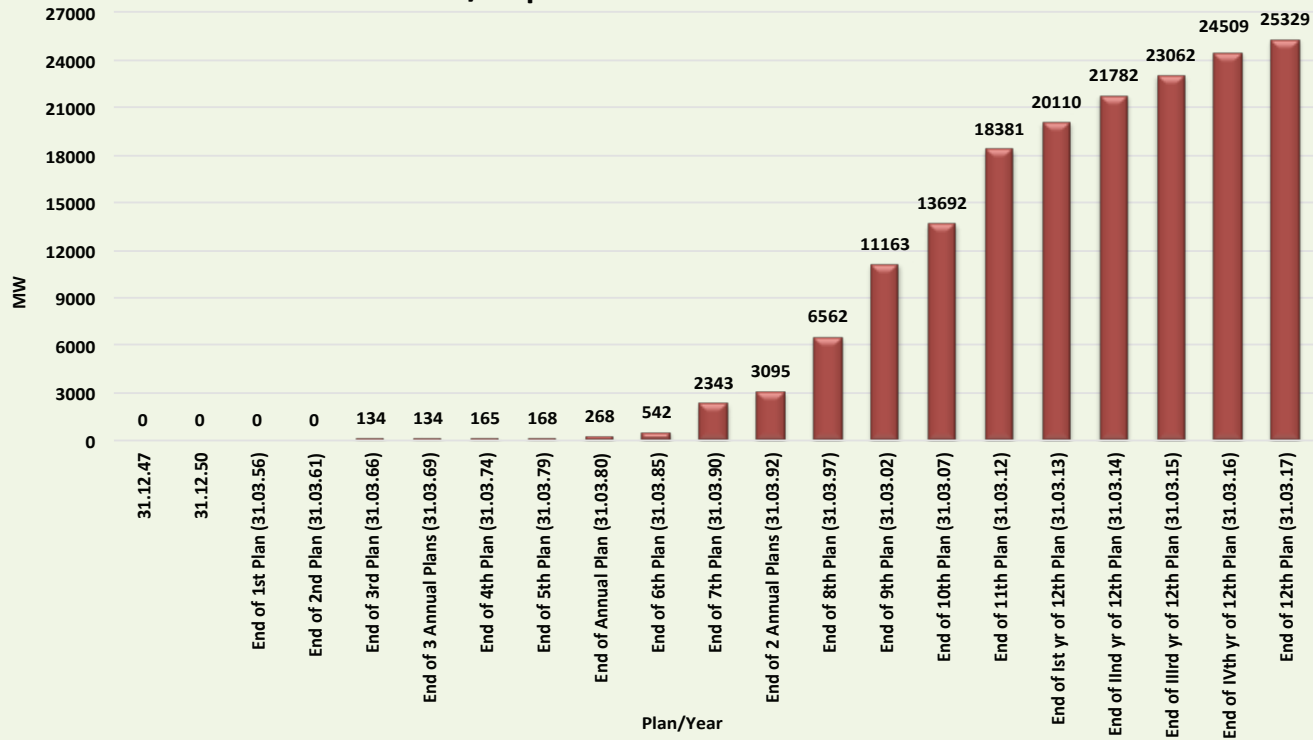
Plan wise Growth of Installed Generating Capacity in India Coal/ Lignite based Power Plants

Chart : 7A



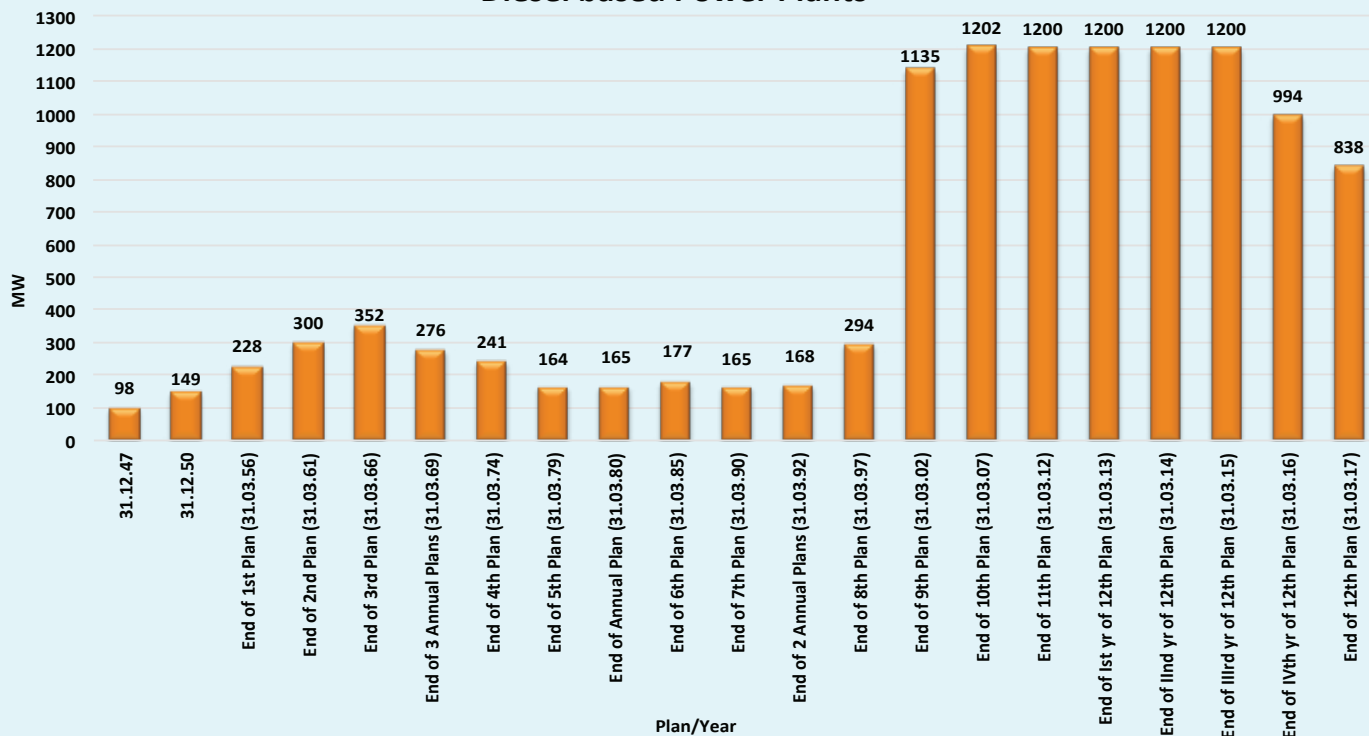
Plan wise Growth of Installed Generating Capacity in India Gas/ Liquid Fuel based Power Plants

Chart : 7B



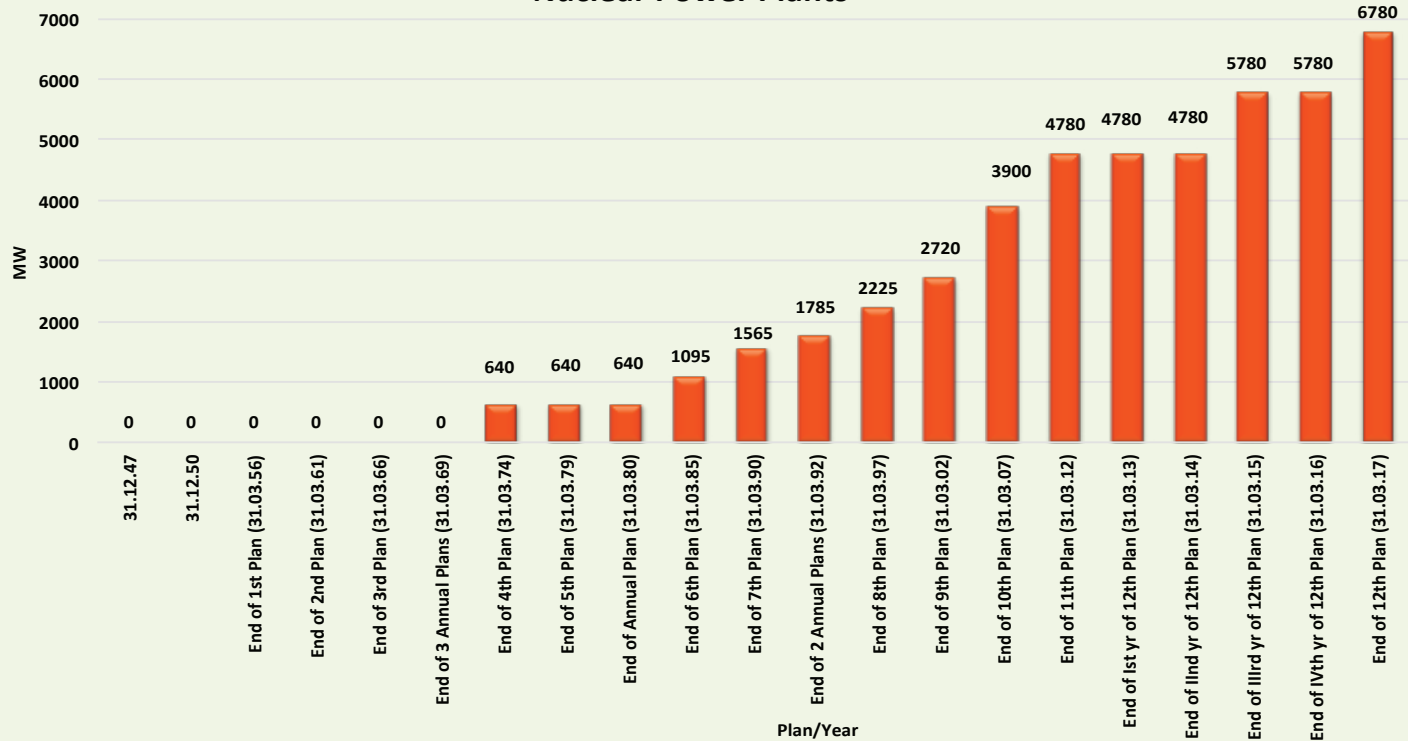
Plan wise Growth of Installed Generating Capacity in India Diesel based Power Plants

Chart : 7C



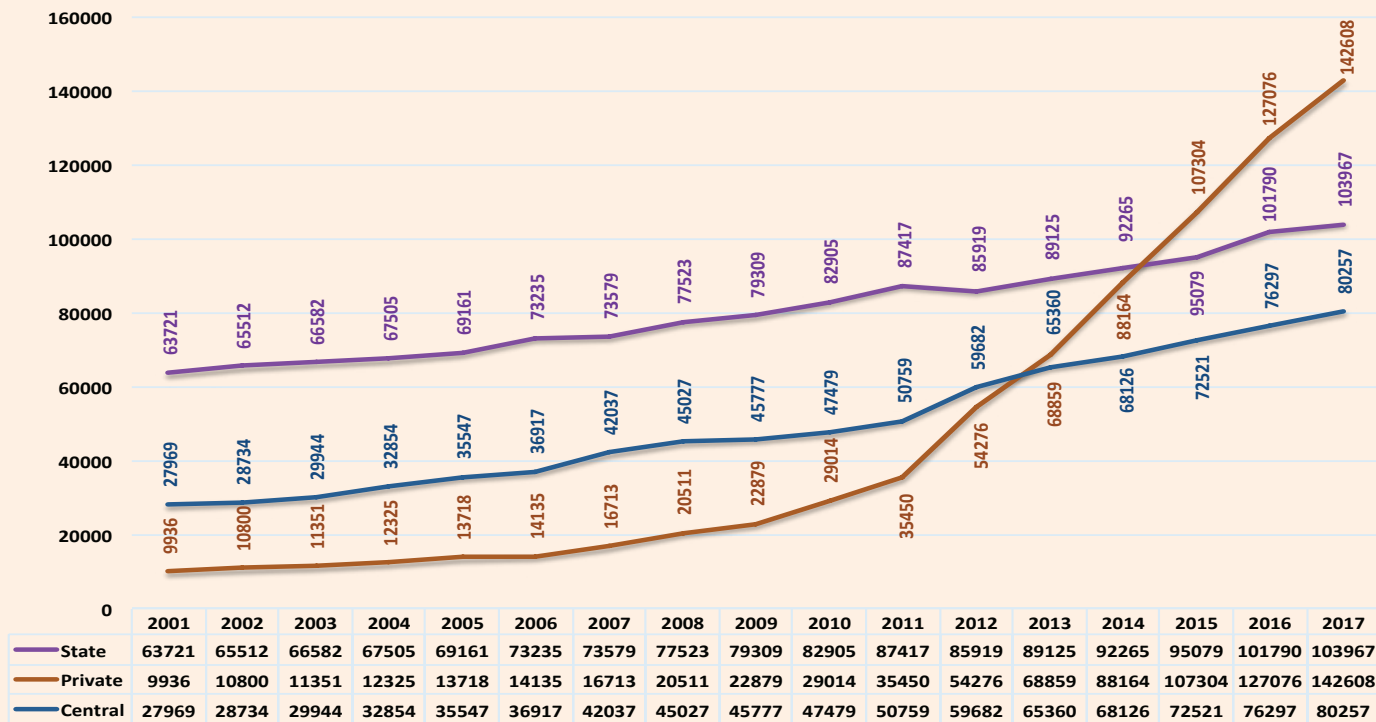
Plan wise Growth of Installed Generating Capacity in India Nuclear Power Plants

Chart : 8



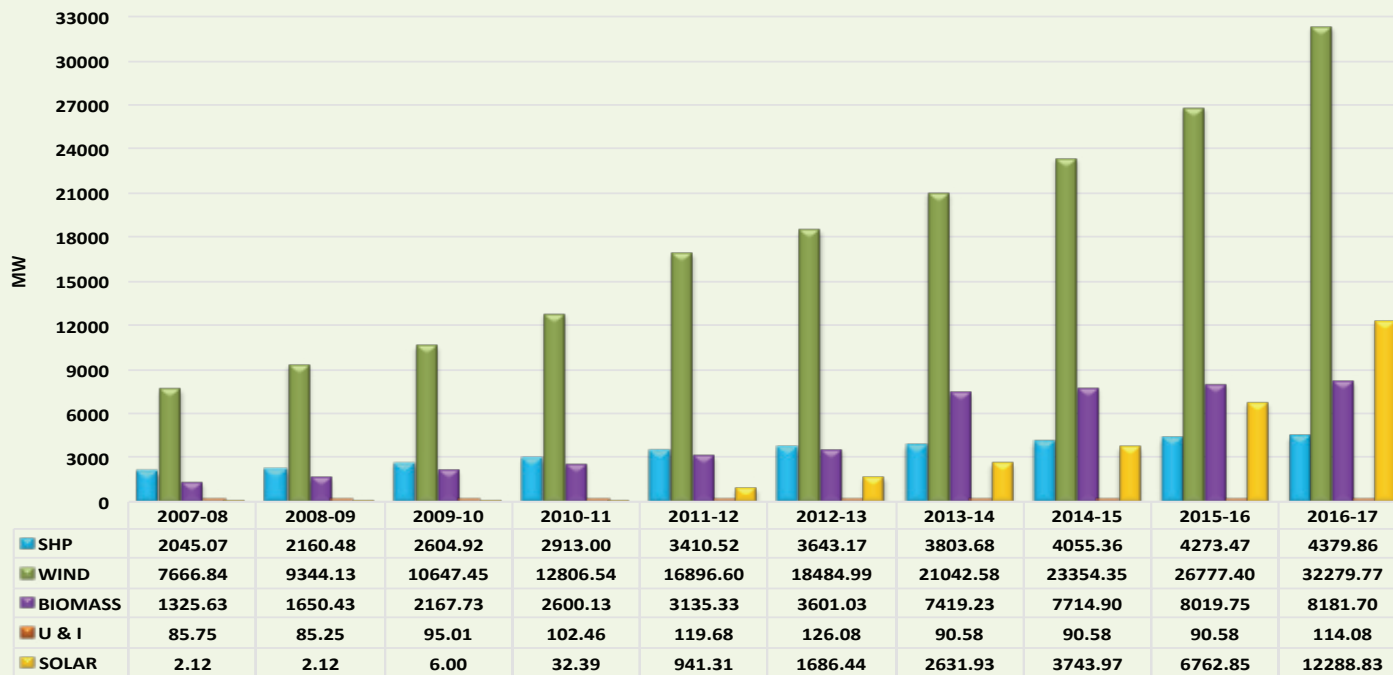
**Sector wise Growth of Generation Capacity (MW)
2000-01 to 2016-17**

Chart : 8A

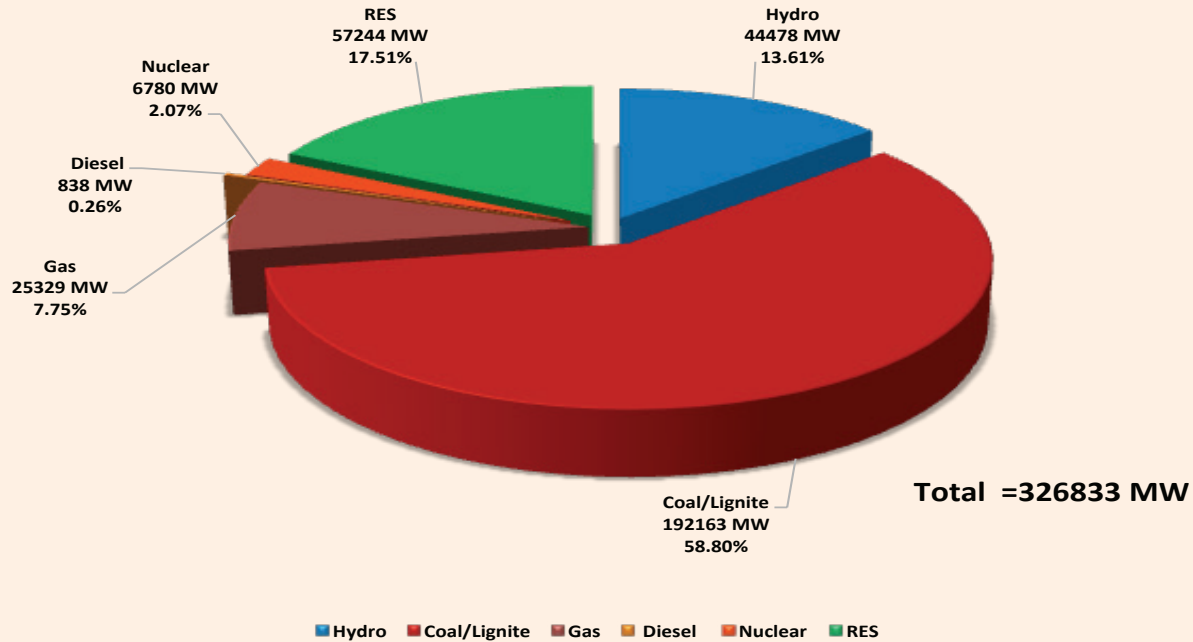


Mode wise/Year wise Growth of Generating Capacity of RES during 12th Plan

Chart : 8B



**All India Installed Generating Capacity - End of Vth Year of 12th Plan (Utilities)
(31.03.2017)**



**All India Installed Generating Capacity - End of IVth Year of 12th Plan
(Utilities)
(31.03.2016)**

Pie Chart : 9A

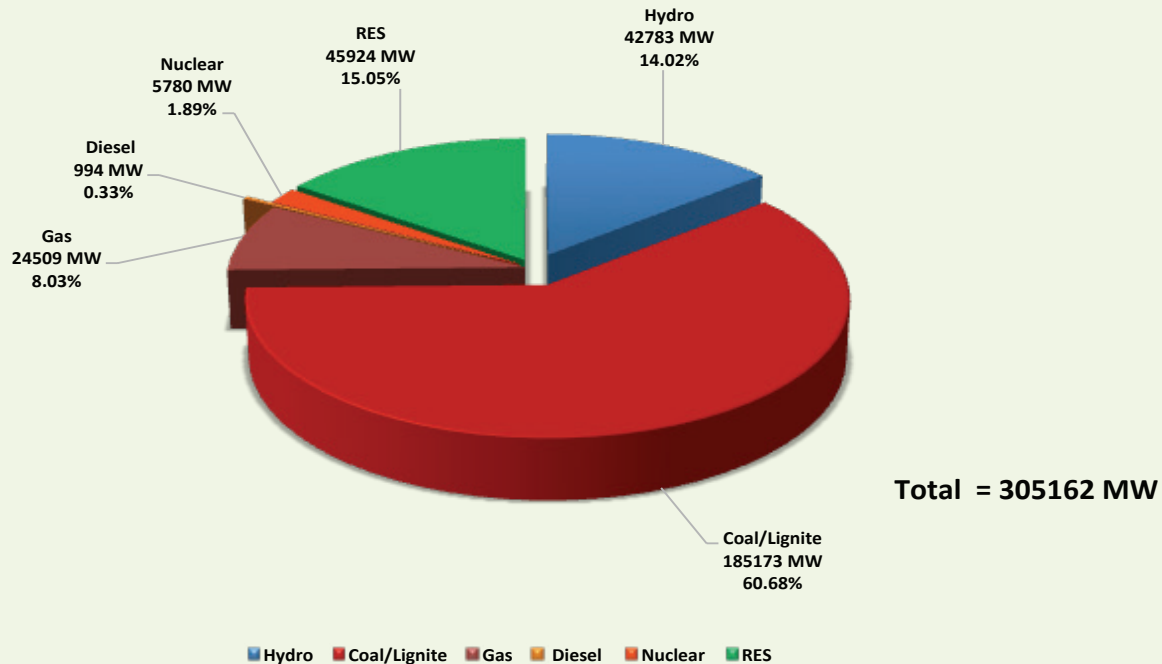


Table 3
Plan wise Growth of Gross Electricity Generation in India - Mode wise
(Utilities)

(GWh)									
Sl. No.	During financial year	Hydro	Thermal				Nuclear	RES	Total
			Coal/Lignite	Gas	Diesel	Total			
1	1947	2195	1733	0	144	1877	0	0	4073
2	1950	2519	2387	0	200	2587	0	0	5106
3	1955-56 (End of 1st Plan)	4295	5134	0	233	5367	0	0	9662
4	1960-61 (End of 2nd Plan)	7837	8732	0	368	9100	0	0	16937
5	1965-66 (End of 3rd Plan)	15225	17372	69	324	17765	0	0	32990
6	1968-69 (End of 3 Annual Plans)	20723	26394	123	194	26711	0	0	47433
7	1973-74 (End of 4th Plan)	28972	34853	343	125	35321	2396	0	66689
8	1978-79 (End of 5th Plan)	47159	52024	515	55	52594	2770	0	102523
9	1979-80 (End of Annual Plan)	45478	55720	500	53	56273	2876	0	104627
10	1984-85 (End of 6th Plan)	53948	96957	1834	45	98836	4075	0	156859
11	1989-90 (End of 7th Plan)	62116	172643	5962	85	178690	4625	6	245438
12	1991-92 (End of 2 Annual Plans)	72757	197163	11450	95	208708	5525	38	287029
13	1996-97 (End of 8th Plan)	68901	289378	26985	679	317042	9071	876	395889
14	2001-02 (End of 9th Plan)	73580	370884	47099	4317	422300	19475	2085	517439
15	2006-07 (End of 10th Plan)	113502	461794	64157	2539	528490	18802	9860	670654
16	2011-12 (End of 11th Plan)	130511	612497	93281	2649	708427	32287	51226	922451
17	2012-13 (Ist yr of 12th Plan)	113720	691341	66664	2449	760454	32866	57449	964489
18	2013-14 (IIInd yr of 12th Plan)	134847	745533	44522	1999	792054	34228	65520	1026649
19	2014-15 (IIIrd yr of 12th Plan)	129244	835291	41075	1575	877941	36102	61785	1105072
20	2015-16 (IVth yr of 12th Plan)	121377	895340	47122	551	943013	37413	65781	1167584
21	2016-17 (End of 12th Plan)*	122378	944861	49094	275	994230	37916	81869	1236392

Note:

* Provisional

1. BBMB generation has been considered in State Sector.

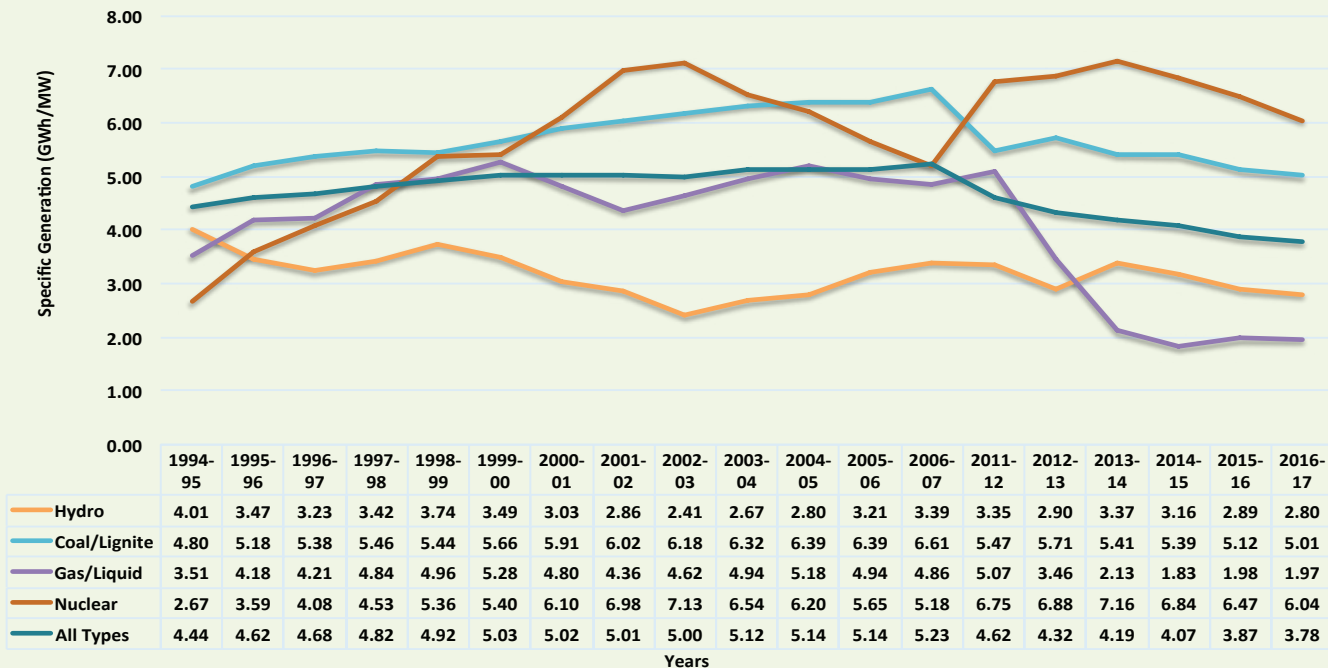
2. RES Generation upto 2013-2014 as per normative generation.

3. RES Generation during 2014-2015 onwards are as per actual generation received from utilities.

Specific Generation by All India Power Stations - Mode wise (Utilities)

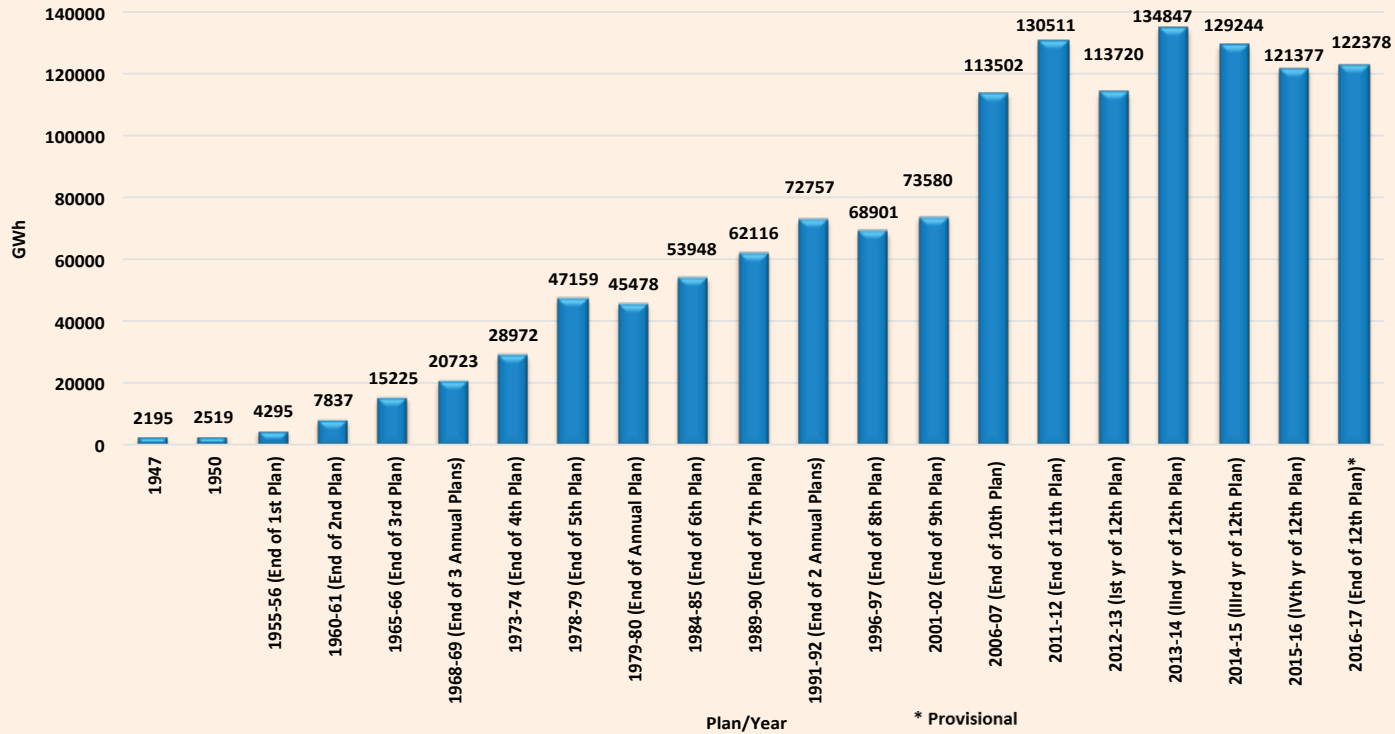
Chart : 10

1994-95 to 2016-17



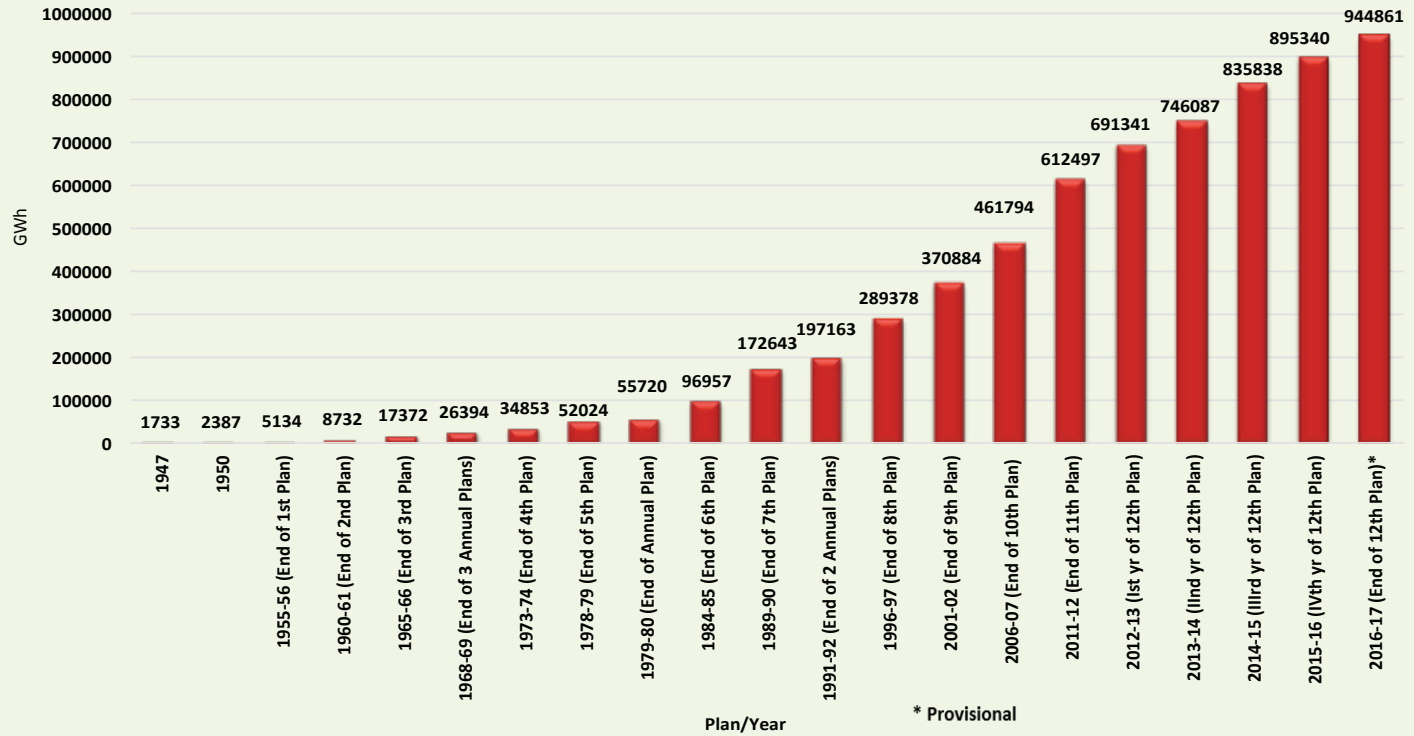
Plan wise Growth of Electricity Generation in India Hydro Electric Power Stations

Chart : 11



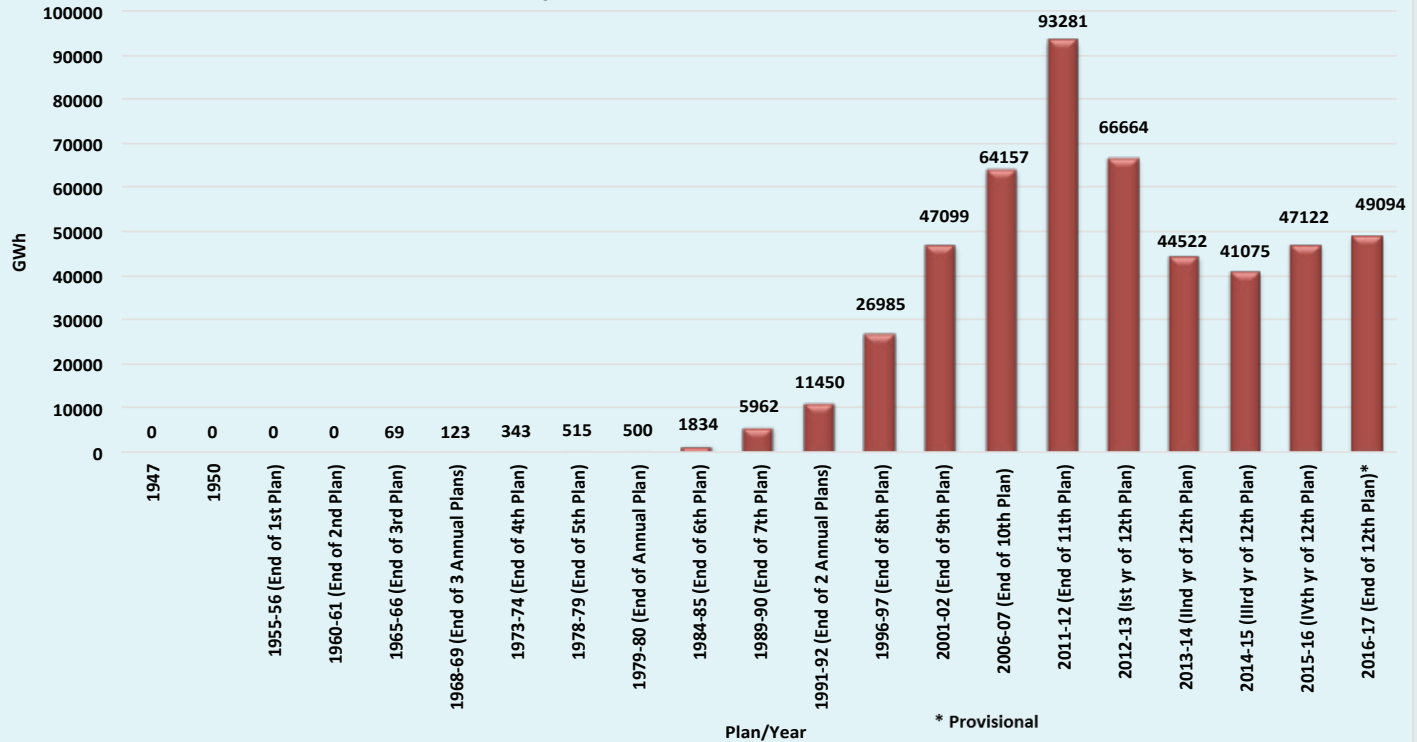
Plan wise Growth of Electricity Generation in India Coal/ Lignite based Power Plants

Chart : 12A



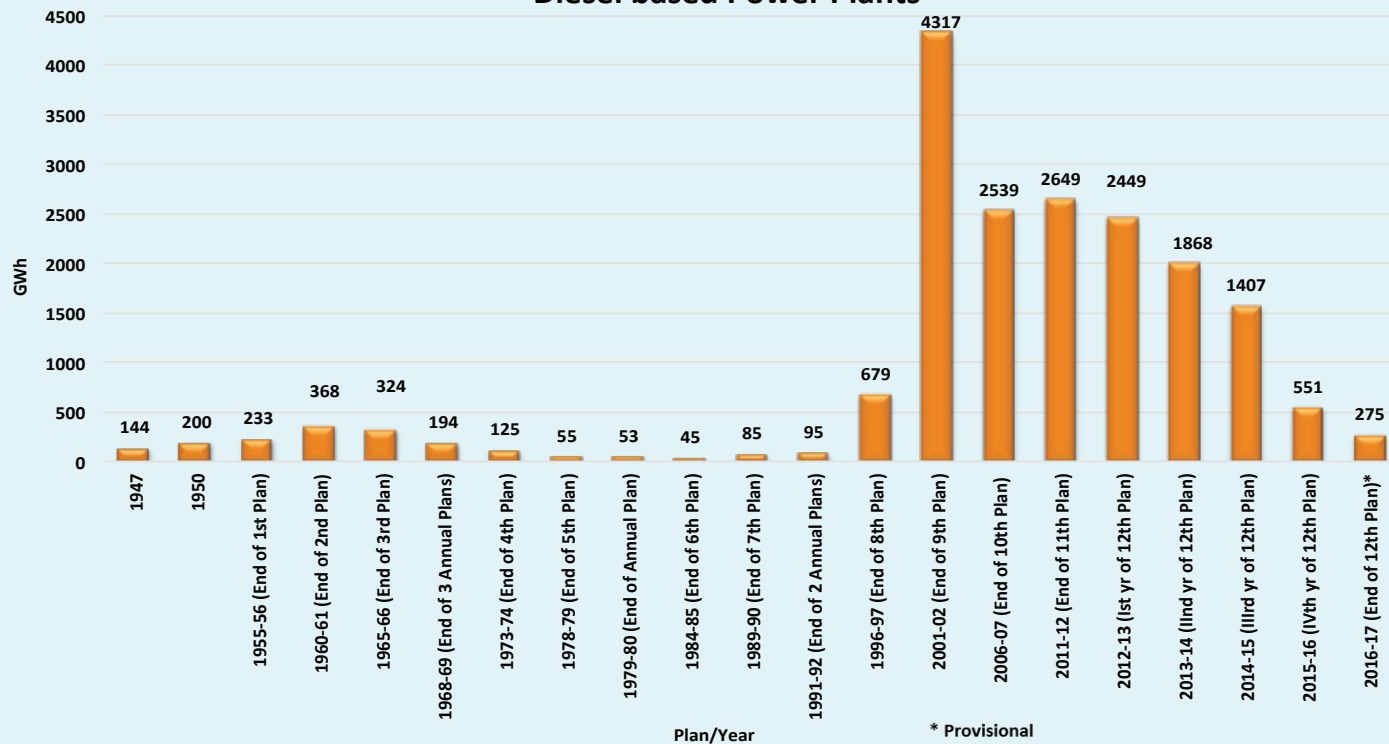
Plan wise Growth of Electricity Generation in India Gas/ Liquid Fuel based Power Plants

Chart : 12B



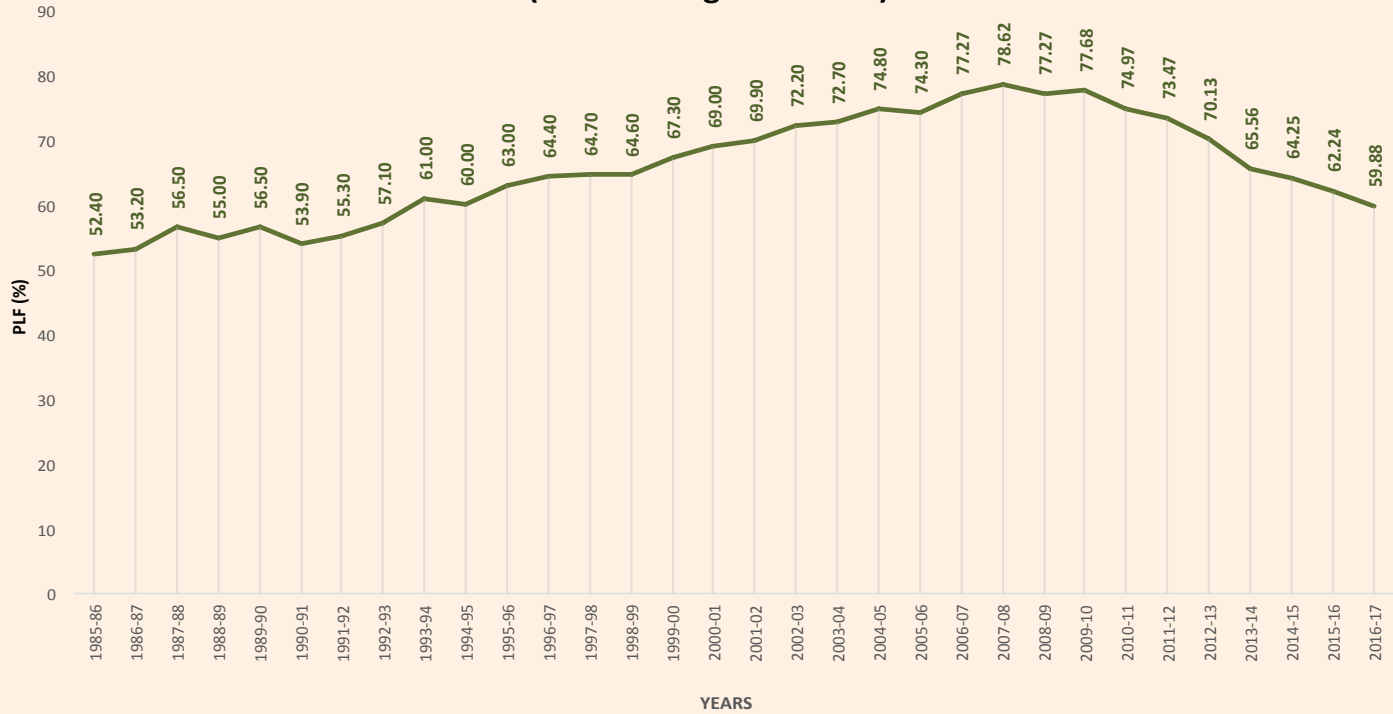
Plan wise Growth of Electricity Generation in India Diesel based Power Plants

Chart : 12C



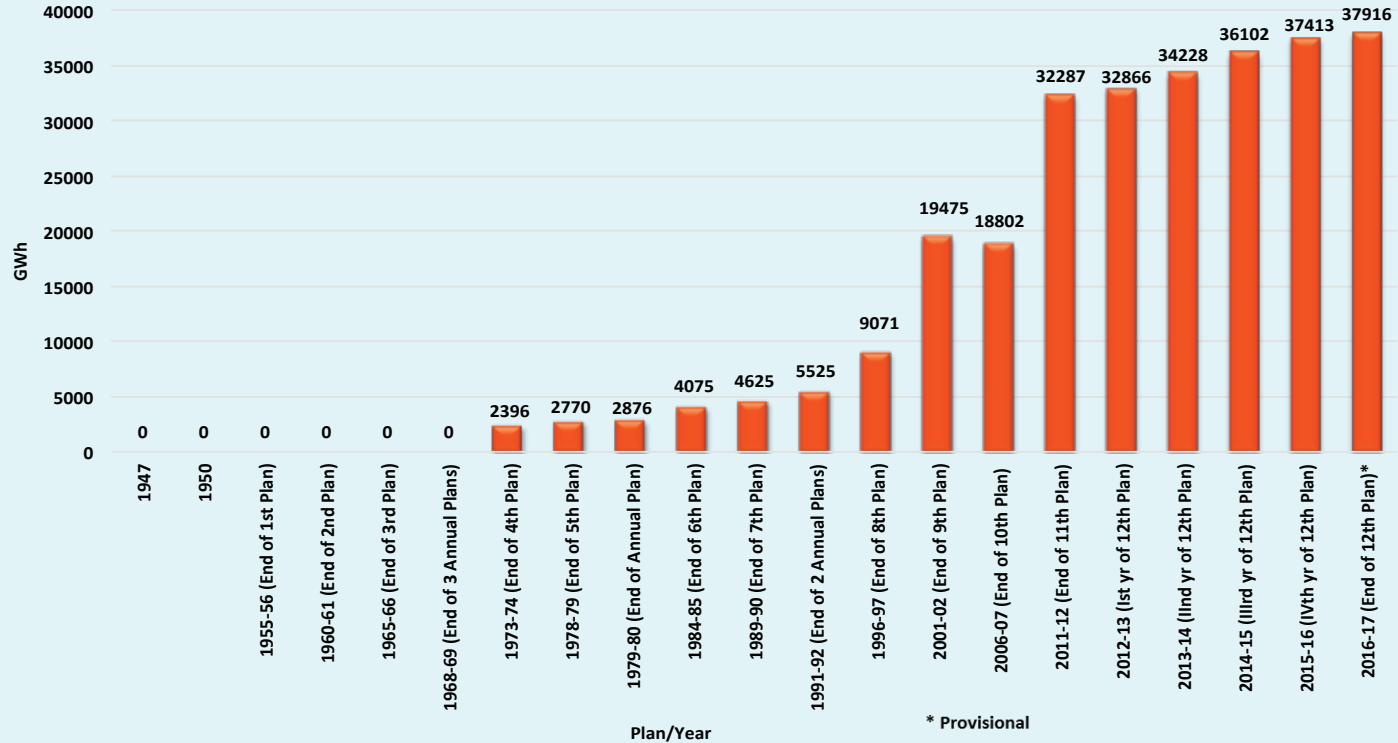
All India PLF (%) of Thermal Power Stations (Coal and Lignite based)

Chart : 13



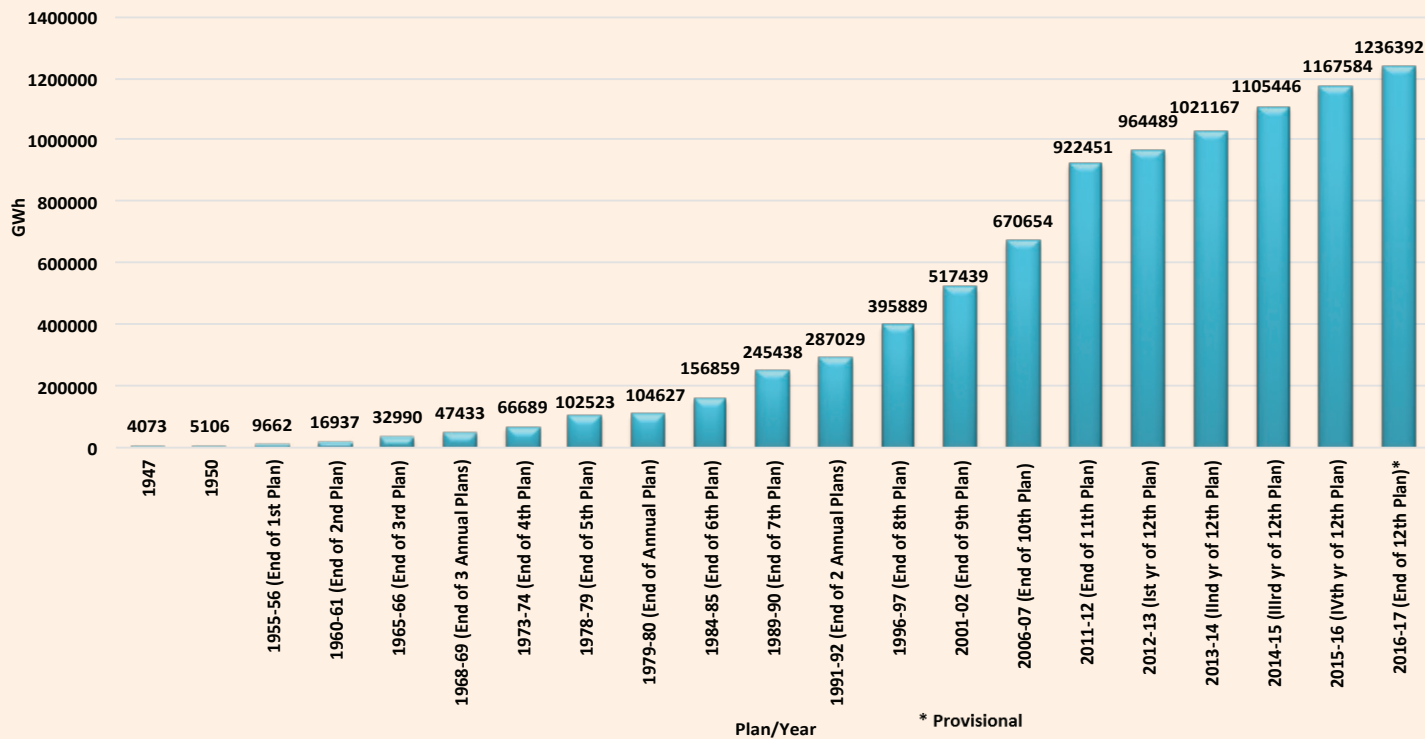
Plan wise Growth of Electricity Generation in India Nuclear Power Plants

Chart : 14



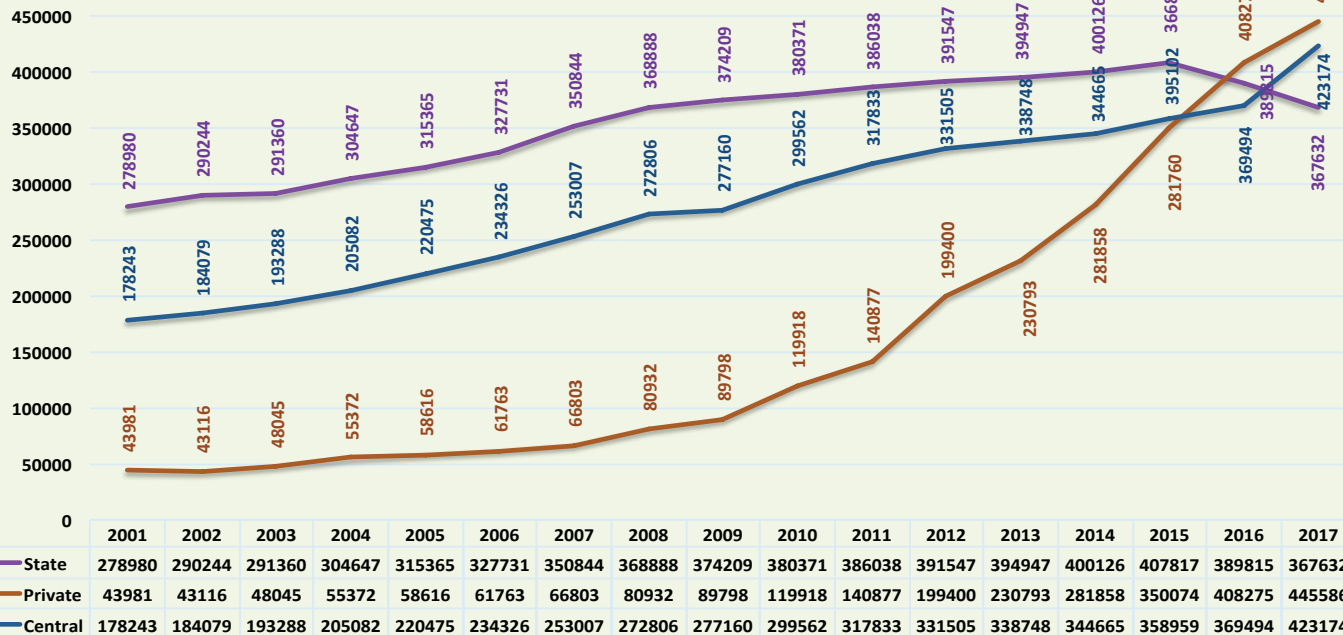
Plan wise Growth of All India Electricity Generation (Utilities)

Chart : 15

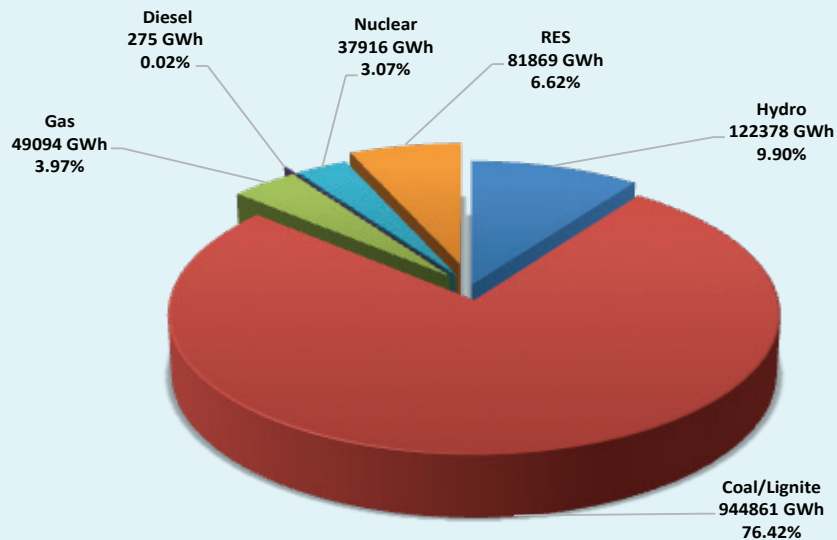


Sector wise Growth of Energy Generation (GWh) 2000-01 to 2016-17

Chart : 15A



**Gross Electricity Generation in India Mode wise - End of Vth Year of 12th Plan (Utilities)
(31.03.2017)*** **Pie Chart : 16**



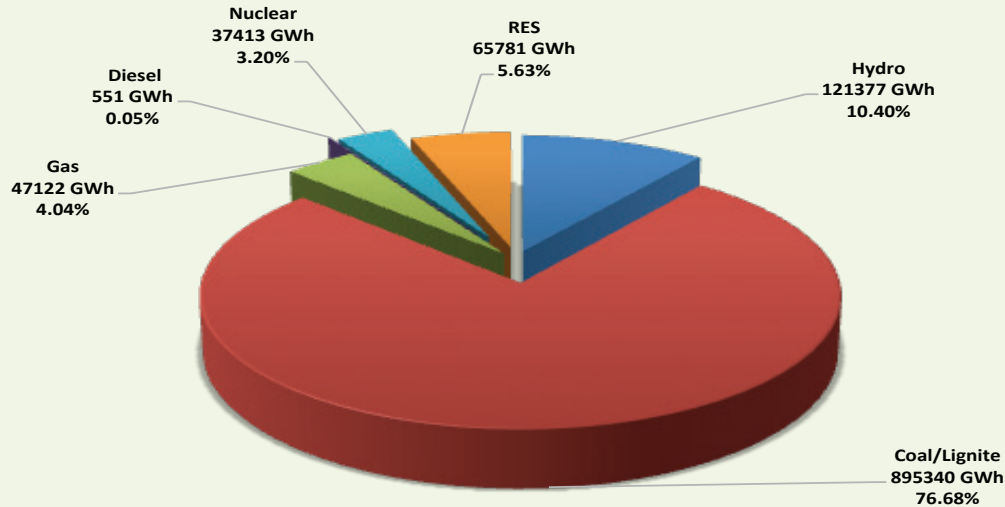
TOTAL = 1236392 GWh

* Provisional

■ Hydro ■ Coal/Lignite ■ Gas ■ Diesel ■ Nuclear ■ RES

**Gross Electricity Generation in India Mode wise - End of IVth Year of 12th Plan
(Utilities)
(31.03.2016)**

Pie Chart : 16A

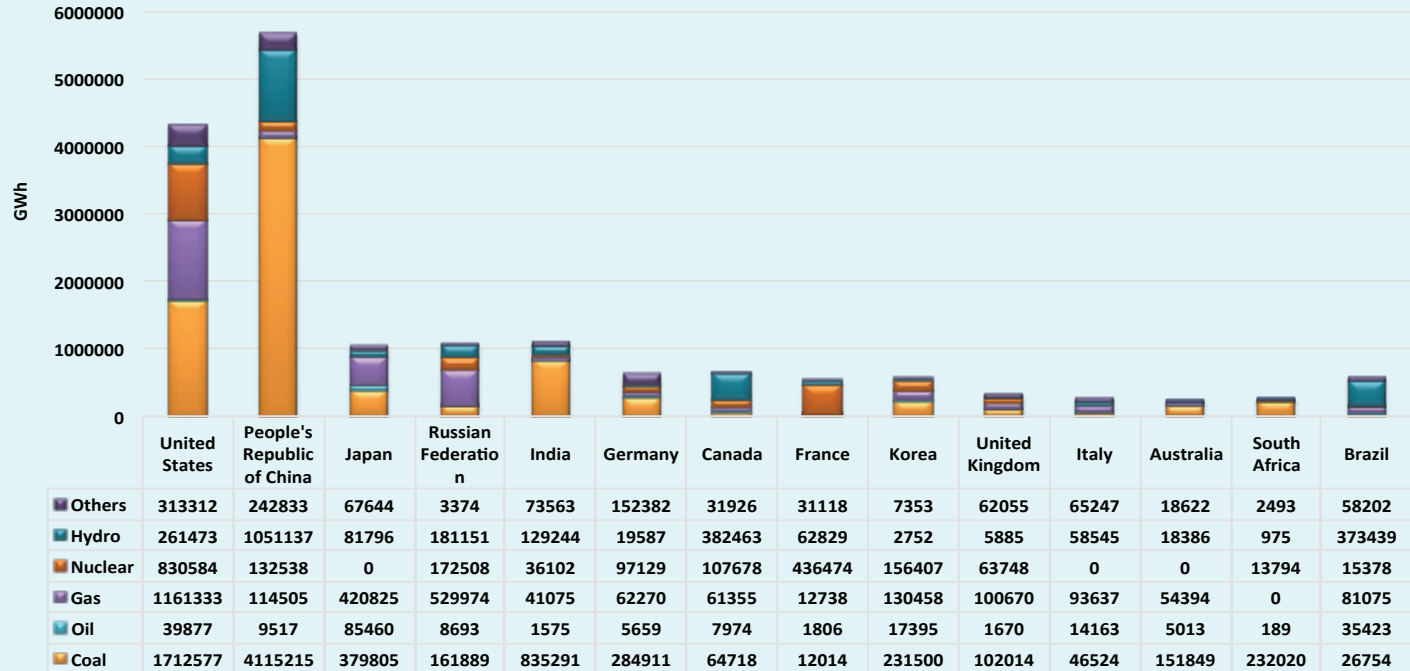


TOTAL = 116758.4 GWh

■ Hydro ■ Coal/Lignite ■ Gas ■ Diesel ■ Nuclear ■ RES

Gross Electricity Generation in various Countries Mode wise in 2014

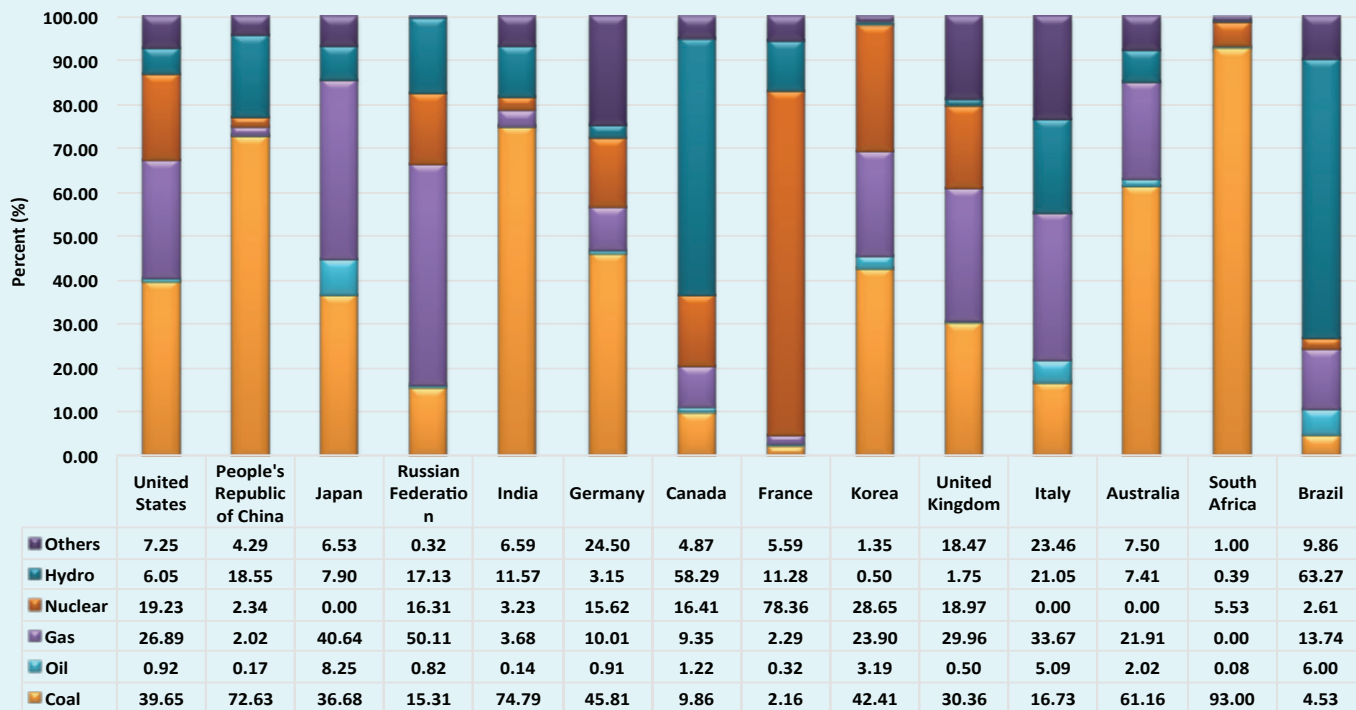
Chart : 17



Source : - International Energy Agency (IEA) except India

**Mode wise % Share in Electricity Generation in various Countries
in 2014**

Chart : 18



Source : - International Energy Agency (IEA) except India.

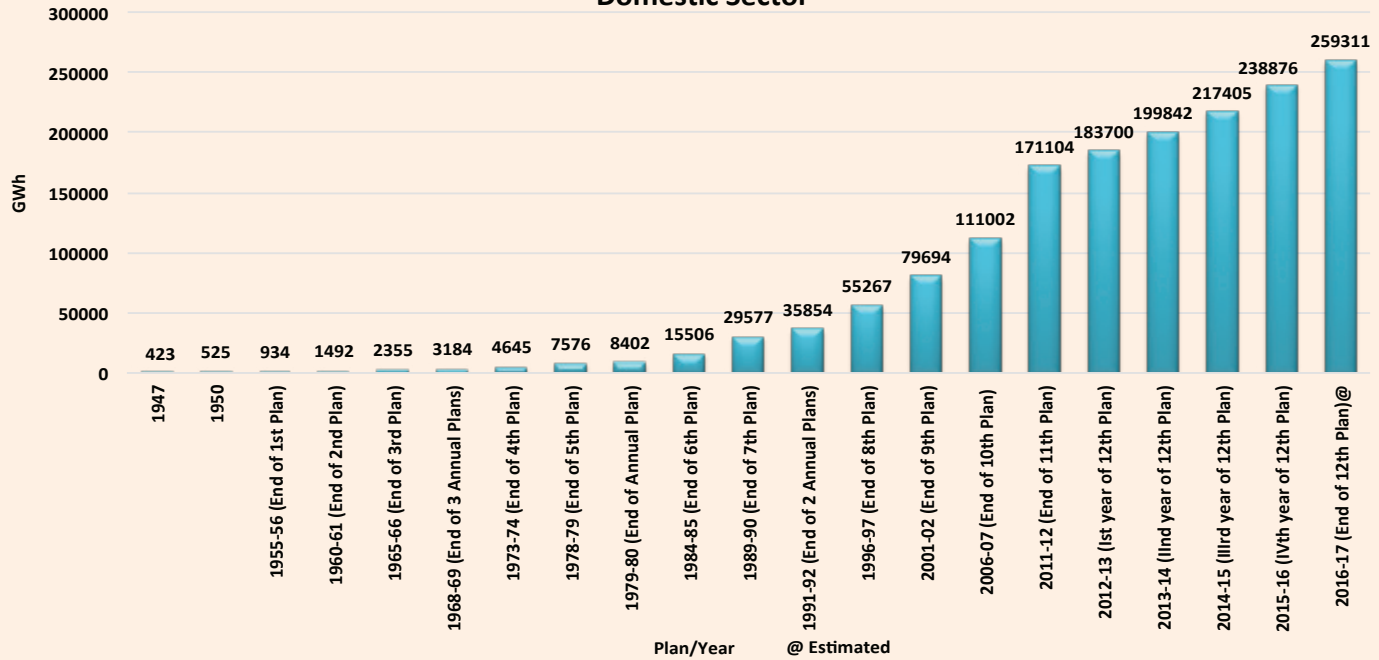
Table 4
Plan wise/ Category wise Growth of Electricity Consumption in India
(Utilities & Non-Utilities)

Sl. No.	During financial year	(GWh)												Total
		Domes- tic	% to Total	Com- mercial	% to Total	Indus- trial	% to Total	Trac- tion	% to Total	Agricul- ture	% to Total	Misc.	% to Total	
1	1947	423	10.11	178	4.26	2960	70.78	277	6.62	125	2.99	219	5.24	4182
2	1950	525	9.36	309	5.51	4057	72.32	308	5.49	162	2.89	249	4.44	5610
3	1955-56 (End of 1st Plan)	934	9.20	546	5.38	7514	74.03	405	3.99	316	3.11	435	4.29	10150
4	1960-61 (End of 2nd Plan)	1492	8.88	848	5.05	12547	74.67	454	2.70	833	4.96	630	3.75	16804
5	1965-66 (End of 3rd Plan)	2355	7.73	1650	5.42	22596	74.19	1057	3.47	1892	6.21	905	2.97	30455
6	1968-69 (End of 3 Annual Plans)	3184	7.69	2126	5.14	29931	72.31	1247	3.01	3465	8.37	1439	3.48	41392
7	1973-74 (End of 4th Plan)	4645	8.36	2988	5.38	37791	68.02	1531	2.76	6310	11.36	2292	4.13	55557
8	1978-79 (End of 5th Plan)	7576	9.02	4330	5.15	54440	64.81	2186	2.60	12028	14.32	3445	4.10	84005
9	1979-80 (End of Annual Plan)	8402	9.85	4657	5.46	53206	62.35	2301	2.70	13452	15.76	3316	3.89	85334
10	1984-85 (End of 6th Plan)	15506	12.45	6937	5.57	73520	59.02	2880	2.31	20961	16.83	4765	3.83	124569
11	1989-90 (End of 7th Plan)	29577	15.16	9548	4.89	100373	51.45	4070	2.09	44056	22.58	7474	3.83	195098
12	1991-92 (End of 2 Annual Plans)	35854	15.51	12032	5.20	110844	47.94	4520	1.96	58557	25.33	9394	4.06	231201
13	1996-97 (End of 8th Plan)	55267	17.53	17519	5.56	139253	44.17	6594	2.09	84019	26.65	12642	4.01	315294
14	2001-02 (End of 9th Plan)	79694	21.27	24139	6.44	159507	42.57	8106	2.16	81673	21.80	21551	5.75	374670
15	2006-07 (End of 10th Plan)	111002	21.12	40220	7.65	241216	45.89	10800	2.05	99023	18.84	23411	4.45	525672
16	2011-12 (End of 11th Plan)	171104	21.79	65381	8.33	352291	44.87	14206	1.81	140960	17.95	41252	5.25	785194
17	2012-13 (1st year of 12th Plan)	183700	22.29	72794	8.83	365989	44.40	14100	1.71	147462	17.89	40256	4.88	824301
18	2013-14 (IInd year of 12th Plan)	199842	22.86	74247	8.49	384418	43.97	15540	1.78	152744	17.47	47418	5.42	874209
19	2014-15 (IIIrd year of 12th Plan)	217405	22.92	78391	8.26	418346	44.11	16177	1.71	168913	17.81	49290	5.20	948522
20	2015-16 (IVth year of 12th Plan)	238876	23.86	86037	8.59	423523	42.30	16594	1.66	173185	17.30	62976	6.29	1001191
21	2016-17 (End of 12th Plan)@	259311	24.32	98333	9.22	426665	40.01	17217	1.61	195473	18.33	69269	6.50	1066268

(@) Estimated

Plan wise Growth of Electricity Consumption in India Domestic Sector

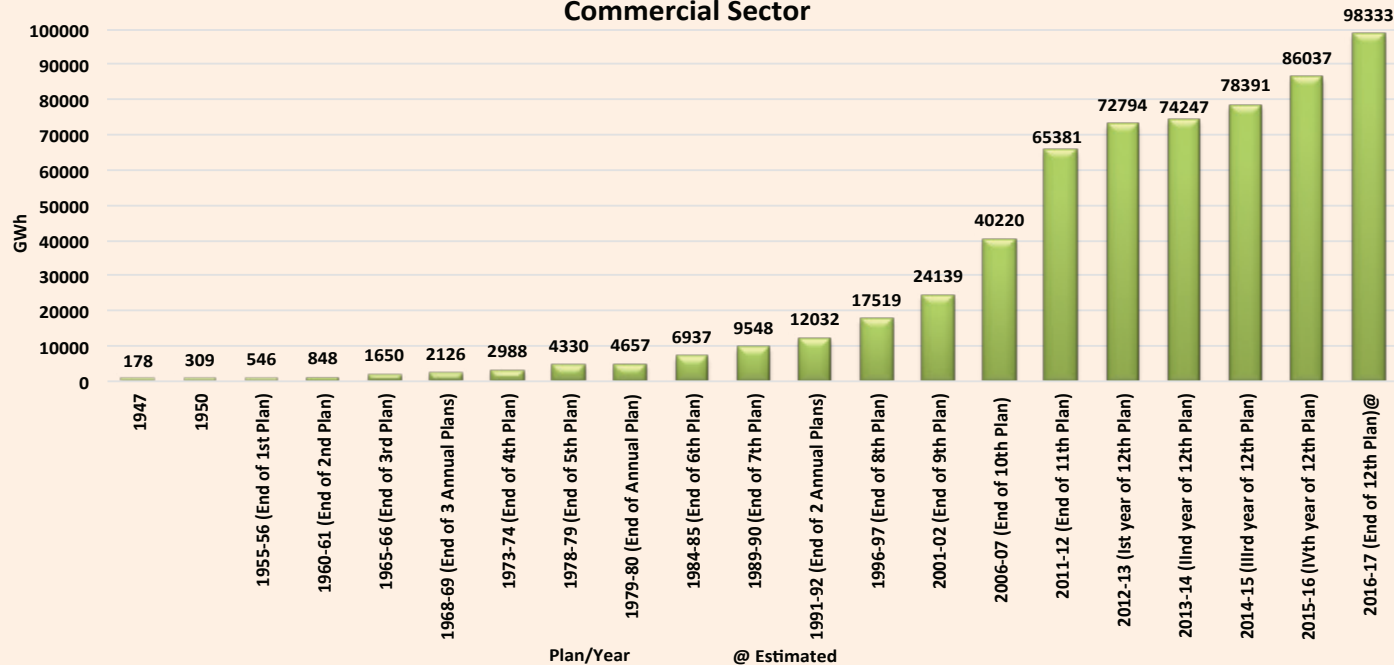
Chart : 19



Year	1947-50	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-17
% Growth	11.87	10.14	9.73	9.18	13.41	9.08	7.21	9.57

Plan wise Growth of Electricity Consumption in India Commercial Sector

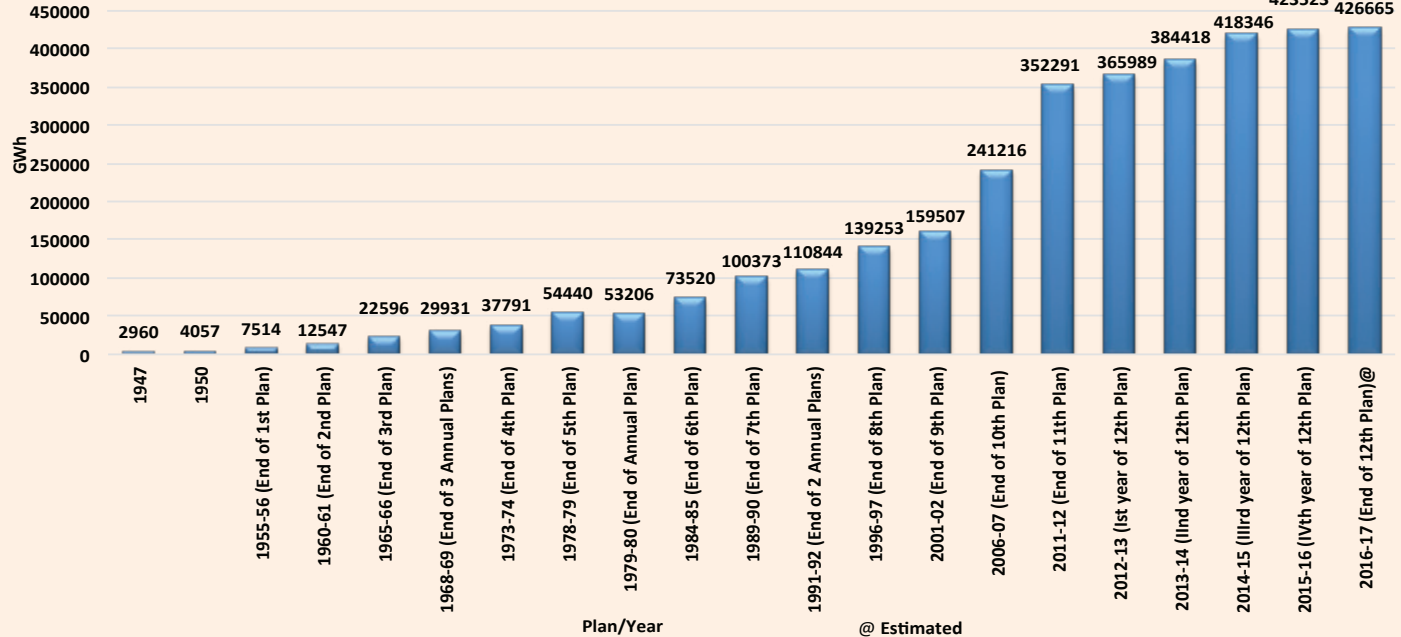
Chart : 20



Year	1947-50	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-17
% Growth	3.18	9.50	11.78	7.15	7.45	8.28	11.47	7.69

**Plan wise Growth of Electricity Consumption in India
Industrial Sector**

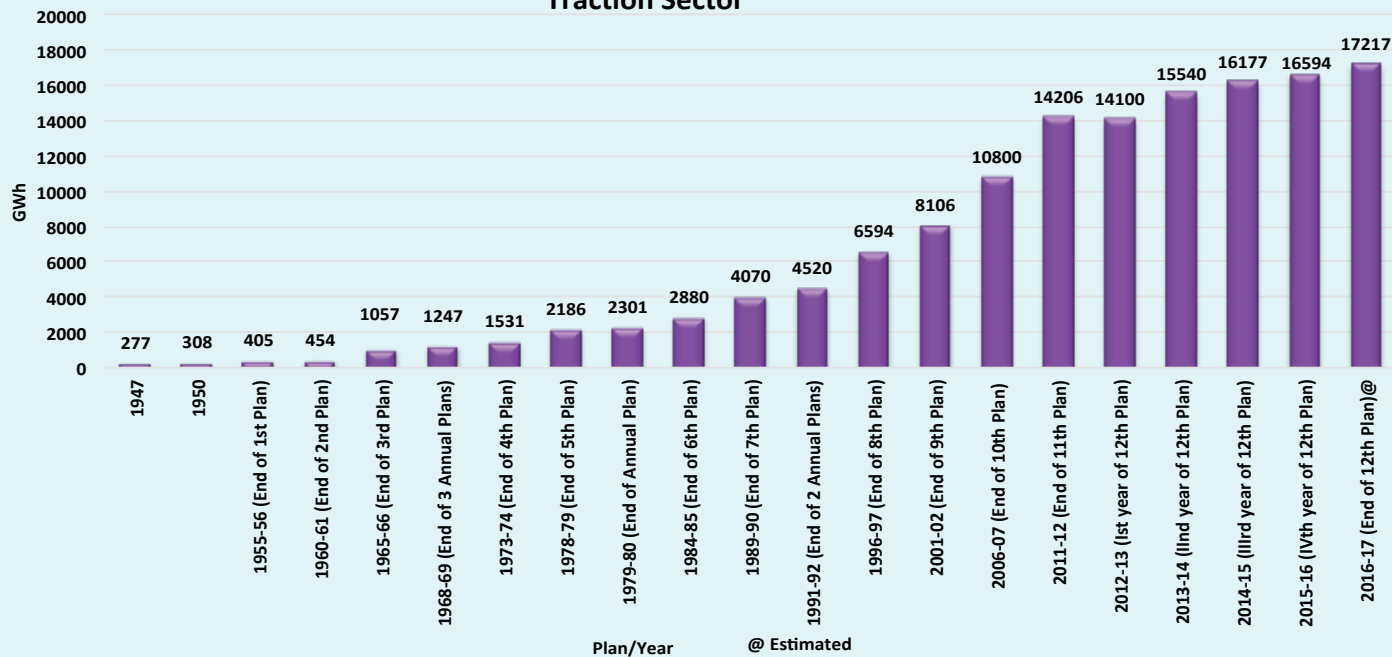
Chart : 21



Year	1947-50	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-17
% Growth	11.08	10.40	11.57	5.02	6.55	4.43	10.36	4.70

**Plan wise Growth of Electricity Consumption in India
Traction Sector**

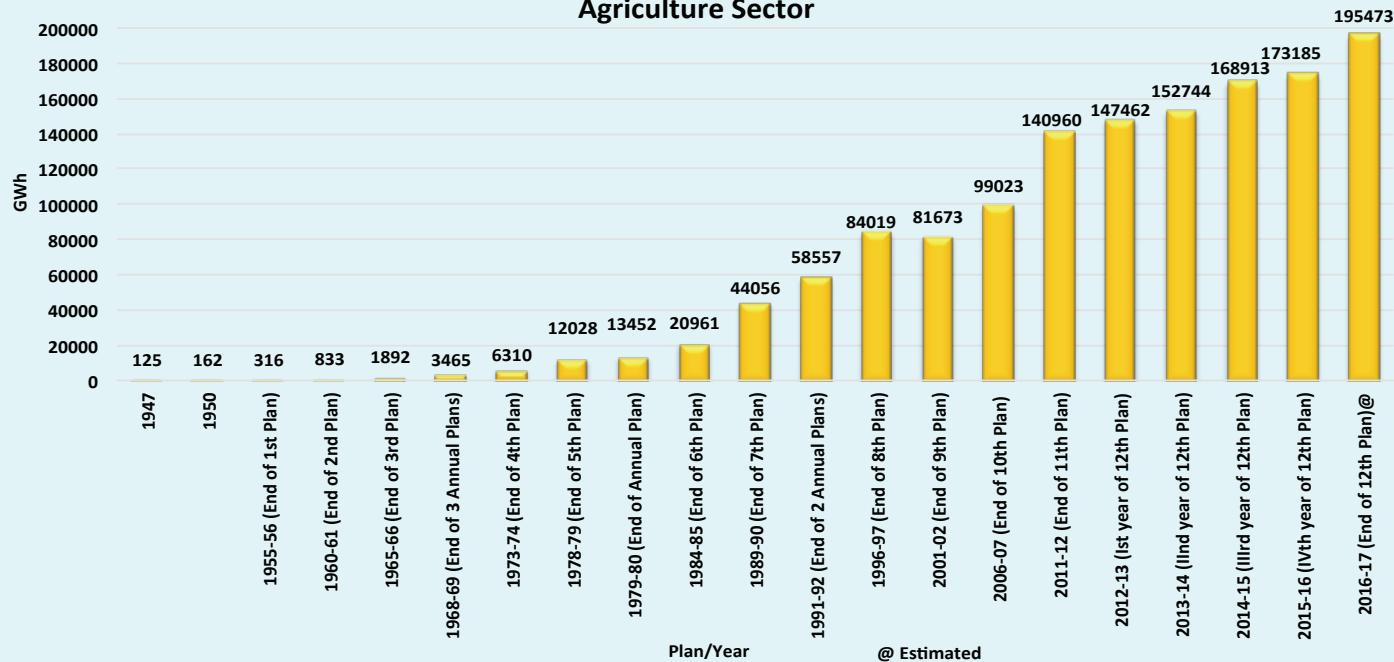
Chart : 22



Year	1947-50	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-17
% Growth	3.60	12.71	48.63	4.74	5.87	7.10	4.33	4.17

**Plan wise Growth of Electricity Consumption in India
Agriculture Sector**

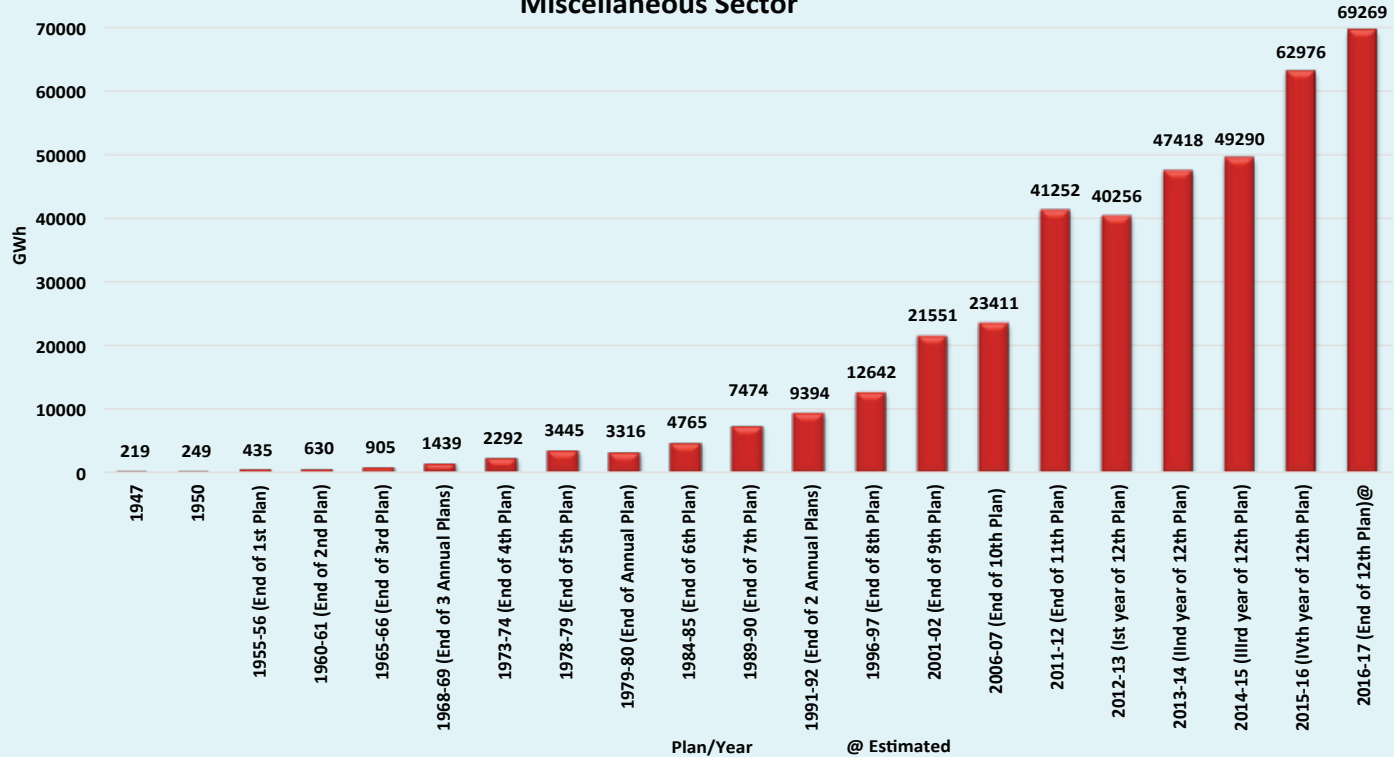
Chart : 23



Year	1947-50	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-17
% Growth	9.03	66.96	71.06	13.55	12.60	7.52	2.05	7.81

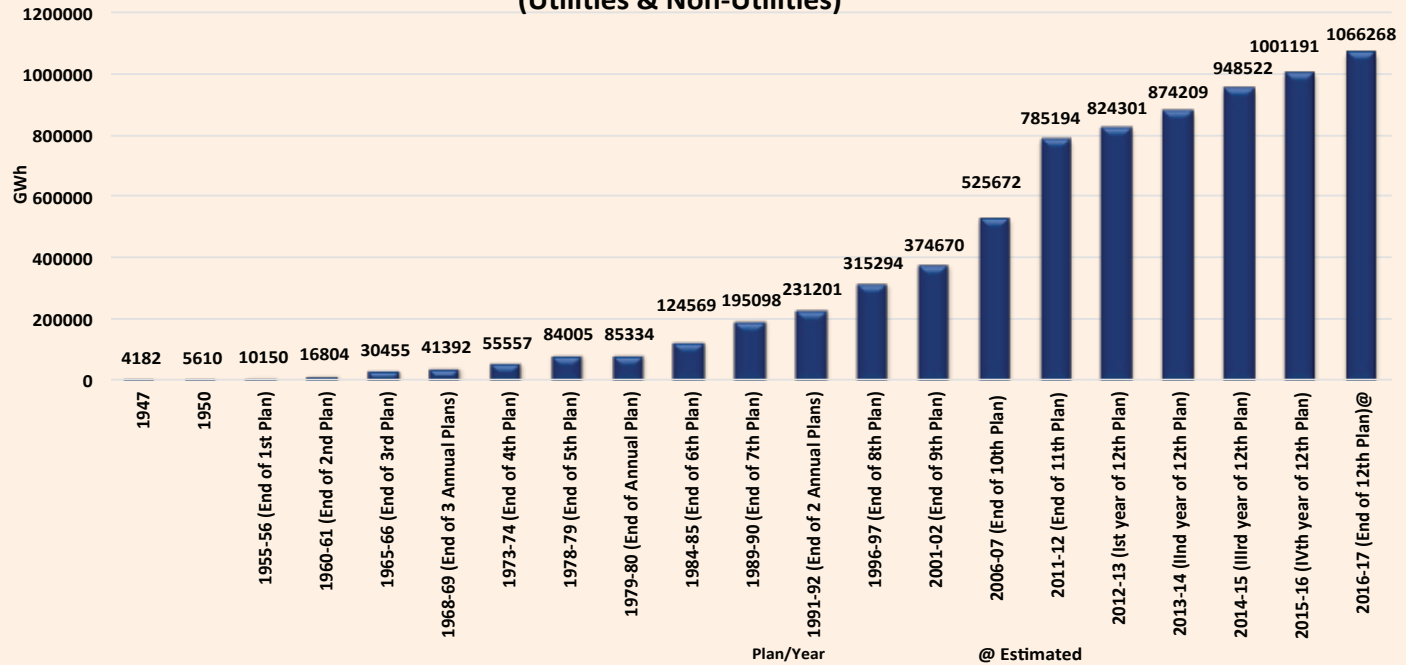
Plan wise Growth of Electricity Consumption in India Miscellaneous Sector

Chart : 24



**Plan wise Growth of All India Total Electricity Consumption
(Utilities & Non-Utilities)**

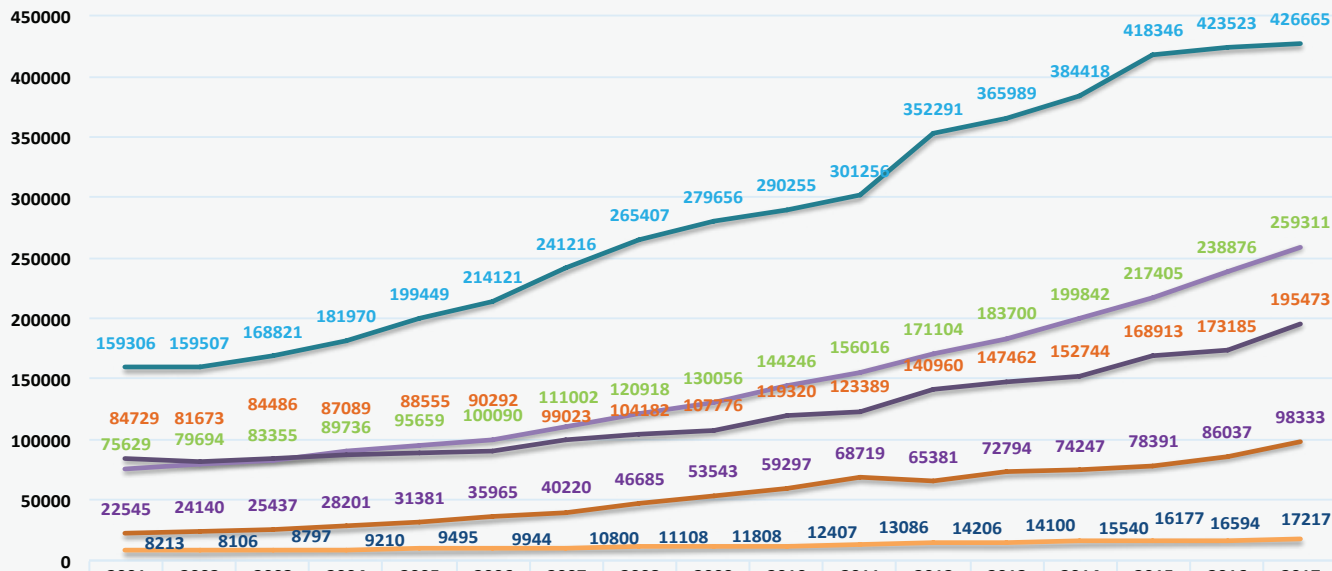
Chart : 25



Year	1947-50	1950-60	1960-70	1970-80	1980-90	1990-2000	2000-10	2010-17
% Growth	10.29	38.38	44.97	6.54	8.62	6.35	8.26	7.08

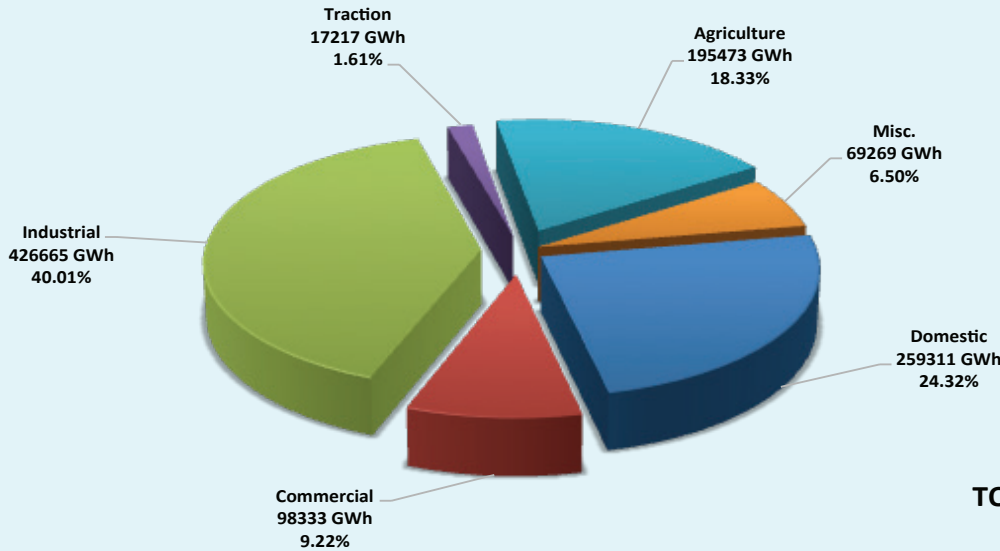
Trend of Category wise Energy Consumption 2000-01 to 2016-17

Chart : 25A



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Domestic	75629	79694	83355	89736	95659	100090	111002	120918	130056	144246	156016	171104	183700	199842	217405	238876	259311
Commercial	22545	24140	25437	28201	31381	35965	40220	46685	53543	59297	68719	65381	72794	74247	78391	86037	98333
Industrial	159306	159507	168821	181970	199449	214121	241216	265407	279656	290255	301256	352291	365989	384418	418346	423523	426665
Agriculture	84729	81673	84486	87089	88555	90292	99023	104182	107776	119320	123389	140960	147462	152744	168913	173185	195473
Traction	8213	8106	8797	9210	9495	9944	10800	11108	11808	12407	13086	14206	14100	15540	16177	16594	17217

**All India Electricity Consumption Sector wise - End of Vth Year of 12th Plan
(Utilities & Non-Utilities)
(31.03.2017)@**

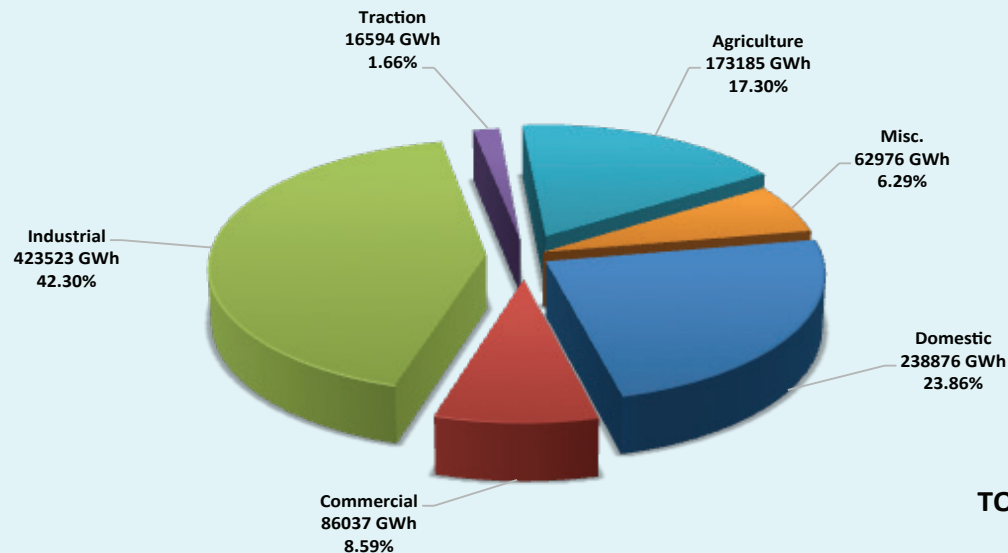


TOTAL = 1066268 GWh

■ Domestic ■ Commercial ■ Industrial ■ Traction ■ Agriculture ■ Misc.

Pie Chart : 26A

All India Electricity Consumption Sector wise - End of IVth Year of 12th Plan (Utilities & Non-Utilities) (31.03.2016)

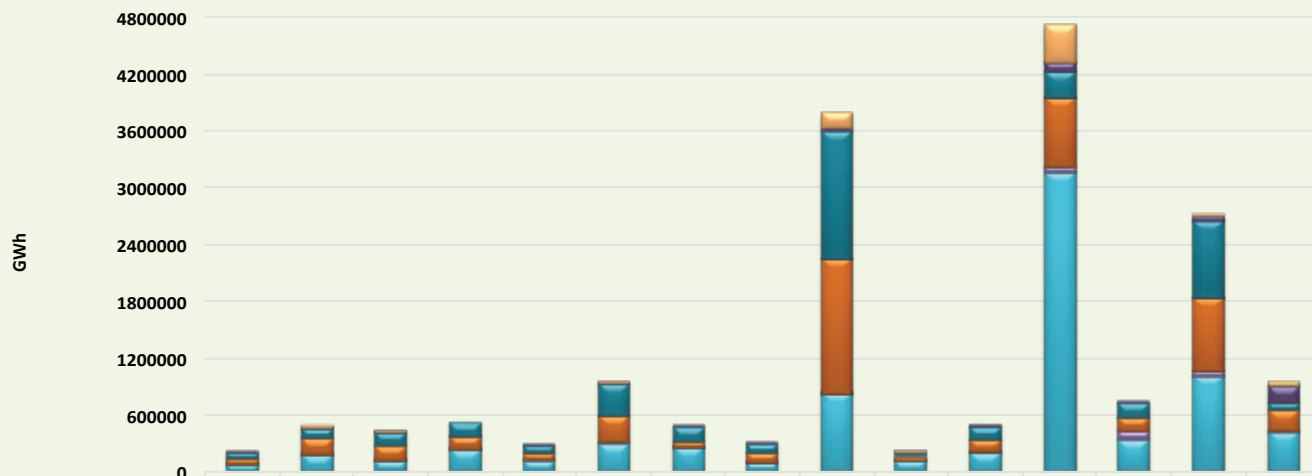


TOTAL = 1001191 GWh

■ Domestic ■ Commercial ■ Industrial ■ Traction ■ Agriculture ■ Misc.

Category wise Electricity Consumption in various Countries - 2014

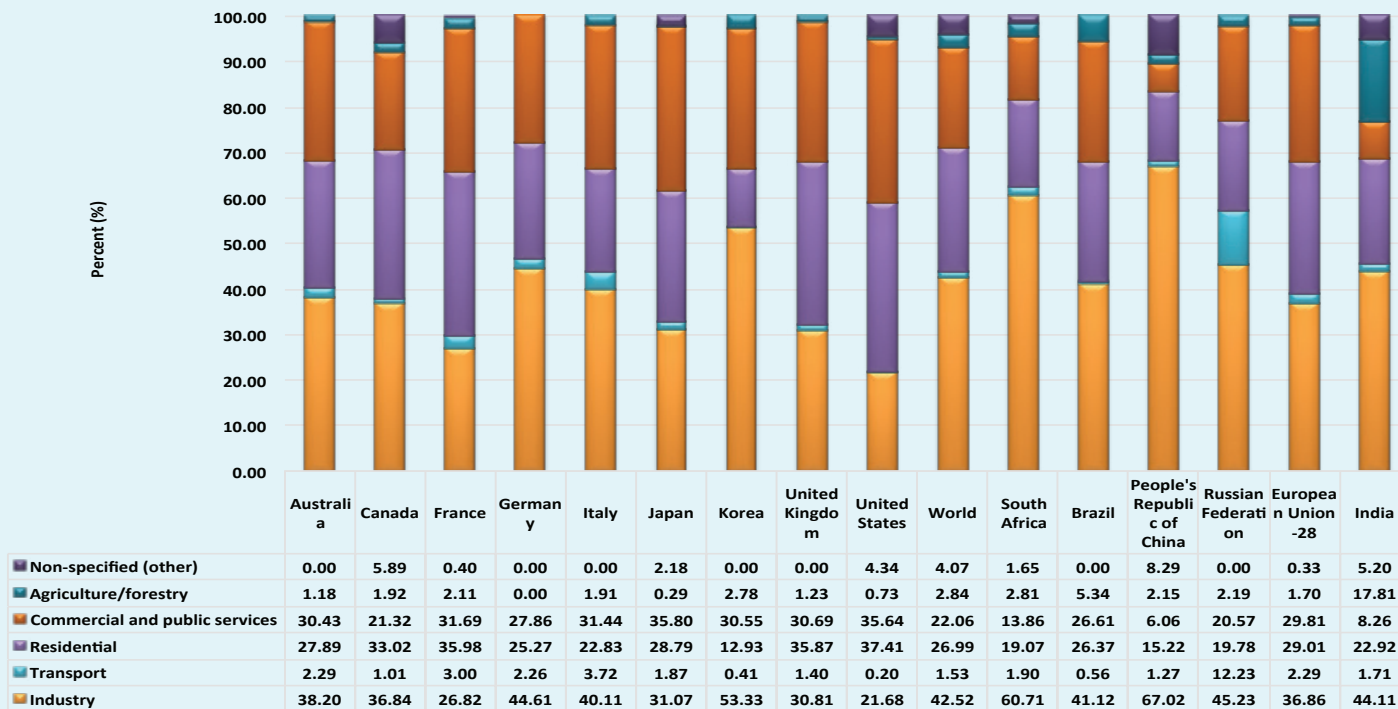
Chart : 27



	Australia	Canada	France	Germany	Italy	Japan	Korea	United Kingdom	United States	South Africa	Brazil	People's Republic of China	Russian Federation	European Union-28	India
Non-specified (other)	0	28832	1667	0	0	20699	0	0	164571	3266	0	390818	0	8923	49290
Agriculture/forestry	2461	9390	8767	0	5373	2767	13556	3728	27671	5562	26735	101339	16180	46014	168913
Commercial and public services	63310	104305	131610	142868	88489	340634	148741	93168	1349929	27455	133266	285587	151774	806700	78391
Residential	58031	161568	149426	129600	64255	273938	62928	108881	1416977	37777	132049	717610	145919	785157	217405
Transport	4770	4925	12473	11594	10463	17826	2003	4260	7605	3773	2794	59706	90256	62077	16177
Industry	79483	180219	111382	228773	112918	295623	259606	93526	821040	120260	205932	3160638	333701	997438	418346

Source: - International Energy Agency (IEA) except India

Category wise % Shares in Electricity Consumption in various Countries - 2014 Chart : 28



Source: - International Energy Agency (IEA) except India

Table 5
Per Capita Electricity Consumption - 2013 & 2014 and
T & D Losses - 2012 & 2013 of various Countries

				MW			
Sl. No.	Per Capita Consumption (kWh)			Sl. No.	T & D Losses (%)		
	Name of the Country	2013	2014		Name of the Country	2012	2013
1	Canada	15520	15544	1	Korea	3.47	3.47
2	USA	12987	12962	2	Japan	4.79	4.87
3	Australia	10067	10002	3	Germany	4.46	4.51
4	Japan	7836	7829	4	Italy	6.61	6.87
5	France	7382	6955	5	Australia	5.68	6.69
6	Germany	7022	7035	6	South Africa	10.19	9.88
7	Korea	10428	10564	7	France	7.99	7.86
8	UK	5409	5131	8	China	6.56	6.52
9	Russia	6562	6603	9	USA	6.73	6.32
10	Italy	5124	5002	10	Canada	8.19	10.40
11	South Africa	4328	4240	11	UK	8.26	7.80
12	Brazil	2583	2578	12	Russia	12.59	12.57
13	China	3766	3927	13	Brazil	16.63	16.11
14	India*	957	1010	14	India	23.65	23.04
15	World	3026	3030	15	World	8.89	8.91

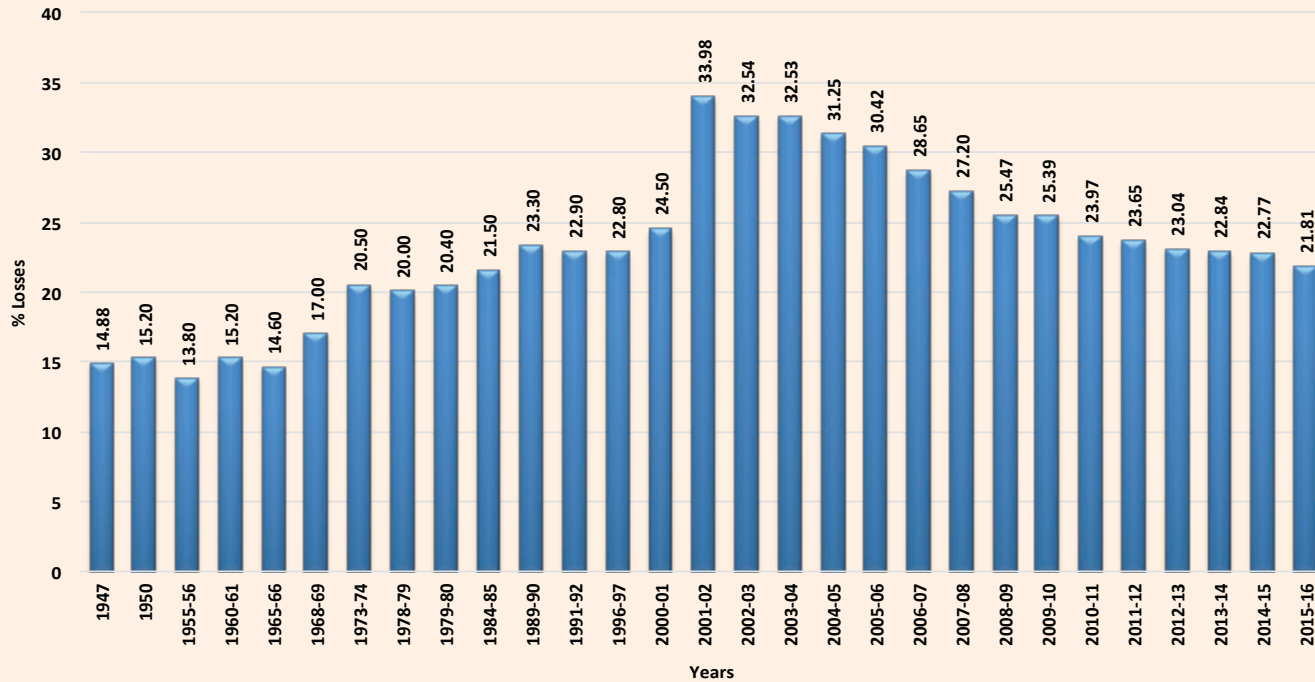
Note :-

Basic data obtained from IEA Website (except) India.

* Per Capita Consumption= (Gross Electrical Energy Availability/Midyear Population).

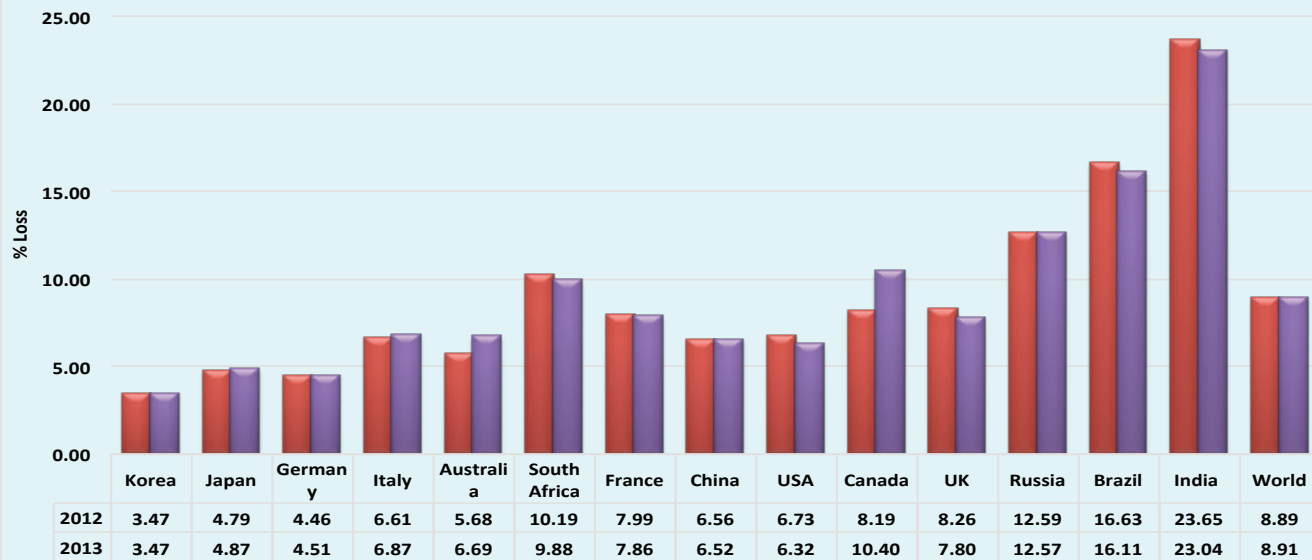
All India Transmission and Distribution Losses (%)

Chart : 29



T & D Losses of Various Countries in 2012 & 2013 (%)

Chart : 30



Source: - International Energy Agency (IEA) (except India)

■ 2012 ■ 2013

Table 6

**Plan wise Growth of Installed Generating Capacity of Captive Power Plants in Industries
having Demand of 1MW & Above - Mode wise**

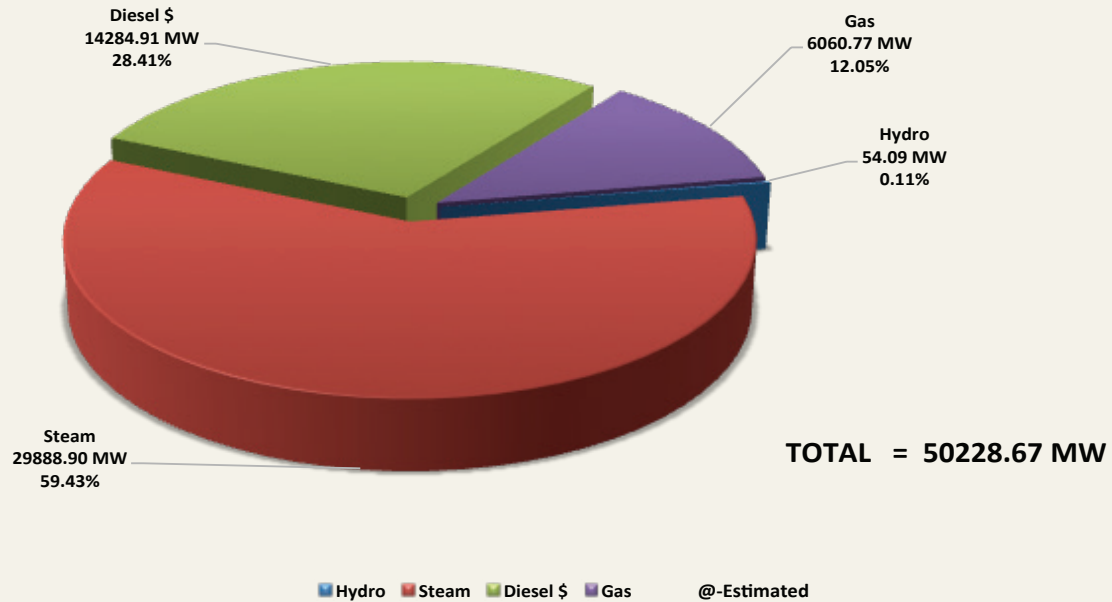
(MW)								
Sl.No.	As on	Hydro	Steam	Diesel \$	Gas	Sub - Total	Railways	Total
1	2	3	4	5	6	(4+5+6) 7	8	(3+7+8) 9
1	31.12.1947	**	**	**	**	410.00	0.00	410.00
2	31.12.1950	**	**	**	**	587.85	0.00	587.85
3	31.03.1956 (End of 1st Plan)	**	**	**	**	759.65	0.00	759.65
4	31.03.1961 (End of 2nd Plan)	**	**	**	**	1001.37	0.00	1001.37
5	31.03.1966 (End of 3rd Plan)	**	**	**	**	1082.36	0.00	1082.36
6	31.03.1969 (End of 3 Annual Plans)	**	**	**	**	1277.47	0.00	1277.47
7	31.03.1974 (End of 4th Plan)	**	**	**	**	1732.70	0.00	1732.70
8	31.03.1979 (End of 5th Plan)	2.61	1949.23	559.17	44.27	2552.67	62.31	2617.59
9	31.03.1980 (End of Annual Plan)	2.61	2021.61	720.58	54.27	2796.46	60.44	2859.51
10	31.03.1985 (End of 6th Plan)	2.91	2803.18	2077.06	155.31	5035.55	81.80	5120.26
11	31.03.1990 (End of 7th Plan)	3.60	4822.85	2754.48	425.51	8002.84	109.29	8115.73
12	31.03.1992 (End of 2 Annual Plans)	4.30	5377.10	3291.06	495.72	9163.88	133.23	9301.41
13	31.03.1997 (End of 8th Plan)	3.50	6151.69	4594.74	1166.38	11912.81	162.62	12078.93
14	31.03.2002 (End of 9th Plan)	51.10	8354.03	6614.16	2125.91	17094.10	0.00	17145.20
15	31.03.07 (End of 10th Plan)	60.50	11397.52	7901.02	2976.00	22274.54	0.00	22335.04
16	31.03.12 (End of 11th Plan)	48.00	22615.00	10827.00	5885.00	39327.00	0.00	39375.00
17	31.03.13 (End of 1st yr of 12th Plan)	66.90	23889.61	12272.19	4497.69	40659.49	0.00	40726.39
18	31.03.14 (End of IIrd yr of 12th Plan)	63.59	24751.58	12691.35	4751.35	42194.28	0.00	42257.87
19	31.03.15 (End of IIIrd yr of 12th Plan)	65.09	26088.59	13309.73	5193.44	44591.76	0.00	44656.85
20	31.03.16 (End of IVth yr of 12th Plan)	59.09	28687.59	13714.19	5818.62	48220.40	0.00	48279.48
21	31.03.17 (End of 12th Plan)@	54.09	29888.90	14284.91	6060.77	50234.58	0.00	50288.67

\$ Includes Wind power capacity

** Breakup Not Available

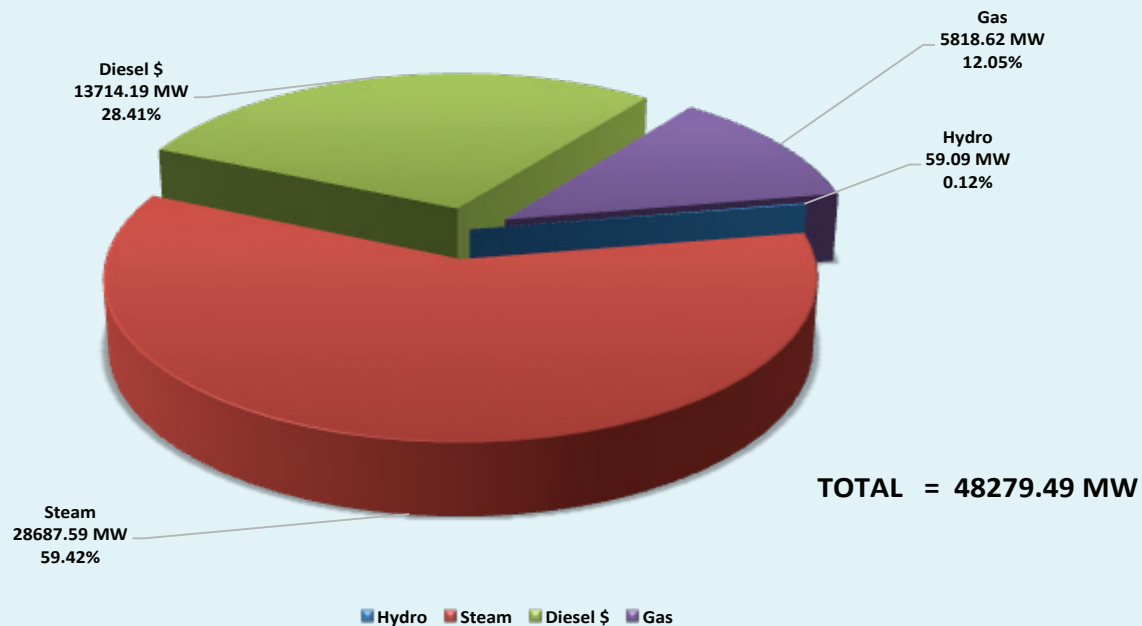
Pie Chart : 31

Installed Generating Capacity of Captive Power Plants in Industries having Demand of 1MW & Above - Mode wise - End of Vth Year of 12th Plan (31.03.2017)@



Installed Generating Capacity of Captive Power Plants in Industries having Demand of 1MW & Above - Mode wise - End of IVth Year of 12th Plan (31.03.2016)

Pie Chart : 31A



Plan wise Growth of All India Installed Generating Capacity of Captive Power Plants in Industries having Demand of 1MW & Above

Chart : 32

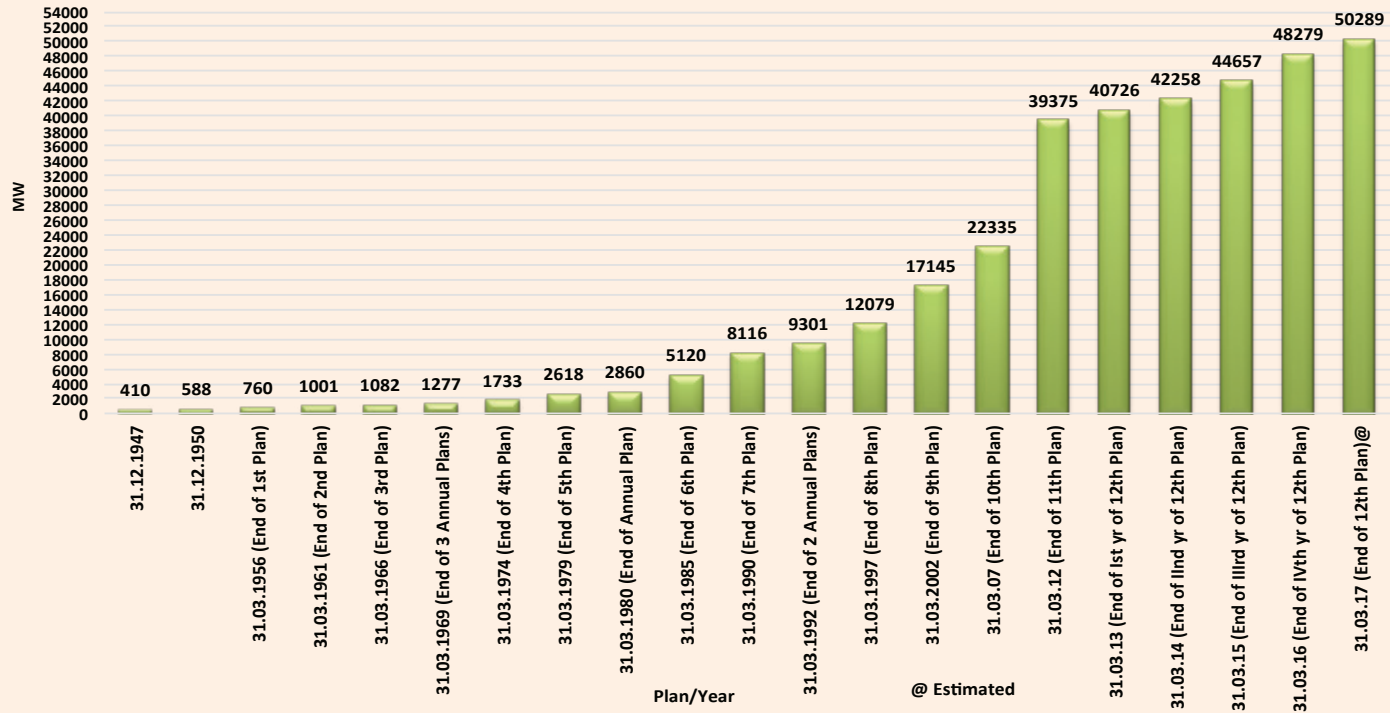
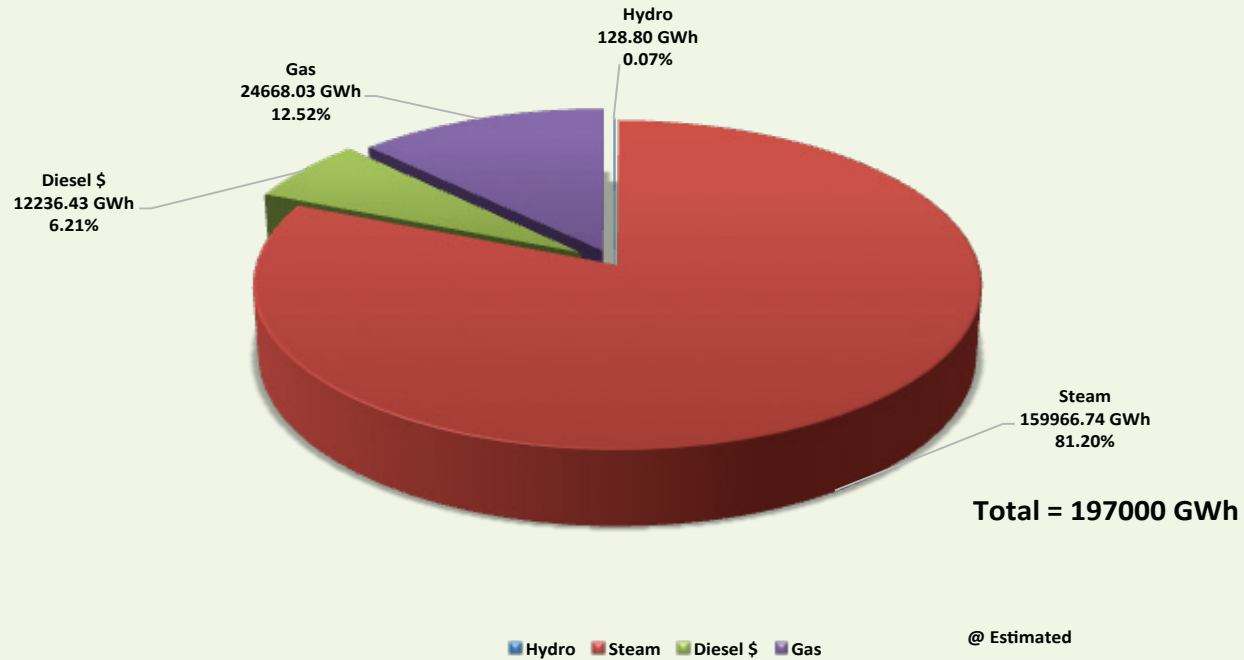


Table 7
Plan wise Growth of Energy Generated by Captive Power Plants in Industries
having Demand of 1MW & Above - Mode wise

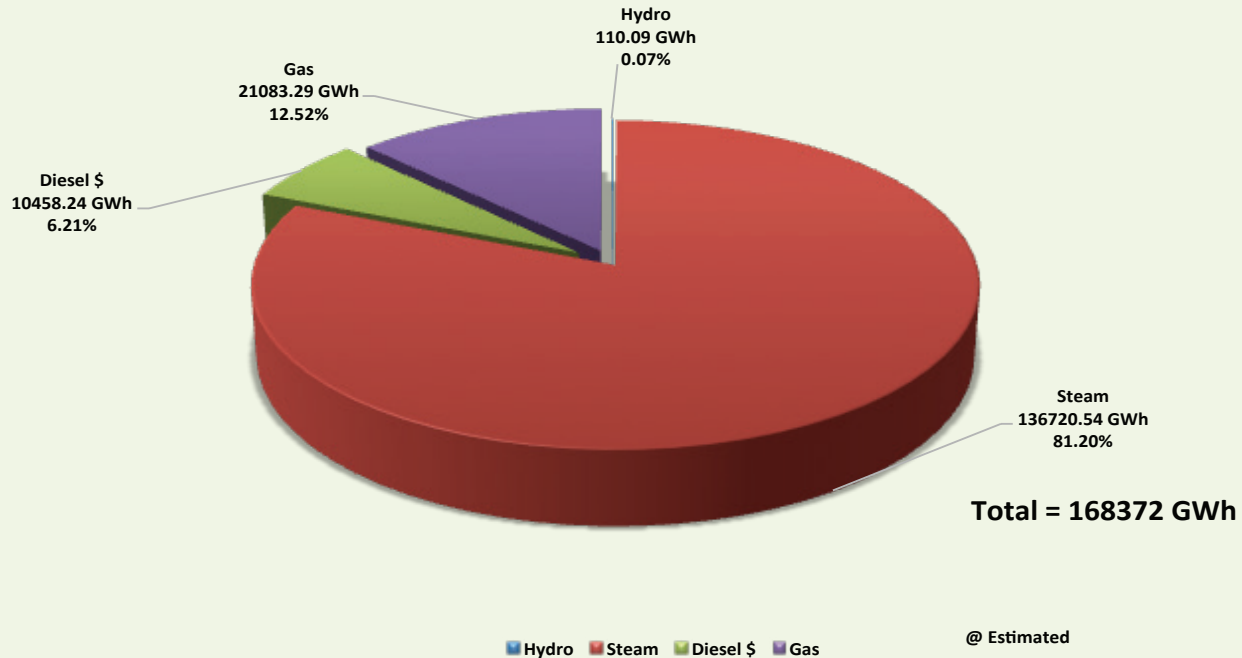
								(GWh)
Sl.No.	During financial year ending with	Hydro	Steam	Diesel \$	Gas	Sub - Total	Railways	Total
1	2	3	4	5	6	(4+5+6) 7	8	(3+7+8) 9
1	1947	**	**	**	**	856.91	**	856.91
2	1950	**	**	**	**	1467.81	0.00	1467.81
3	1955-56 (End of 1st Plan)	**	**	**	**	2184.82	0.00	2184.82
4	1960-61 (End of 2nd Plan)	**	**	**	**	3186.10	0.00	3186.10
5	1965-66 (End of 3rd Plan)	**	**	**	**	3733.19	0.00	3733.19
6	1968-69 (End of 3 Annual Plans)	**	**	**	**	4136.06	0.00	4136.06
7	1973-74 (End of 4th Plan)	**	**	**	**	6067.47	0.00	6067.47
8	1978-79 (End of 5th Plan)	13.22	7211.30	299.13	48.97	7559.40	34.47	7607.09
9	1979-80 (End of Annual Plan)	15.06	7225.60	825.71	90.67	8141.98	35.67	8192.71
10	1984-85 (End of 6th Plan)	18.29	9966.55	2001.18	317.03	12284.76	42.80	12345.85
11	1989-90 (End of 7th Plan)	15.83	19110.46	2757.27	1313.29	23181.02	29.07	23225.92
12	1991-92 (End of 2 Annual Plans)	17.57	23409.35	3247.81	1905.24	28562.40	22.52	28602.49
13	1996-97 (End of 8th Plan)	28.84	29127.94	6619.01	5039.22	40786.17	25.07	40840.08
14	2001-02 (End of 9th Plan)	116.59	41853.85	10875.19	8835.19	61564.23	0.00	61680.82
15	2006-07 (End of 10th Plan)	217.81	56184.04	10190.74	15207.17	81581.95	0.00	81799.76
16	2011-12 (End of 11th Plan)	131.28	104862.65	7422.48	21971.57	134256.70	0.00	134387.98
17	2012-13 (1st year of 12th Plan)	118.18	113166.95	9955.64	20768.88	143891.47	0.00	144009.65
18	2013-14 (IInd year of 12th Plan)	129.06	118178.44	10769.08	19911.64	148859.16	0.00	148988.22
19	2014-15 (IIIrd year of 12th Plan)	144.69	128401.06	12376.00	21135.25	161912.31	0.00	162057.00
20	2015-16 (IVth year of 12th Plan)	110.09	136720.54	10458.24	21083.29	168262.07	0.00	168372.16
21	2016-17 (End of 12th Plan)@	128.80	159966.74	12236.43	24668.03	196871.20	0.00	197000.00

\$ Includes RES capacity
 ** Breakup Not Available
 @ Estimated

All India Electrical Energy Generated by Captive Power Plants in Industries Pie Chart : 33
having Demand of 1MW and Above - Mode wise
End of Vth Year of 12th Plan (31.03.2017)@

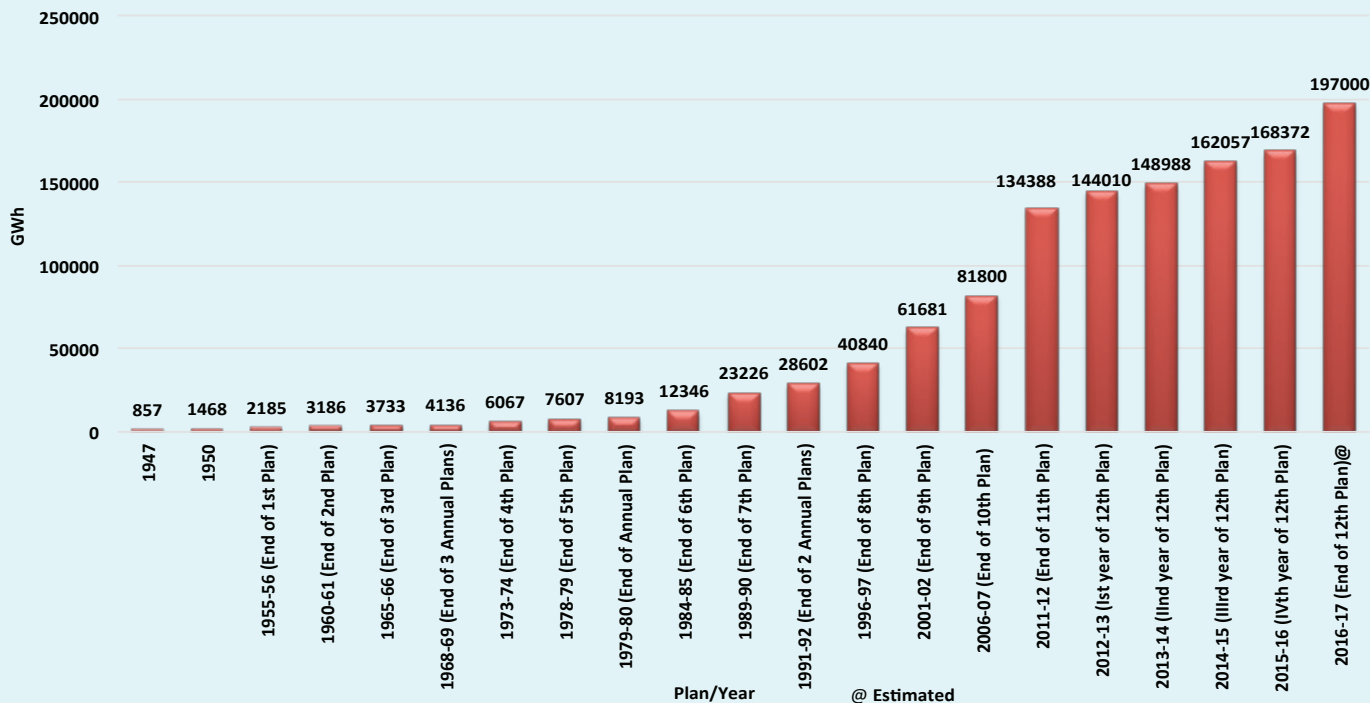


All India Electrical Energy Generated by Captive Power Plants in Industries Pie Chart : 33A
having Demand of 1MW and Above - Mode wise
End of IVth Year of 12th Plan (31.03.2016)



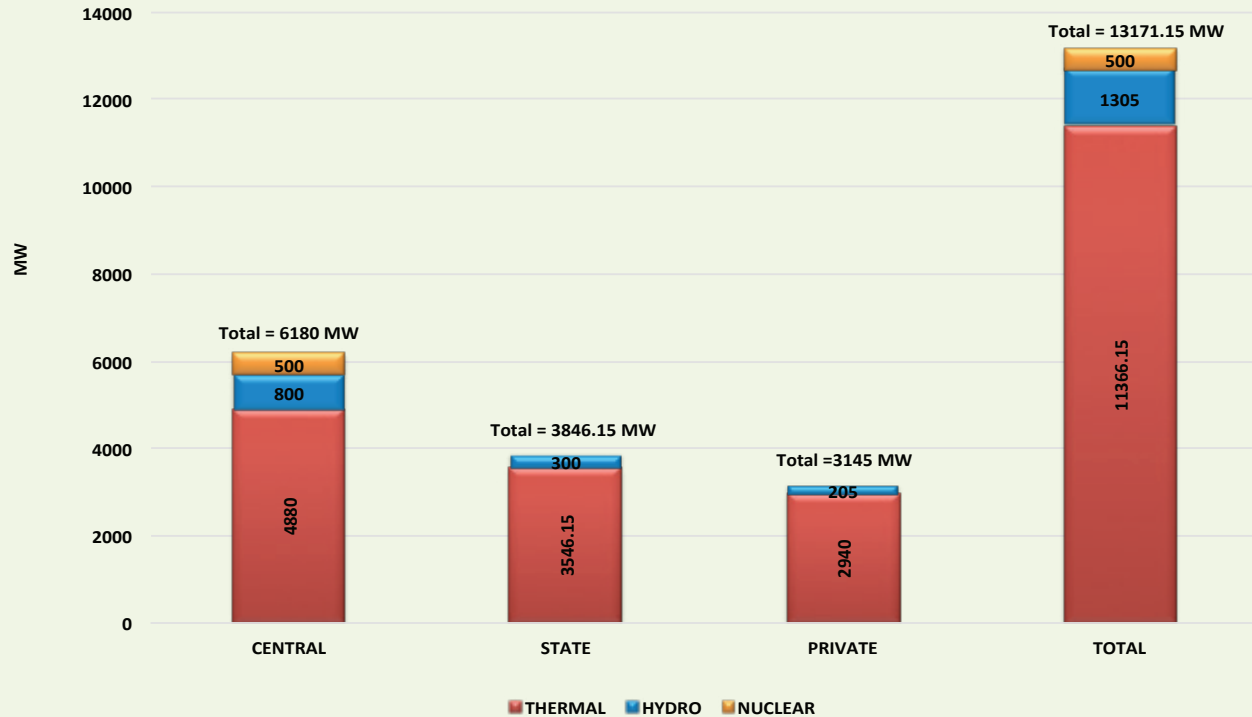
Plan wise Growth of Energy Generated by Captive Power Plants in Industries having Demand of 1MW & above

Chart : 34



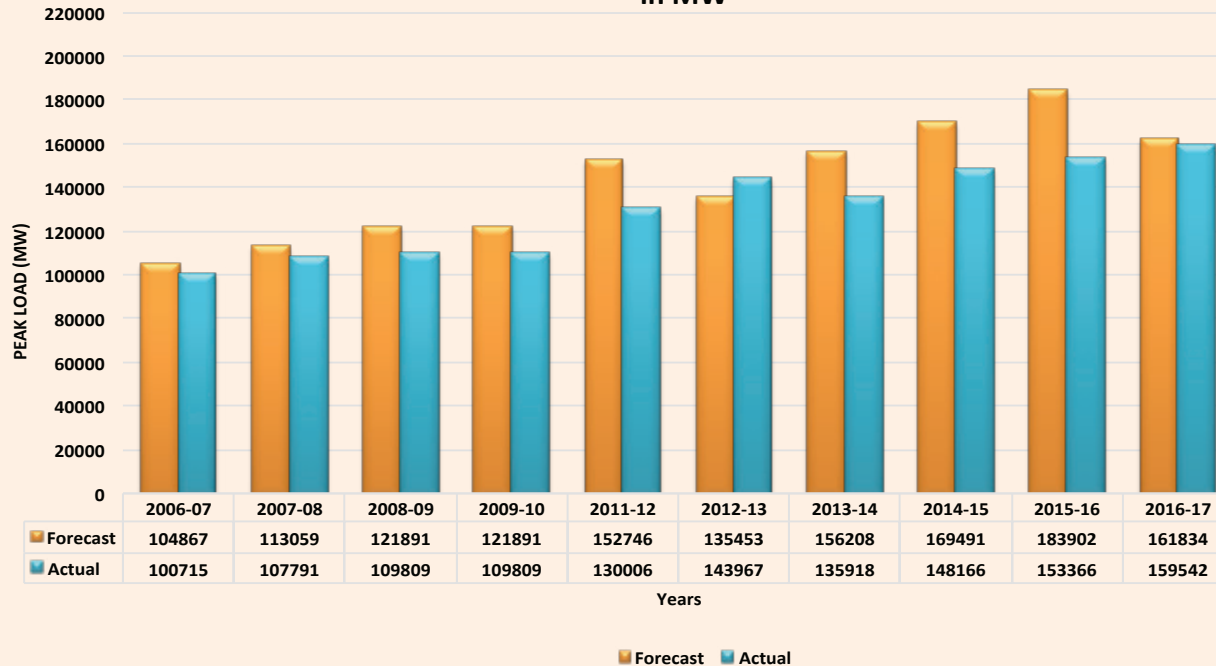
Capacity Addition Programme during 2017-18

Chart : 35



**Forecast of All India Peak Electricity Demand
(Utilities)
As Per 18th & 19th Electric Power Survey
in MW**

Chart : 36



**Forecast of All India Energy Requirement
(Utilities)
As Per 18th & 19th Electric Power Survey
in GWh**

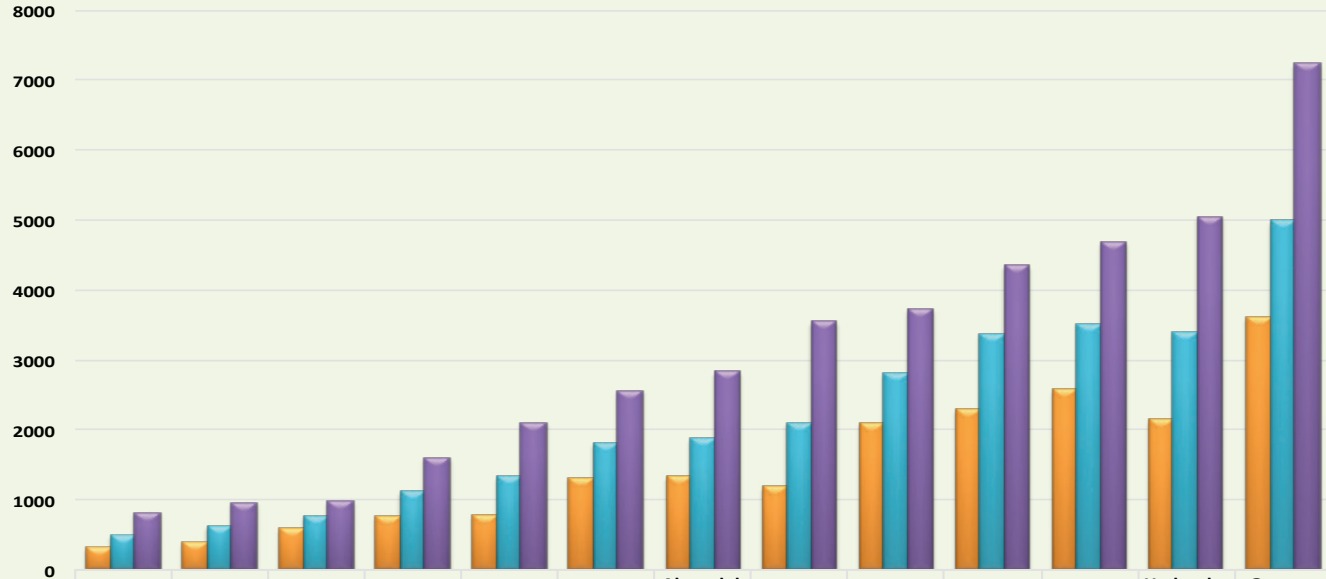
Chart : 37



Forecast Actual

18th Electric Power Survey of India (Volume - II)
Annual Electric Peak Load (in MW) of Mega Cities at Power Station Bus Bar
(For the Year 2011-12, 2016-17 & 2021-22)

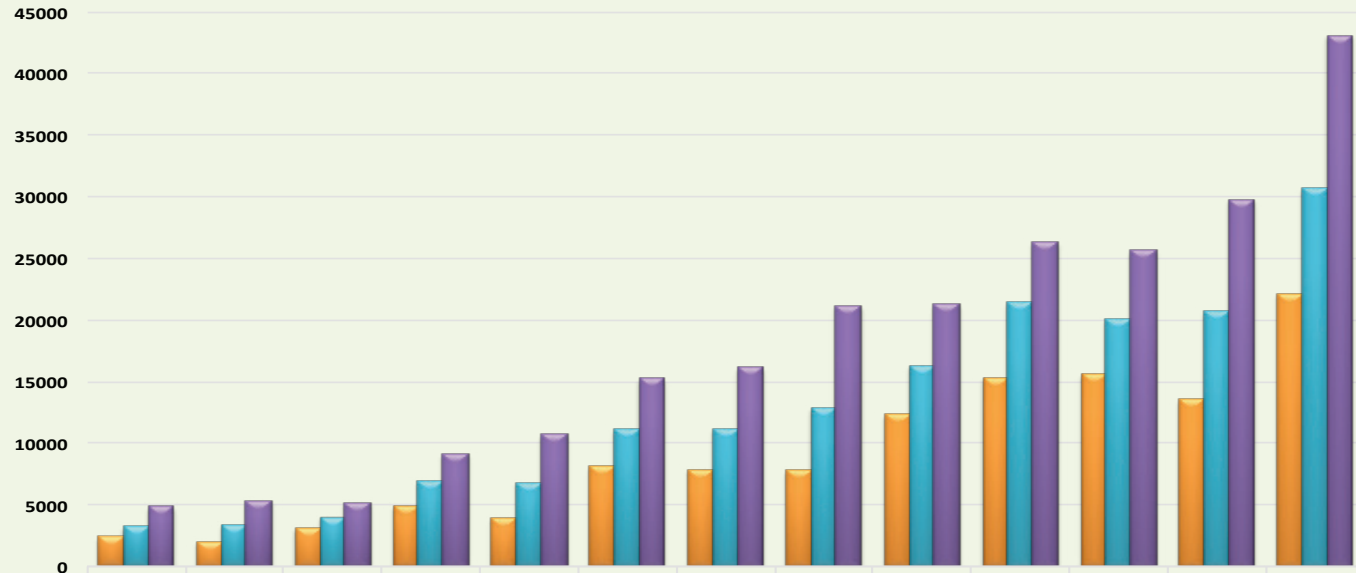
Chart :37A



	Nagpur	Indore	Kanpur	Lucknow	Jaipur	Surat	Ahmedabad	Pune	Bengaluru	Chennai	Kolkata	Hyderabad	Greater Mumbai
2011-12	315	391	580	750	771	1309	1320	1173	2090	2291	2577	2134	3605
2016-17	481	621	765	1119	1329	1802	1869	2091	2805	3370	3512	3375	4985
2021-22	812	950	976	1594	2103	2556	2827	3544	3717	4334	4674	5039	7225

18th Electric Power Survey of India (Volume - II)
Electrical Energy Requirement (in MU) of Mega Cities
(For the Year 2011-12, 2016-17 & 2021-22)

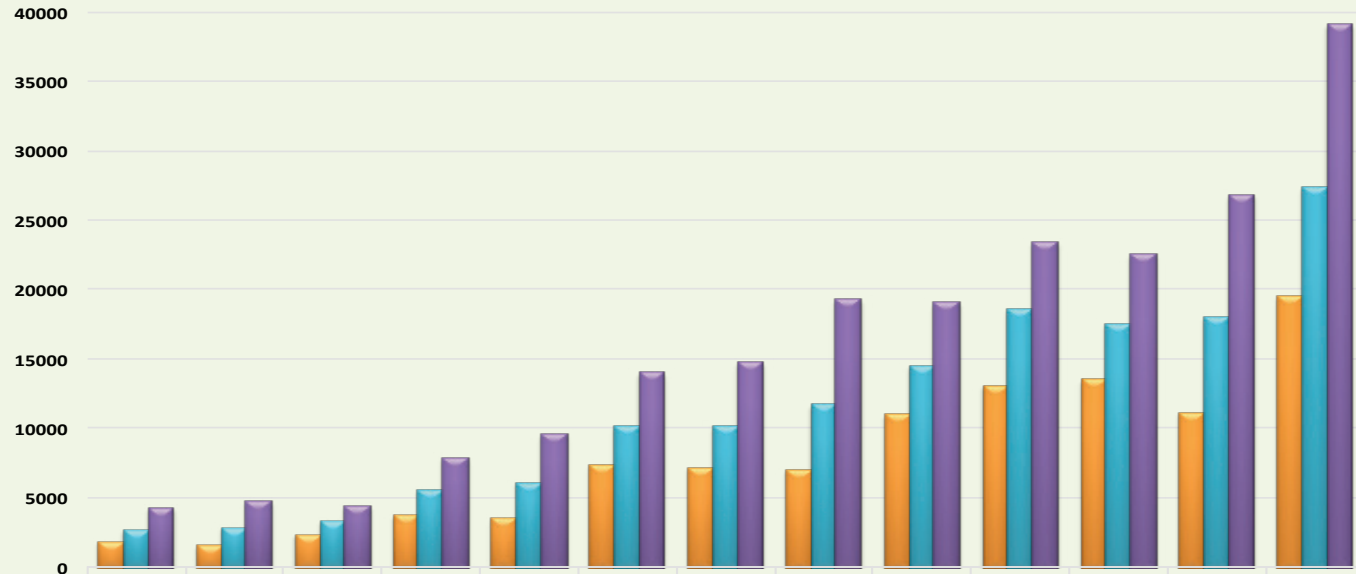
Chart : 37B



	Nagpur	Indore	Kanpur	Lucknow	Jaipur	Surat	Ahmedabad	Pune	Bengaluru	Chennai	Kolkata	Hyderabad	Greater Mumbai
2011-12	2311	2007	3046	4840	3905	8029	7862	7760	12300	15273	15528	13528	22107
2016-17	3193	3325	4023	6796	6743	11053	11133	12819	16260	21434	20006	20652	30568
2021-22	4820	5292	5131	9074	10683	15225	16097	21111	21219	26236	25588	29730	43039

18th Electric Power Survey of India (Volume - II)
Electrical Energy Consumption (in MU) of Mega Cities
(For the Year 2011-12, 2016-17 & 2021-22)

Chart : 37C



	Nagpur	Indore	Kanpur	Lucknow	Jaipur	Surat	Ahmedabad	Pune	Bengaluru	Chennai	Kolkata	Hyderabad	Greater Mumbai
2011-12	1829	1528	2315	3679	3484	7325	7117	7000	10917	13034	13483	11127	19472
2016-17	2655	2780	3259	5504	6023	10099	10102	11625	14465	18537	17470	17967	27346
2021-22	4200	4691	4361	7803	9553	13940	14665	19241	18972	23346	22471	26757	39023

Table 8
All India Power Supply Position Energy wise & Peak wise (Utilities)
1984-85 to 2016-17

Year	Energy				Peak Demand			
	Requirement	Availability	Deficit	Deficit	Demand	Availability	Deficit	Deficit
	(GWh)	(GWh)	(GWh)	(%)	(MW)	(MW)	(MW)	(%)
1984-85	155432	145013	10419	6.70	25810	22800	3010	11.66
1985-86	170746	157262	13484	7.90	28090	24215	3875	13.79
1986-87	192356	174276	18080	9.40	30850	26924	3926	12.73
1987-88	210993	187976	23017	10.91	31990	28242	3748	11.72
1988-89	223194	205909	17285	7.74	36245	31713	4532	12.50
1989-90	247762	228151	19611	7.92	40385	33658	6727	16.66
1990-91	267632	246560	21072	7.87	44005	37171	6834	15.53
1991-92	288974	266432	22542	7.80	48055	39027	9028	18.79
1992-93	305266	279824	25442	8.33	52805	41984	10821	20.49
1993-94	323252	299494	23758	7.35	54875	44830	10045	18.31
1994-95	352260	327281	24979	7.09	57530	48066	9464	16.45
1995-96	389721	354045	35676	9.15	60981	49836	11145	18.28
1996-97	413490	365900	47590	11.51	63853	52376	11477	17.97
1997-98	424505	390330	34175	8.05	65435	58042	7393	11.30
1998-99	446584	420235	26349	5.90	67905	58445	9460	13.93
1999-00	480430	450594	29836	6.21	72669	63691	8978	12.35

Table 8 (Contd.)
All India Power Supply Position Energy wise & Peak wise (Utilities)
1984-85 to 2016-17

Year	Energy				Peak Demand			
	Requirement	Availability	Deficit	Deficit	Demand	Availability	Deficit	Deficit
	(GWh)	(GWh)	(GWh)	(%)	(MW)	(MW)	(MW)	(%)
2000-01	507216	467409	39807	7.85	74872	65628	9244	12.35
2001-02	522537	483350	39187	7.50	78441	69189	9252	11.79
2002-03	545674	497589	48085	8.81	81492	71547	9945	12.20
2003-04	559264	519398	39866	7.13	84574	75066	9508	11.24
2004-05	591373	548115	43258	7.31	87906	77652	10254	11.66
2005-06	631757	578819	52938	8.38	93255	81792	11463	12.29
2006-07	690587	624495	66092	9.57	100715	86818	13897	13.80
2007-08	739343	666007	73336	9.92	108866	90793	18073	16.60
2008-09	777039	691038	86001	11.07	109809	96785	13024	11.86
2009-10	830594	746644	83950	10.11	119166	104009	15157	12.72
2010-11	861591	788355	73236	8.50	122287	110256	12031	9.84
2011-12	937199	857886	79313	8.46	130006	116191	13815	10.63
2012-13	998114	911209	86905	8.71	135453	123294	12159	8.98
2013-14	1002257	959829	42428	4.23	135918	129815	6103	4.49
2014-15	1067085	1028955	38130	3.60	148166	141160	7006	4.70
2015-16	1114408	1090850	23558	2.10	153366	148463	4903	3.20
2016-17	1142928	1135332	7596	0.66	159542	156934	2608	1.63

Table 8A
Region wise Summary of EER & APEL
For the Year 2017-18 and 2021-22
As Per 19th EPS (Volume-I)

Region/Year	EER (MU)		APEL(MW)	
	2017-18	2021-22	2017-18	2021-22
Northern	376550	468196	58899	73770
Western	377343	481501	54673	71020
Southern	330336	420753	48635	62975
Eastern	138862	171228	22849	28046
North East	17261	23809	3252	4499
A & N Island	356	475	73	97
Lakshdweep	54	62	10	11
All India Total	1240760	1566023	176897	225751

NOTE : EER : - Electrical Energy Requirement
APEL : - Annual Peak Electric Load
EPS :- Electric Power Survey

Table 8B
Category wise Forecast of Electrical Energy Consumption
For the Year 2017-18 and 2021-22
As Per 19th EPS (Volume-I)

Category	Year	Year
	2017-18	2021-22
Domestic	283253	386790
Commercial	98333	128888
Irrigation	213983	276277
Industries	300482	386450
Others	98331	122081
Total	994382	1300486

Table 8C
Forecast of Electrical Energy Consumption (in MU) of NCR
For the Year 2017-18 to 2021-22
As Per 18th EPS (Volume-III)

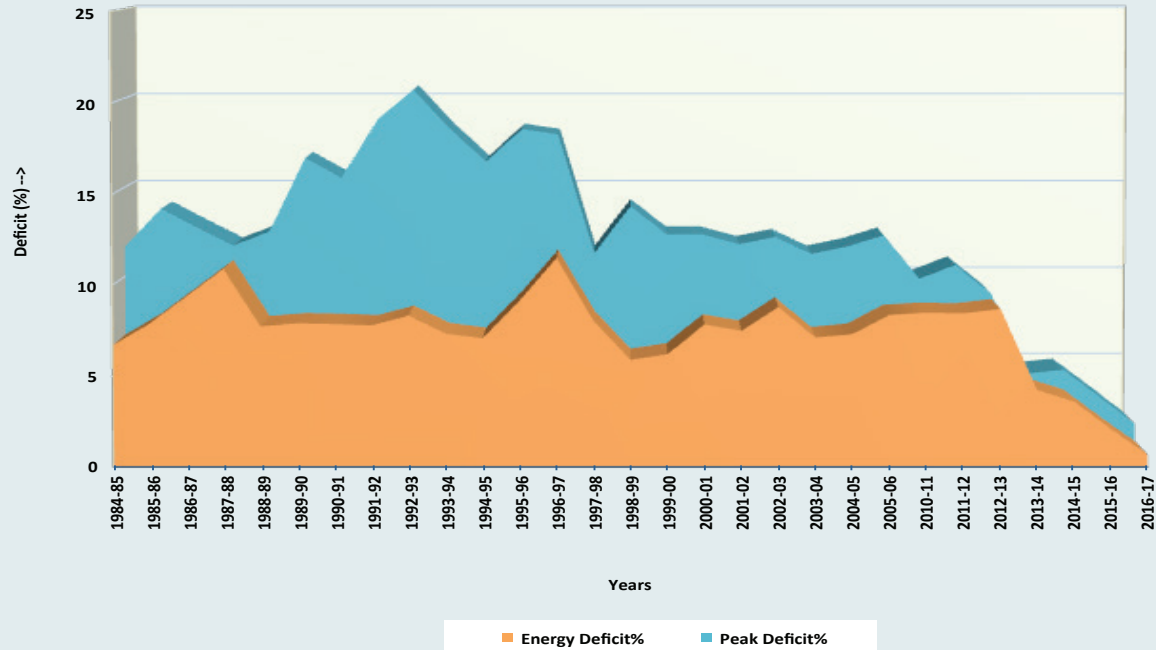
Consumption Category	2017-18	2021-22
Domestic	28858	39278
Commercial & Misc.	14022	18588
Public lighting	745	937
Public Water Works	2080	2687
Irrigation	8263	9781
Industries LT	6820	9101
Industries HT	20568	28189
Railway traction	799	993
Bulk Supply	2799	3830
Total (Energy Consumption)	84952	113384

Table 8D
Forecast of Electrical Energy Requirement (in MU) of NCR
For the Year 2017-18 and 2021-22
As Per 18th EPS (Volume-III)

NCR Sub Region	2017-18	2021-22
Delhi	40176	52930
Haryana	31099	37864
Rajasthan	8101	10868
Uttar Pradesh	22003	30192
NCR - Total	101379	131854

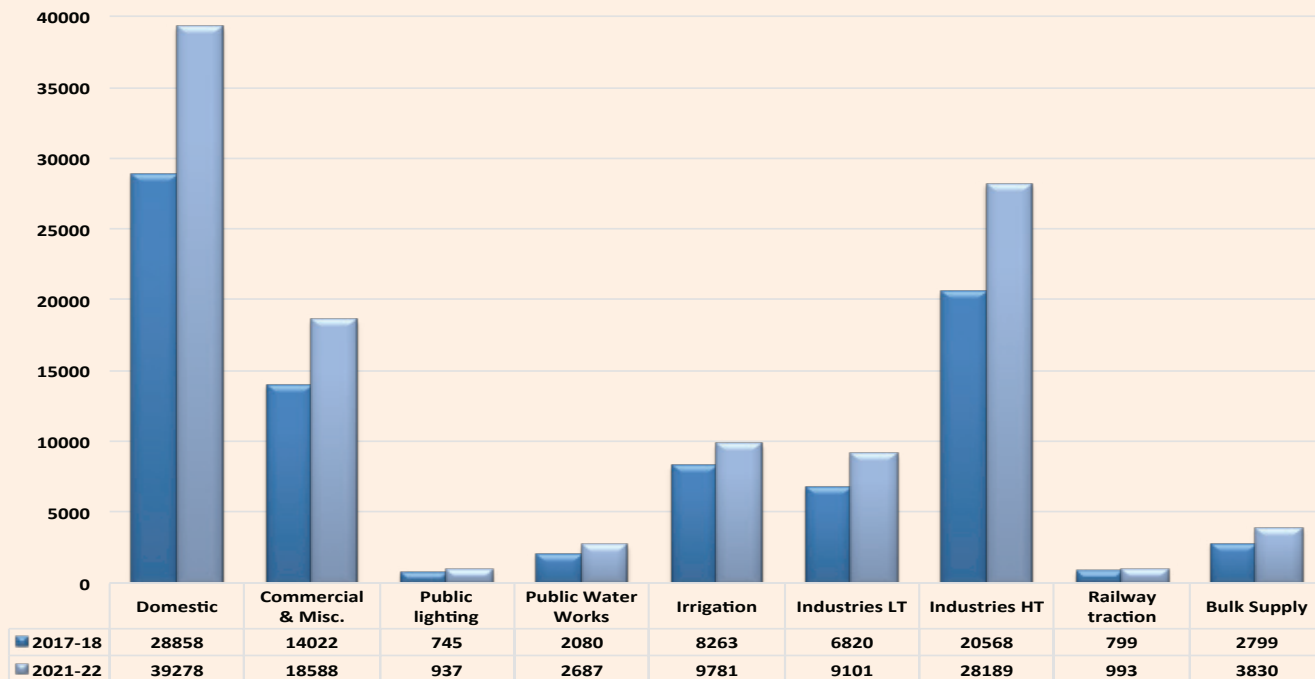
All India Peak and Energy Deficit (Utilities) 1984-85 to 2016-17

Chart : 38



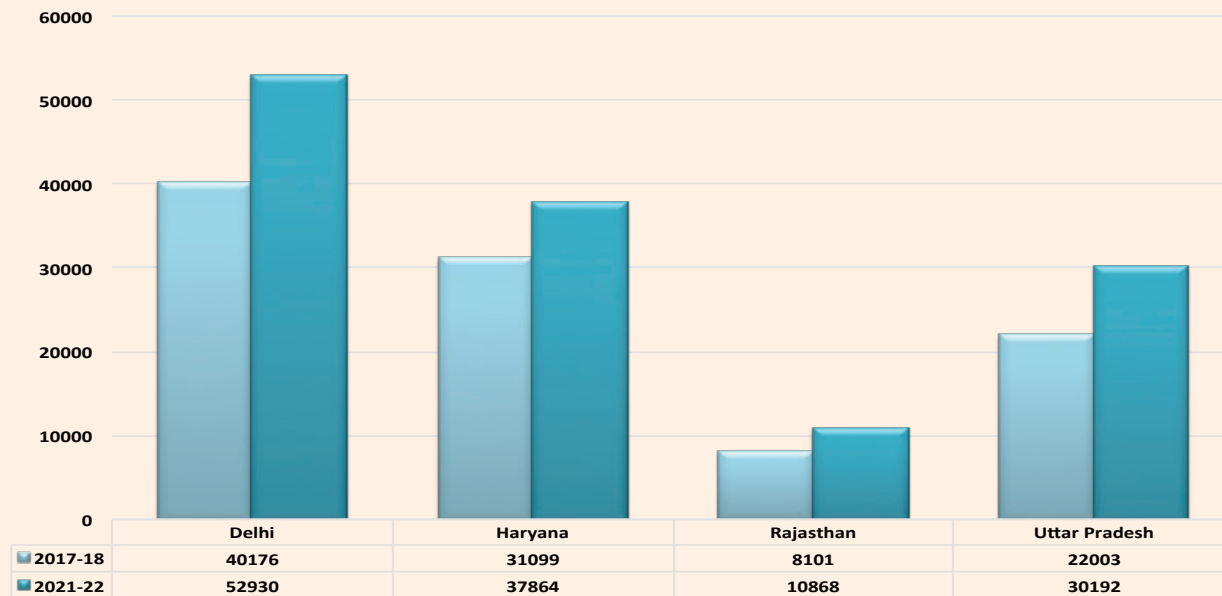
**Forecast of Electrical Energy Consumption (in MU) of NCR
For the Year 2017-18 and 2021-22**

Chart :39



**Forecast of Electrical Energy Requirement (in MU) of NCR
For the Year 2017-18 and 2021-22**

Chart : 40



MAP OF INDIA

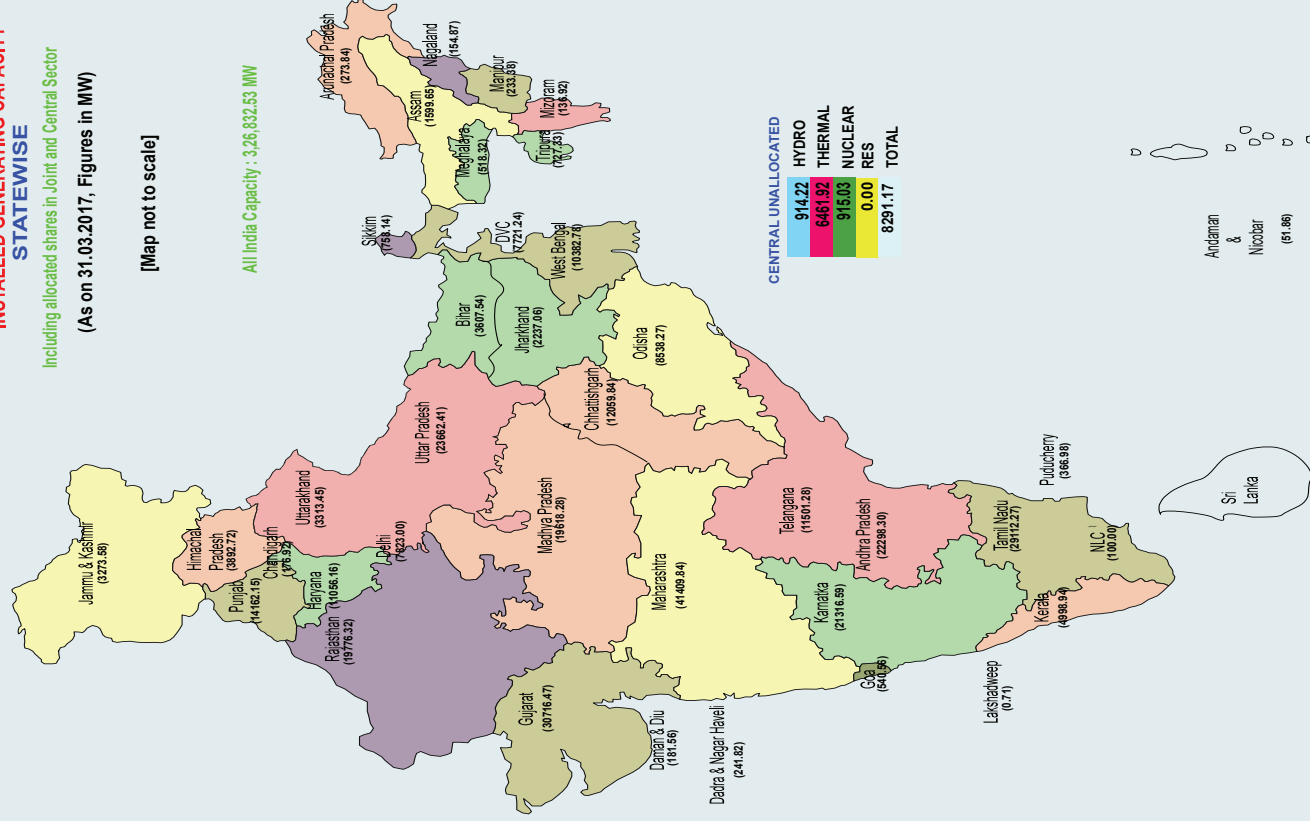
SHOWING INSTALLED GENERATING CAPACITY STATEWISE

Including allocated shares in Joint and Central Sector

(As on 31.03.2017, Figures in MW)

[Map not to scale]

All India Capacity : 3,26,832.53 MW



MAP OF INDIA

SHOWING

INSTALLED GENERATING CAPACITY
STATEWISE/MODEWISE

(As on 31.03.2017, Figures in MW)
Including allocated shares in Joint and Central Sector

[Map not to scale]

All India Capacity : 3,26,832.53 MW

