

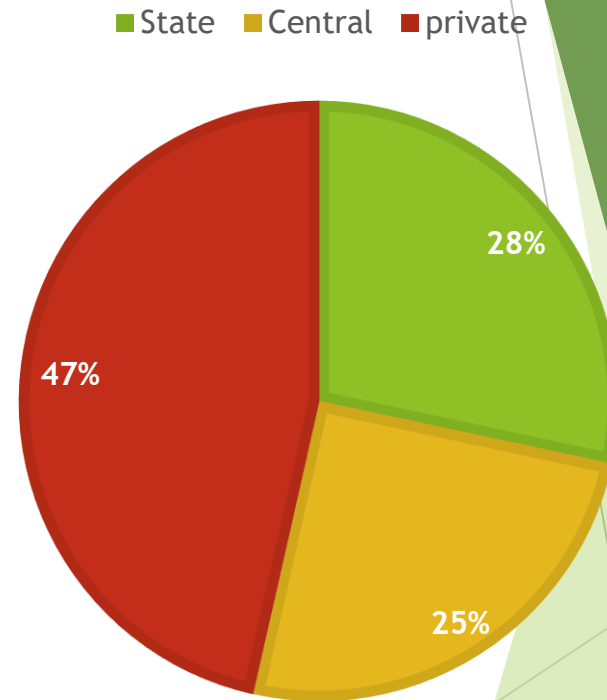


Updates and Future Directions of Indian Power Sector

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Installed Capacity (in MW) as on 30.09.2019

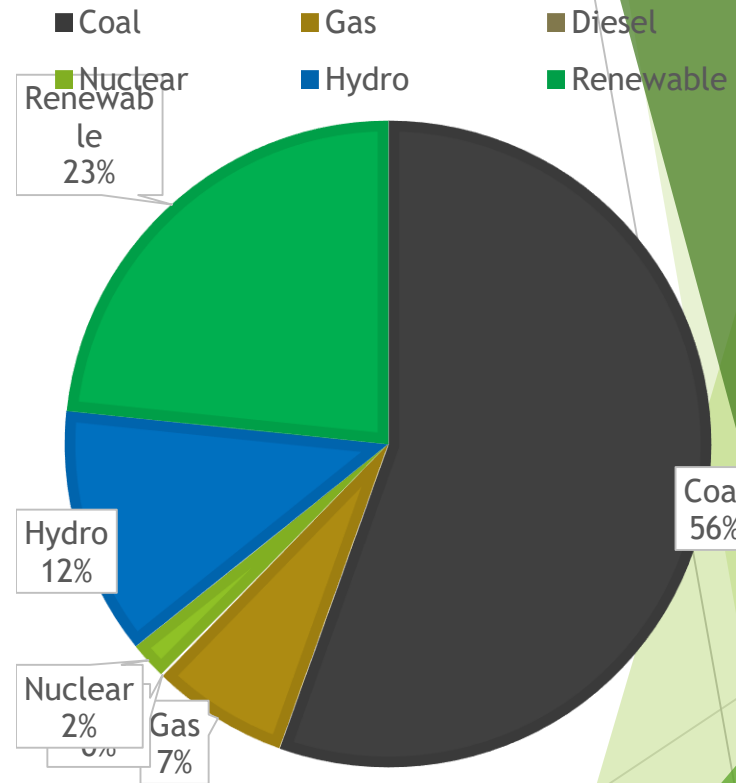
Sector	Installed Capacity(MW)
State	103014
Central	91497
Private	168858
Total	363369



Total Installed Capacity 363369 MW

Installed Capacity (in MW) as on 30.09.2019

Type	Installed Capacity(MW)
Coal	203154
Gas	24937
Diesel	509
Nuclear	6780
Hydro	45400
Renewable	85589
Total	363369

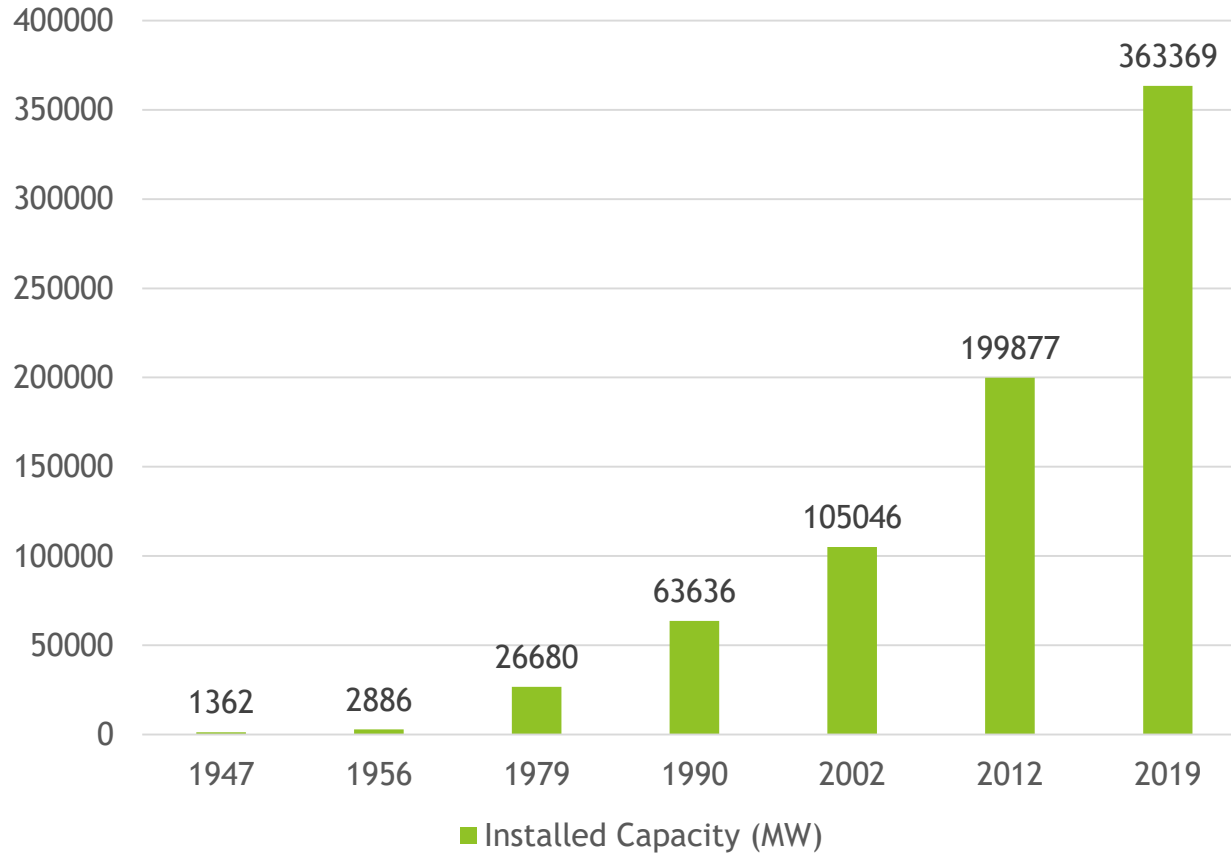


Total Installed Capacity 363369 MW

Growth of Installed Capacity

Plan/Year	Installed Capacity (MW)
1947	1362
1956	2886
1979	26680
1990	63636
2002	105046
2012	199877
2019	363369

Installed Capacity Growth (MW)



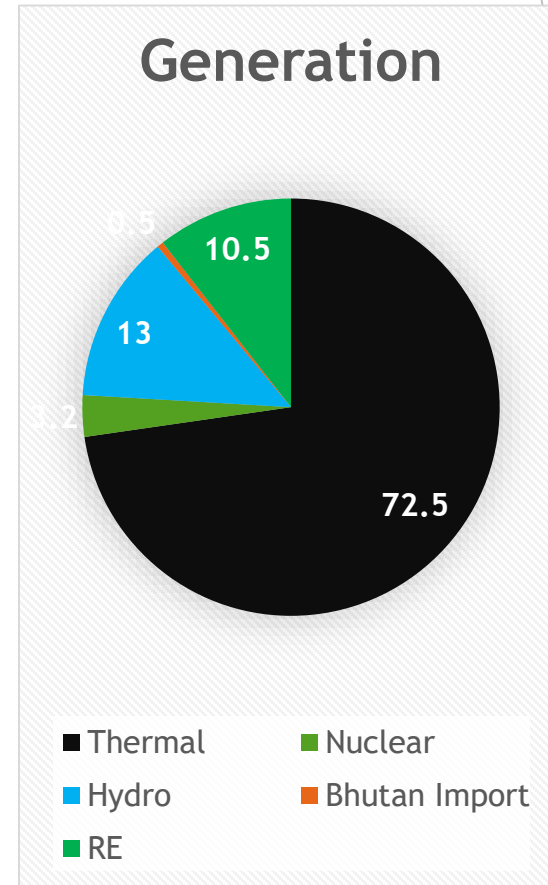
Installed capacity

	As on 30.09.2019		As on 31.03.2022		As on 31.03.2030	
	(GW)	(%)	(GW)	(%)	(GW)	(%)
Thermal:	203.0	56.00	217.0	45.30	266.8	32.1
Hydro:	45.0	12.45	51.0	10.65	73.4	8.8
Gas:	25.0	6.90	26.0	5.43	25.0	3.0
Nuclear:	6.8	1.87	10.0	2.09	16.8	2.0
Renewable:	82.5	22.78	175.0	36.53	450.0	54.1
Total:	362.30	100.00	479.00	100.00	832.00	100.00

Generation Report

April 2019 to September 2019

Category	Generation in BU	% of total Generation
Thermal	534.5	72.5
Nuclear	23.8	3.2
Hydro	95.9	13
Bhutan Import	4.2	0.5
RE	78	10.5
Total	736.4	100



Power Supply Position in India September 2019

Energy(MU)

	Requirement	Availability	Deficit(MU)	Deficit (%)
Northern Region	38305	37725	580	1.5
Western Region	28790	28790	0	0
Southern Region	26259	26237	22	0.1
Eastern Region	12986	12985	1	0
North-Eastern Region	1623	1526	97	6
All India	107963	107262	701	0.6

Power Supply Position in India September 2019

Peak(MW)

	Requirement	Availability	Deficit(MW)	Deficit (%)
Northern Region	63365	62023	1342	2.1
Western Region	46261	46261	0	0
Southern Region	44626	44591	38	0.1
Eastern Region	23804	23804	0	0.0
North-Eastern Region	3183	3070	113	3.6
All India	174584	173145	1439	0.8

All India PLF of Thermal plants Month-wise

Month	PLF 2018	PLF 2019
April	64.54	64.71
May	64.04	63.24
June	59.39	62.17
July	54.53	55.5
Aug	55.49	51.02
Sep	59.80	51.05

PLAN WISE / YEAR WISE CAPACITY ADDITION TARGET VS ACHIEVEMENT

PLAN/ YEAR	TARGET (MW)	ACTUAL(MW)	%
7 th	22245	21401.6	96.21
8 th	30537.7	16422.6	53.8
9 th	40245.2	19119	47.5
10 th	41109.8	21180	51.52
11 th	78700	54965	69.84
12 th	88537	99209.5	112.05
2017-18	13171.15	9505	72.17
2018-19	8106	5921	73.05

Load Forecast courtesy 19th EPS, CEA

	2016-17	2021-22	2026-27	2031-32	2036-37
Electricity Consumption (in BU)	921	1300	1743	2192	2672
Electrical Energy Requirement (in BU)	1160	1566	2047	2531	3049
Peak Electricity Demand (in GW)	162	226	299	370	448

INDIA AIMING EMISSION REDUCTION IN POWER SECTOR

In continuing efforts to safeguard the environment and reduce emissions from power sector, India has made the following commitments in COP 21:

- India intends to reduce the emissions intensity of its GDP by 33 to 35 % by 2030 from 2005 level.
- To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance.
- Introducing new, more efficient and cleaner technologies in thermal power generation
- Further, to reduce emissions from Thermal Power Stations, Ministry of Environment, Forest and Climate Change(MoEF&CC) has also issued new environmental norms in December 2015 regarding Suspended Particulate matter (SPM), SO_x, NO_x, Mercury. Norms for specific water consumption by Thermal Power Stations have also been notified to conserve water.
- The present installed capacity of coal and lignite based thermal power plants is 203 GW as on 30.09.2019 and around 63 GW is under construction. The impact of the environmental norms on thermal power generation is under study.

Implementation of Phasing Plan for FGD Installation /ESP Upgradation in respect of new Environmental Norms

Year wise FGD Phasing Plan

Year wise ESP Upgradation Plan Plan

FGD Phasing Plan	All India		Year	Capacity (MW)	Units
	Capacit y(MW)	No . Of Units			
Year					
2019	16410	39	2018	500	1
2020	22310	47	2019	1300	2
2021	62298	170	2020	10405	27
2022	65455	184	2021	23495	97
Total	166473	440	2022	27725	93
			Total	63425	220

Govt's Initiatives and Thrust Areas

- World's largest renewable Integration plan:- 175 GW renewable Capacity to be added by 2022 (Solar- 100 GW, Wind 60 GW, SHP- 5GW, Bio.- 10 GW)
- Green Energy Corridor
- National Energy storage mission
- E-mobility



Renewable Power

- Integrated Power development Scheme (IPDS) for urban areas
- Pradhan Mantri Sahaj Bijli Har Ghar Yojana - Saubhagya(सौभाग्य)”
- Distributed Decentralized Generation (DDG) for remote areas
- National Smart Grid mission



Electrification

- UDAY scheme launched to improve the financial condition of Distribution company.
- Creation of a power sector development fund to bailout stressed projects
- Coal linkage rationalization
- Liberally allowing coal swaps from inefficient plants to efficient plants and from plants situated away from mines to pithead plants to minimize cost of coal transportation
- Proposed amendments in the Electricity Act



Other reforms

Road Ahead for Thermal Generation Planning

(based on NEP and 19th EPS report of CEA)

- With 56,400 MW of coal based capacity expected between 2017-22 along with the committed capacity of 38,040 MW from Hydro, Nuclear and Gas, there may not be any further requirement of additional capacity during 2017-22. Further, for 2022-27, capacity addition requirement will be assessed based on Mid term Review of Demand.
- Compliance of New Environmental norms before 2022- Technical, Financial and regulatory issues
- The Plant load factor of the coal based power plants may vary between 50% to 60% depending upon variation in Electricity Demand and achievement in capacity addition from conventional and Renewable Energy Sources.
- Total coal requirement may be around 730-800 MT in 2021-22

Road Ahead for Thermal Generation Planning

- Renewable Energy Sources to contribute around 20% of the Total Energy Requirement by 2021-22.
- Share of Non-fossil fuel installed capacity to increase to 47% by March, 2022.
- Coal power plants need to have enhanced ramping capability
- Minimum technical limit for Coal power plants may have to be revised downward.
- Gas and Hydro Power Plants need to play a major role in meeting the ramping & balancing requirement



Indo-Japan Cooperation

For Efficiency and Environmental Improvement of
Coal Fired Stations





MoUs between CEA and JCOAL

1st MOU between CEA and JCOAL for Pre-Preliminary Study for Efficiency and Environment Improvement of Coal Fired Power Plants was signed on 30.4.2010.

The 2nd MoU between CEA and JCOAL was signed on 11.06.2012 for carrying out detail diagnostic study for energy efficiency oriented R&M activities in thermal power units.

The 3rd MoU between CEA and JCOAL on Japan - India Cooperation for Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity has been signed on 22.01.2016.

Highlights of the MoU Works

- ❖ Joint identification of relevant issues such as condition based monitoring (predictive/risk based maintenance) of USC/SC units.
- ❖ Study on adoption of available technologies to meet new environment standards and the economic viability of using such technologies in existing plants on Indian coal. The study in progress.
- ❖ Study to explore the feasibility of replacement of old inefficient small size units by new units based SC/USC technologies at least at one site.
- ❖ Conductance of RLA and CA studies by JCOAL in One (1) 210 MW coal based unit of thermal power station and submission of report.
- ❖ Consideration of financial viability and provide advice and support for the concerned utility to utilize finance schemes for implementation
- ❖ Jointly organize and conduct CCT Transfer Program in Japan.
- ❖ Jointly organize and conduct an annual workshop in India.

Achievement Under 3rd Phase MoU

1. Environmental Study through combustion test of Indian coal
2. Joint Feasibility Study on Replacement of Thermal Power Station to the latest USC Plant with Comprehensive Environmental Measures
3. Full-fledge diagnosis and other available and effective measures including Residual Life Assessment (RLA) and Condition Assessment (CA) Study.
4. Techno economic viability study of R&M/LE vs Replacement.
5. Study of O&M enhancement and safety improvement.
6. Study on flexible operation for smooth integration of RE.
7. CCT Training Programme
8. Workshop

Running Projects under CEA- JCOAL Cooperation

- ❖ Pilot test for SCR (De-Nox system) at Sipat TPS of NTPC.
- ❖ Flexibilisation study of thermal power station at Vidhyachal TPS of NTPC.
- ❖ Baseline study on Agricultural Biomass utilization in Thermal power stations.
- ❖ Workshop and Study tour for capacity building and knowledge transfer.

Future Co-operation Area

- ❖ Update on the current and future policy trend in the Indian power sector and consideration of the identified issues/barriers to find out those which could be addressed through mutual collaboration by the Parties.
- ❖ Measures to address New Environmental norms and requirements for further environmental compliance..
- ❖ Flexibilization measures at thermal generating units considering large scale integration of renewable generation into grid.
- ❖ Study on utilization of Biomass includes:
 - ▶ Co firing of biomass pellets.
 - ▶ Waste to Energy Technologies.

Future Co-operation Area

- ❖ Study on Coal GCV loss in power plant and its remedy.
- ❖ efficiency optimization with IoT.

Thank you For the attention



धन्यवाद