

## PREAMBLE FOR NATIONAL ELECTRICITY PLAN, 2022-27

Section 3(4) of Electricity Act, 2003 stipulates that, the Central Electricity Authority (CEA) shall prepare a National Electricity Plan in accordance with the National Electricity Policy and notify such plan once in five years.

Provided that the Authority while preparing the National Electricity Plan shall publish the draft National Electricity Plan and invite suggestions and objections thereon from licensees, generating companies and the public within such time as may be prescribed:

Provided further that the Authority shall –

- a) Notify the plan after obtaining the approval of the Central Government;
- b) Revise the plan incorporating therein the directions, if any, given by the Central Government while granting approval under clause (a).

Further Section 3(5) of said act stipulates that, the Authority may review or revise the National Electricity Plan in accordance with the National Electricity Policy.

Para 3 of National Electricity Policy, 2005 stipulates that, assessment of demand is an important pre-requisite for planning capacity addition. Also, section 73 (a) of the Electricity Act provides that formulation of short-term and perspective plans for development of the electricity system and coordinating the activities of various planning agencies for the optimal utilization of resources to sub serve the interests of the national economy shall be one of the functions of the CEA. The Plan prepared by CEA and approved by the Central Government can be used by prospective generating companies, transmission utilities and transmission/distribution licensees as reference document.

Accordingly, CEA shall prepare the National Electricity Plan that would be for a short-term framework of five years while giving a 15-year perspective and would include:

- Short-term and long term demand forecast for different regions;
- Suggested areas/locations for capacity additions in generation and transmission keeping in view the economics of generation and transmission, losses in the system, load centre requirements, grid stability, security of supply, quality of power including voltage profile etc. and environmental considerations including rehabilitation and resettlement;
- Integration of such possible locations with transmission system and development of national grid including type of transmission systems and requirement of redundancies; and
- Different technologies available for efficient generation, transmission and distribution.
- Fuel choices based on economy, energy security and environmental considerations.

While evolving the National Electricity Plan, CEA will consult all the stakeholders including State Governments and the State Governments would, at state level, undertake this exercise in coordination with stakeholders including distribution licensees and State Transmission Utilities (STUs). While conducting studies periodically to assess short-term and long-term demand, projections made by distribution utilities would be given due weightage. CEA will also interact with institutions and agencies having economic expertise, particularly in the field of demand forecasting. Projected growth rates for different sectors of the economy will also be taken into account in the exercise of demand forecasting.

Accordingly, the first National Electricity Plan covering the review of 10<sup>th</sup> plan, detailed plan for 11<sup>th</sup> plan and perspective Plan for 12<sup>th</sup> Plan was notified in the Gazette in August, 2007.

The Second National Electricity Plan covering the review of 11<sup>th</sup> plan, detailed plan for 12<sup>th</sup> plan and perspective Plan for 13<sup>th</sup> plan was notified in the Gazette in December, 2013 in two volumes (**Volume-I, Generation and Volume-II, Transmission**).

The Third National Electricity Plan covers the review of 12<sup>th</sup> Plan, detailed Plan for 2017-22 and perspective Plan for 2022-27 and was notified in the Gazette of India (Volume-I-Generation in March 2018 and Volume-II – Transmission in January, 2019)

In order to initiate the work of preparation of NEP for the next five years (2022-27), a committee on National Electricity plan under the chairmanship of Chairperson, CEA has been constituted by CEA vide office order no.

File No.CEA-PL-11-12/1/2019-IRP Division dated 16.06.2020.In order to elicit views of various experts in Power Sector in the work relating to the preparation of the National Electricity Plan for the next five years (2022-2027), a committee for National Electricity Plan is constituted with following composition and Terms of Reference (TOR).

### **COMMITTEE FOR PREPARATION OF NATIONAL ELECTRICITY PLAN 2022-27**

#### **A. CONSTITUTION:**

- i. Chairperson, CEA - **Chairman**
- ii. Chief Engineer(IRP), CEA - **Member Secretary**

#### **MEMBERS**

- i. All Members of CEA
- ii. Economic Advisor, MOP
- iii. Representative of MNRE not below the rank of JS, (MNRE)
- iv. Director General, BEE
- v. Advisor(Energy), NITI Aayog
- vi. Director General, CPRI
- vii. Chairman cum Managing Director, NTPC
- viii. Chairman cum Managing Director, NHPC
- ix. Chairman cum Managing Director, PGCIL
- x. Chairman cum Managing Director, PFC
- xi. Chief Executive Officer, (POSOCO)
- xii. Chairman cum Managing Director, NPCIL
- xiii. Chairman cum Managing Director, REC
- xiv. Chairman cum Managing Director, EESL

#### **B. TERMS OF REFERENCE OF THE COMMITTEE FOR NATIONAL ELECTRICITY PLAN, 2022-27**

- i. To review the likely achievements vis-à-vis targets set for the 2017-22 period towards generation from conventional sources along with reasons for shortfalls, if any.
- ii. To assess the peak load and energy requirement for the period 2022-27 and perspective forecast for 2027-32.
- iii. To assess the incremental capacity requirement to meet the projected load and energy requirement after considering retirements, renewable and captive injection and suggest the feasible break up in terms of thermal, hydro, nuclear ,renewables etc.
- iv. To make an assessment of the resource requirement like fuel, land, water, indigenous manufacturing capabilities, infrastructural, human resource for meeting the capacity addition requirements.
- v. To assess investment requirement for generation and transmission capacity addition during 2022-27 and beyond.
- vi. To suggest energy conservation measures through Demand Side Management and suggest a strategy for low carbon growth.
- vii. Review of latest technological development and R & D in the power sector and to assess its suitability for Indian conditions.
- viii. Development of integrated Transmission Plan for the period from 2022-27 and perspective plan for 2027-32 including Grid Security, evacuation of Renewable Energy Sources and exploring SAARC integration.

- C. 1. The NEP committee may co-opt any expert as may be considered necessary.
2. NEP committee may constitute separate sub-Committees on any aspect. The report of the Sub-Committee(s) shall be submitted to NEP Committee for consideration.

The first meeting of the Committee for the National Electricity Plan (NEP), 2022-27 was held on 6th August, 2020 under the chairmanship of Chairperson, CEA wherein, it was decided to constitute 10 nos. of Sub-Committees to look into different aspects of power sector and provides inputs to committee for NEP. Thereafter NEP Committee had met on 21.01.2022.The constitution and TOR of the Sub-Committees are given as:

**CONSTITUTION AND TERMS OF REFERENCE OF 10 SUB COMMITTEES CONSTITUTED UNDER  
COMMITTEE FOR NATIONAL ELECTRICITY PLAN, 2022-27**

**1. SUB-COMMITTEE- 1- DEMAND SIDE MANAGEMENT, ENERGY EFFICIENCY & CONSERVATION**

**CONSTITUTION:**

- Director General(BEE)- Chairman
- Chief Engineer( TPE&CC), CEA - Member Secretary

**MEMBERS:**

- Representative from NTPC, EESL,PCRA,CII,IEEMA,ELCOMA
- Chief Engineer(DP&T), CEA
- Representative from Energy Intensive Industry
- Representative from Major DISCOM

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- Assess and review energy efficiency & conservation measures implemented and achievements till 2022.
- Major Plans for efficiency improvement during the period 2022-27 and 2027-32
- Assessment of reduction in energy requirement and peak load demand through demand side management (DSM) and energy efficiency.

**2. SUB-COMMITTEE 2: DEMAND PROJECTION**

**CONSTITUTION:**

- Member (Planning), CEA - Chairman
- Chief Engineer (PS& LF), CEA - Member Secretary

**MEMBERS:**

- Representative from MNRE, NITI Aayog, BEE, POSOCO,NTPC
- Chief Engineer( DP&T),CEA
- Representative from State Discoms
- Representative from Energy Intensive Industry

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- In coordination with the 20th EPS committee, demand assessment in terms of peak load and energy requirements for the period from 2022-2027 & 2027-2032.
- To assess captive demand including Solar roof top and its impact on Grid demand.
- To assess the impact of various Govt. schemes for ex. Kusum, Saubhagaya, National Electric mobility mission plan, etc on Grid demand.

**3. SUB-COMMITTEE 3: REVIEW OF GENERATION CAPACITY ADDITION (2017-22) AND GENERATION PLANNING**

**CONSTITUTION:**

- Member (Planning), CEA- Chairman
- Chief Engineer (IRP), CEA – Member Secretary
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**MEMBERS:**

- Representative from MNRE,CTU,POSOCO, NPCIL,BHEL ,Sterlite, L&T, TPPDL,

- Representative from Solar Energy Corporation of India
- Representative from National Institute for Wind Energy
- CEA- CE( RPM),CE(TPM),CE(TPRM),CE( HPM),CE(TPP&D),CE(HPI),CE(GM)

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- To review generation capacity addition achievements vis-à-vis targets during 2017-22 including new & renewable energy and reasons for shortfalls if any.
- Assessment of generation capacity addition during 2022-27 and 2027-32 including renewable energy sources and its integration thereof.

**4. SUB-COMMITTEE 4- RESEARCH AND DEVELOPMENT IN POWER SECTOR****CONSTITUTION:**

- Director General, CPRI - Chairman
- Chief Engineer(R&D),CEA - Member Secretary

**MEMBERS:**

- Representative from MNRE, National Institute for Solar Energy & National Institute for Wind Energy
- Representative from NETRA,NTPC
- Representative from IEEMA, IIT Kanpur, PGCIL, DST, BHEL
- CEA- CE(TETD), CE(HETD), CE(SETD)

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- Review of existing R&D facilities & programmes in Power sector
- Recommendation regarding R&D activities to be taken up during 2022-27 & 2027-32,
- Issues relating to cyber security
- To assess the infrastructure requirement to promote R&D activities in Power Sector.
- To identify future technologies in power generation including waste (Municipality, hospital, Industrial etc.)

**5. SUB-COMMITTEE 5- FUEL REQUIREMENT****CONSTITUTION:**

- Member( Planning), CEA as Chairman
- Chief Engineer,(FM), CEA as Member Secretary

**MEMBERS:**

- Representative from MOP&NG, MOC, NTPC, NPCIL, NLC, GAIL,CIL
- CEA- CE(IRP),CE(TPP&D)

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- Identify and quantify the different types of fuels required to meet the electricity demand for the period 2022-27 and 2022-32
- To assess the availability of fuel source wise.

**6. SUB-COMMITTEE 6- FUND REQUIREMENT****CONSTITUTION:**

- Member, (E&C), CEA as chairman
- Chief Engineer( F&CA), CEA as Member Secretary

**MEMBERS:**

- Representative from MOP, MNRE, NITI Aayog, NTPC,PGCIL ,NHPC, NPCIL, PFC, REC
- CEA-CE(TPP&D),CE(HPI),CE(PSP&A I)

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- Review of financial issues related to power sector
- Identify the investment required to meet the capacity addition and associated transmission system and possible sources of fund etc.

**7. SUB-COMMITTEE 7: KEY INPUTS FOR POWER SECTOR****CONSTITUTION:**

- CMD, NTPC as Chairman
- Chief Engineer( TETD), CEA as Member Secretary

**MEMBERS:**

- Representatives of MoP&NG, Ministry of Railways, Ministry of Steel, Ministry of Road Transport and Highway, Ministry of Shipping, MNRE, CPRI,PFC,BHEL, NHPC, Private Equipment Manufacturer, CII.  
CEA-CE(TPP&D),CE (PSP&A-I), CE(SETD), CE(TPRM)

**TERMS OF REFERENCE OF SUB-COMMITTEE:**

- Identify the key inputs required for meeting the capacity addition requirements
- To assess infrastructural support required for Power capacity addition during 2022-27 & 2027-32.
- Land , water Requirement & its availability
- Transport( Railways, Roads, Waterways, pipeline, LNG terminals), Port facilities
- Construction & manufacturing capabilities specifically erection machinery and agencies including civil and BOP contractors. Steel, cement, aluminium & other materials required for construction work in power sector.
- Assessment of sourcing inputs for power Sector under the Atmanirbhar Bharat initiative.

**8. SUB-COMMITTEE 8- TRANSMISSION PLANNING****CONSTITUTION:**

- Member(PS), CEA as Chairman
- Chief Engineer ( PSP&A-I) as Member secretary

**MEMBERS:**

- Representative of MNRE,PGCIL,POSOCO,PFC,REC, State Transmission Utility, CTU Distribution Licensee
- CEA- CE(PSP&A-II),CE(PSPM),CE(SETD),RPCs

**TERMS OF REFERENCE OF SUB-COMMITTEE**

- Review of achievement of targets for the period of 2017-22 for transmission and reasons of shortfall if any.
- Development of integrated transmission plan for the period from 2022-27 and perspective plan for 2027-32.
- Technology development in transmission

## **9. SUB-COMMITTEE 9- HUMAN RESOURCE REQUIREMENT**

### **CONSTITUTION:**

- Member( E&C), as Chairman
- Chief Engineer(HRD),CEA as Member Secretary

### **MEMBERS:**

- Representatives of MNRE,PGCIL,NTPC,NHPC, POSOCO , two State GENCOs
- Representative from NPTI, PSTI
- Representative from National Skill Development Corporation

### **TERMS OF REFERENCE OF SUB-COMMITTEE:**

- Assess the human resource requirement in power sector for the period 2022-27 and 2027-32.
- Human Resource Development Plans including training need assessment and infrastructure required.

## **10. SUB-COMMITTEE-10: REQUIREMENT OF FLEXIBLE RESOURCES FOR GRID STABILITY**

### **CONSTITUTION:**

- Member (Planning), CEA as Chairman
- Chief Engineer (PSP&A -II) as Member Secretary of the Sub-committee.

### **MEMBERS:**

- Representative from MNRE, NITI AAYOG, CTU, POWERGRID, NHPC, NTPC,NPCIL, POSOCO,PFC
- CEA- Chief Engineer (IRP), Chief Engineer (TETD), Chief Engineer (PSP&A I), Chief Engineer (R&D), Chief Engineer(HETD), Chief Engineer(HP&I), Chief Engineer (TPRM)

### **TERMS OF REFERENCE OF SUB-COMMITTEE:**

- To assess the requirement of flexible resources for grid stability.
- To identify various flexible resources available for grid operation including energy storage options for better operational characteristics, better utilization of Renewable energy, etc.
- Development of future roadmap for integration of energy storage system for better Operational characteristics, better utilization of Renewable energy, etc.
- To formulate roadmap for maximum utilization of renewable energy by flexible operation of conventional generating units keeping in consideration Grid stability, Security, reliability and cost constraints.

## MAJOR HIGHLIGHTS

The National Electricity Plan includes a review of the period 2017-22, detailed capacity addition requirement during the years 2022-27 and Perspective Plan projections for the years 2027-32. Major Highlights are as follows.

- i) The scheduled capacity addition from conventional sources during the period of 2017-22 was 51,561.15 MW as per National Electricity Plan, 2018. The capacity addition achieved from conventional sources is 30,667.91 MW for the year 2021-22.
- ii) India has achieved a cumulative installed renewable energy capacity (including large hydro) of 156607.9 MW as on 31.03.2022.
- iii) Capacity consisting of Coal (18320 MW), Hydro (4801.5 MW) and Nuclear (3300 MW) envisaged during the period 2017-22 is slipped where COVID-19 being the major reason resulting in delay.
- iv) The projected electrical energy requirement and peak electricity demand on all-India basis is estimated as 1874 BU and 272 GW for year 2026-27 and 2538 BU and 363 GW for year 2031-32 respectively.
- v) Projections of energy savings for utility and non-utility is estimated to be 213 TWh for the year 2026-27 and 404 TWh for year 2031-32.
- vi) The projections of reduction of energy demand through implementation of various programmes of Demand side management is 398.49 BU for year 2026-27 and 590.53 BU for year 2031-32.
- vii) The Installed Capacity of the country as on 31.03.2022 was 398986 MW(excluding 510 MW of Diesel) comprising of 235599 MW thermal, 6,780 MW Nuclear and 156607MW renewables This is considered as a base installed capacity for the study period 2022-32.
- viii) Under construction plants comprising of 25,950 MW of Thermal Power Plants, 10,903 MW of Hydro Power plants, 1580 MW of Pumped storage plants and 7,000 MW of Nuclear Power plants has been considered for the studies during period of 2022-27. Additionally, a likely capacity of 8700 MW of Nuclear Power plants which are at under various stages of construction (or in advance stages of development) likely to benefit during period 2027-32.
- ix) The retirement for period 2022-27 has been considered as 4629 MW.
- x) The capacity addition required during 2022-27 to meet the peak demand and energy requirement for the year 2026-27 is 2,28541 MW comprising of 40,632 MW of Conventional capacity addition (Coal-25580MW, Gas-370 MW and Nuclear-7000MW) and 187,909 MW of Renewable based Capacity Addition (Large Hydro-10951 MW, Solar-132,080, Wind-40500 MW, Biomass-2318 MW, PSP-2700 MW) excluding 5,856 MW of likely Hydro based Imports.
- xi) The capacity addition required during 2027-32 to meet the peak demand and energy requirement for the year 2031-32 is 2,43,042 MW comprising of 18,134 MW of Conventional capacity addition (Coal-9,434 MW, Nuclear-8700 MW) and 224,908 MW of Renewable based Capacity Addition (Large Hydro-10,888 MW, Solar-147,400, Wind-53,100( Onshore- 43,100 and Offshore 10,000 MW, Biomass-1,500 MW, PSP-12,020 MW) excluding 5,856 MW of likely Hydro based Imports



- xii) All India installed capacity is likely to be 6,22,899 MW at the end of year 2026-27 and 8,65,941 MW at the end of year 2031-32.
- xiii) It is seen that apart from under construction coal based capacity of 25GW, the additional coal based capacity required till 2031-32 may vary from 17 GW to around 28 GW. It is also seen that the BESS (5-hour) requirement in 2031-32 is varying from 51 GW to 84GW.
- xiv) The Projection of Total capacity addition are in line with the target of the country to achieve a non-fossil based installed capacity of 500 GW by the year 2029-30.
- xv) A PSP based storage capacity of 6.81 GW is required to meet the projected peak electricity demand and energy requirement in 2026-27. A PSP based capacity of 18.82 GW and 5-hour BESS capacity of 51.56 GW is likely to be required to meet the peak electricity demand and energy requirement in 2031-32.
- xvi) A generation of 1968 BU comprising of coal based -1158.8 BU, Gas based-35 BU, Nuclear based- 82 BU, Large Hydro based- 189 BU (including generation from Hydro imports), PV based-326 BU, Wind based- 170 BU and SHP based-8 BU, is projected during the year 2026-27 based on the generation planning studies to meet the projected hourly demand.
- xvii) The average PLF of the total Installed coal capacity of 239.3 GW was found to be about 55% in 2026-27. The average PLF of the total Installed coal capacity of 248.9 GW was found to be about 62 % in 2031-32.
- xviii) The domestic coal requirement in the year 2026-27 have been estimated as 831.5 Million Tonnes and in 2031-32 as 1018.2 MT and Imports by plants designed on imported coal to be 40 Million tonnes.
- xix) The total fund requirement for the period 2022-2027 is estimated to be Rs. 14,30,718 Crores, which also includes the likely expenditure during 2022-27 for advance action for the projects expected to get commissioned during 2027-2032.
- xx) The total fund requirement for the period 2027-2032 has been estimated to be Rs. 17,15,608 Crores. This fund requirement does not include advance action for the projects which may get commissioned after 31.03.2032
- xxi) Based on the estimation of fund requirement for the period 2022-27 and considering sector-wise equity contribution mentioned in para 11.3.1, it is estimated that developers will be required to infuse equity amount totalling to Rs. 3,57,679 Crores. Further, they will have to arrange for total debt of Rs. 10,73,039 Crores.
- xxii) Similarly, the equity and debt requirement (excluding fund requirement for advance action for projects during the period beyond 31.03.2032) for the period 2027-2032 have been estimated as Rs. 4,28,902 Crores and Rs. 12,86,706 Crores respectively.
- xxiii) The average CO<sub>2</sub> emission rate from coal based stations in the country has been on declining trend indicating improvement in efficiency of power generation from coal based power plants.
- xxiv) During 2020-21, the country has achieved Fly Ash Utilization of 107.77 Million tonnes with percentage utilization of 60.97%.
- xxv) The total CO<sub>2</sub> emissions projected will increase from 910 Million tonnes in 2020-21 to 1030 Million tonnes in the year 2026-27 and 1180 Million tonnes in 2031-32.
- xxvi) The average emission factor is expected to reduce to 0.524 kg CO<sub>2</sub>/kWh in the year 2026-27 and to 0.441 kg CO<sub>2</sub>/kWh by the end of 2031-32.





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# CHAPTER 1

## INTRODUCTION

### 1.0 BACKGROUND

Power infrastructure is one of the most critical component for prosperity and economic growth of country. The development of requisite power infrastructure is key for sustained growth of Indian economy. With the increase in economic activity, the demand for power is also increasing. India has witnessed electricity demand increase of around 4.1 % during the last decade and it is projected that the increase in electricity demand is likely to be 6 % per year for next decade. To meet the ever-increasing electricity demand, power sector in India has grown considerably. The enactment of Electricity Act, 2003, has brought in revolutionary changes in almost all the areas of the sector. Through this Act a conducive environment has been created to promote private sector participation and competition in the sector by providing a level playing field. This has led to significant investment in generation, transmission and distribution areas. Over the years the installed capacity of Power Plants (Utilities) has increased to 399496 MW as on 31.03.2022 from a meagre 1362 MW 1947. Similarly, the electricity generation increased from about 5.1 Billion units in 1950 to 1491.9 BU (including imports) in the year 2021-22. Regional grids have been integrated into a single national grid with effect from 31.12.2013 thereby providing free flow of power from one corner of the country to another through strong inter regional AC and HVDC links. As a result, the all India peak demand (MW) not met as well as energy (MU) not supplied have registered steady decline. The peak power deficit during 2021-22 has been 1.2 % and Energy Deficit has been 0.4 % only. This marginal shortage seen is on account of reasons other than unavailability of Generation Capacity.

To ascertain the objective of carbon free energy capacity addition through RE [excluding hydro above 25 MW] sources has exhibited a remarkable CAGR of 19 % since FY 2006–07. The contribution of RE sources(including Large Hydro) to the installed capacity has increased from 5.8% in 2006–07 to 39 % in 2021-22 till 31.03.2022 and its energy contribution in the total generation has increased to 21.54 % in 2021-22 from 1.5 % in 2006-07.

### 1.1 STIPULATION REGARDING NATIONAL ELECTRICITY PLAN

#### 1.1.1 Stipulations Regarding National Electricity Plan in Electricity Act 2003

The Electricity Act, 2003 provides an enabling legislation conducive to development of the Power Sector in transparent and competitive environment, keeping in view the interest of the consumers.

As per Section 3(4) of the Electricity Act 2003, Central Electricity Authority (CEA) is required to prepare a National Electricity Plan in accordance with the National Electricity Policy and notify such Plan once in five years. The draft plan has to be published and suggestions and objections invited thereon from licensees, generating companies and the public within the prescribed time. The Plan has to be notified after obtaining the approval of the Central Government. The National Electricity Policy stipulates that the Plan prepared by CEA and approved by the Central Government can be used by prospective generating companies, transmission utilities and transmission/distribution licensees as reference document.

### **1.1.2 Stipulations Regarding National Electricity Plan in National Electricity Policy 2005**

National Electricity Policy stipulates that the National Electricity Plan would be for a short-term framework of five years while giving a 15-year perspective and would include:

- Short-term and long term demand forecast for different regions;
- Suggested areas/locations for capacity additions in generation and transmission keeping in view of the economics of generation and transmission, losses in the system, load centre requirements, grid stability, security of supply, quality of power including voltage profile, etc.; and environmental considerations including rehabilitation and resettlement;
- Integration of such possible locations with transmission system and development of national grid including type of transmission systems and requirement of redundancies; and
- Different technologies available for efficient generation, transmission and distribution.
- Fuel choices based on economy, energy security and environmental considerations.

The Policy also stipulates that while evolving the National Electricity Plan, CEA will consult all the stakeholders including State Governments and the State Governments would, at State level, undertake this exercise in coordination with stakeholders including distribution licensees and State Transmission Utilities (STUs). While conducting studies periodically to assess short-term and long-term demand, projections made by distribution utilities would be given due weightage. CEA will also interact with institutions and agencies having economic expertise, particularly in the field of demand forecasting. Projected growth rates for different sectors of the economy will also be taken into account in the exercise of demand forecasting.

The Policy stipulates that in addition to enhancing the overall availability of installed capacity to 85%, a spinning reserve of at least 5% at national level would be needed to be created to ensure grid security, quality and reliability of power supply.

The Policy states that efficient technologies, like super-critical technology, Integrated Gasification Combined Cycle (IGCC) etc. and large size units would be gradually introduced for generation of electricity as their cost effectiveness gets established.

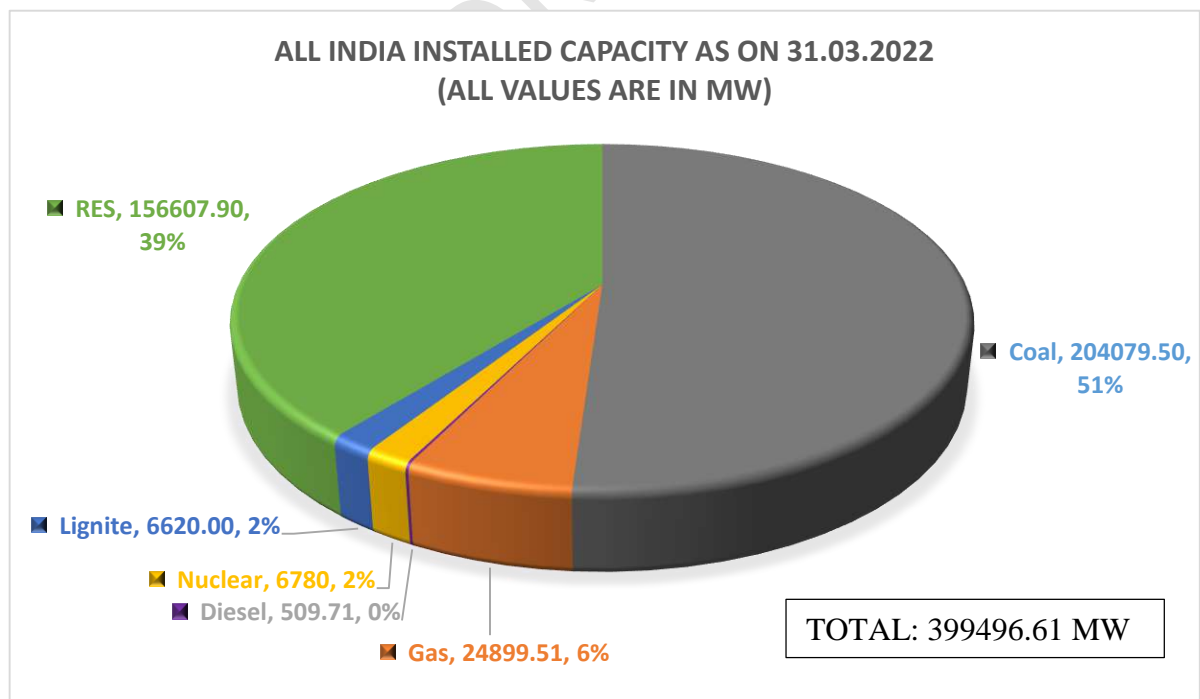
The present National Electricity Policy was enunciated in 2005 and since then it's various Aims and Objectives have achieved different levels of implementation. Keeping in view of these and to cater to the further challenges of the sector the National Electricity Policy is under revision.

## 1.2 POWER SCENARIO IN COUNTRY

### 1.2.1 Installed Capacity

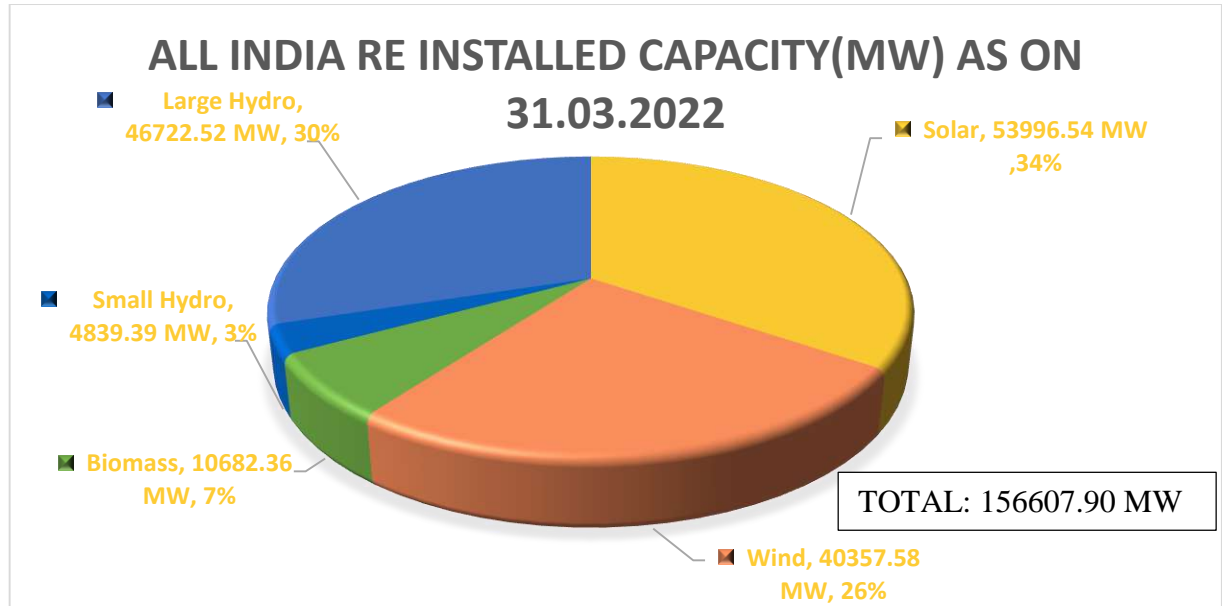
The Installed Capacity of the country as on 31.03.2022 was 399496.61 MW comprising of 236108.72 MW thermal, 6,780 MW Nuclear and 156607.90 MW renewables and is depicted in the **Exhibit 1.1**.

Exhibit 1.1



The country has significant potential of generation from renewable energy sources. All efforts are being made by Government of India to harness this potential. The Installed capacity as on 31<sup>st</sup> March, 2022 from renewable energy sources is 156607.90 MW. The total renewable installed capacity comprises of 46722.52 MW of Large Hydro, 40357.58MW of wind, 53996.54 MW of solar, 10682.36 MW of bio-Power & waste power and 4848.9MW of small hydro plants as shown in **Exhibit 1.2**.

**Exhibit1.2**



The growth of Installed Capacity and Electricity Generation in India from various sources is shown in **Table 1.1, Exhibit 1.3 and 1.4**.

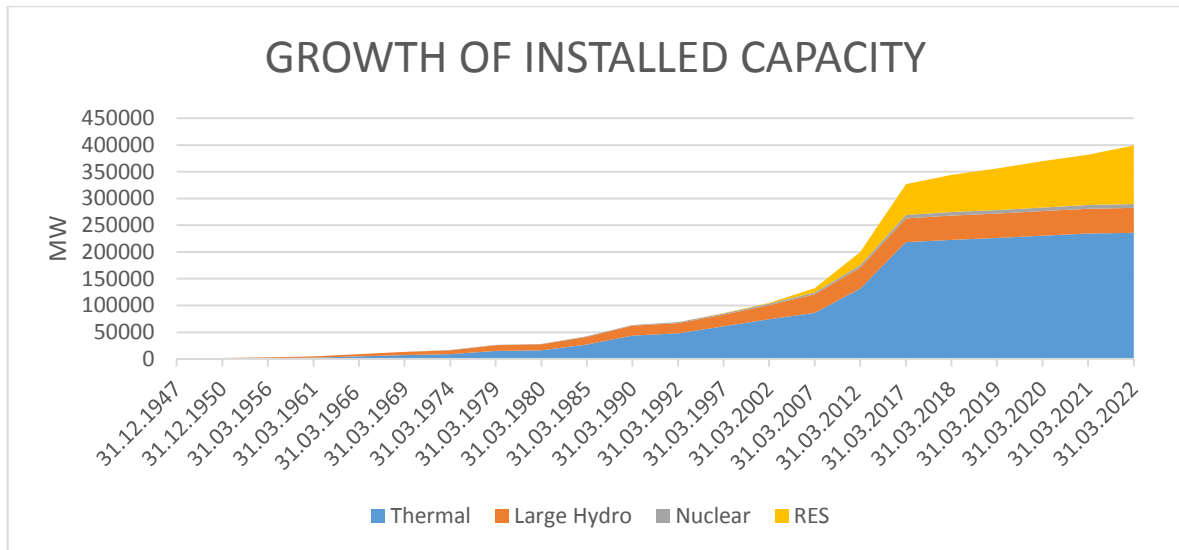
**Table 1.1**

**Growth of Installed Capacity & Electricity Generation**

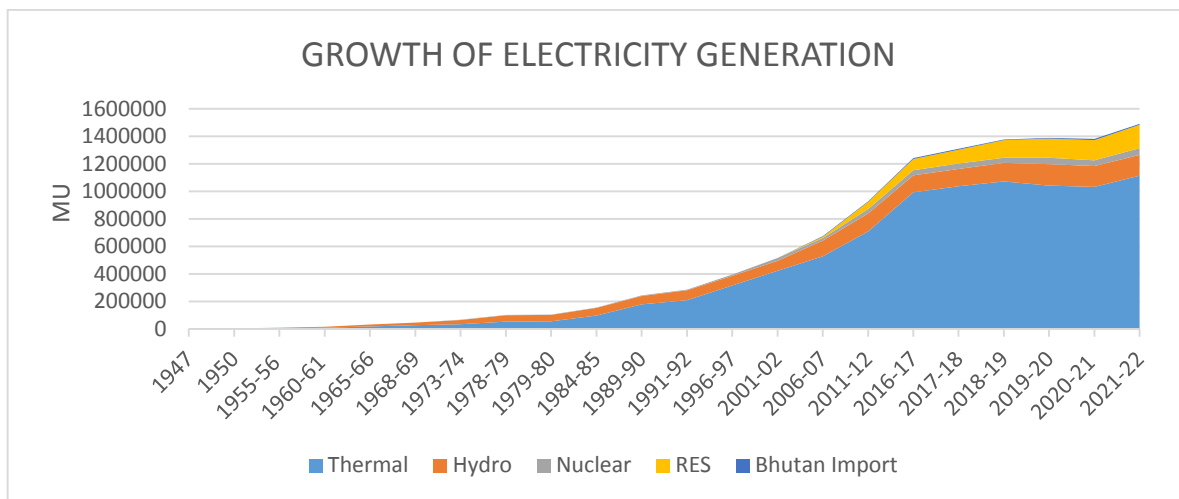
Plan/Year	Installed Capacity (MW)	IC Growth Rate YoY basis (%)	CARG for IC (%)	Generation (BU)	Generation Growth YoY basis (%)	CAGR for Generation (%)
At the end of 12 <sup>th</sup> Year plan	326832			1242		
2017-18	344002	5.25	4.1	1307.76	5.35	3.72
2018-19	356100	3.52		1375.95	5.21	
2019-20	370106	3.93		1389.12	0.96	
2020-21	382151	3.25		1381.86	-0.522*	
2021-22	399496	4.54		1491.9	7.96	

\* COVID YEAR

**Exhibit 1.3**



**Exhibit 1.4**



### 1.2.2 Per Capita Electricity Consumption

The per capita electricity consumption was 1122.00 kWh at the beginning of the 2017-18 i.e. 01.04.2017 and as on 31.03.2021 the per capita electricity consumption has increased to 1161 kWh. The per capita electricity consumption during 2017-22 is summarized in Table 1.2.

**Table 1.2**  
**Per Capita Electricity Consumption**

YEAR	PER CAPITA CONSUMPTION (KWh)
2017-18	1149
2018-19	1181
2019-20	1208
2020-21	1161

### 1.2.3 Actual Power Supply Position

The peak demand not met was about 3,314 MW (2.0%) and the average energy not supplied in the country was about 8,629 MU (0.7%) during 2017-18. The peak not met and energy not supplied of the country has substantially declined to 2475 MW (1.2 %) and 5,787 MU (0.4%) respectively by the end of 2021-22. The power supply position in the country during 2017-22 is summarized in Table 1.3.

**Table 1.3**  
**All-India Actual Power Supply Position (2012-17)**

Period	Peak Demand (MW)	Peak Met (MW)	Peak Not Met/ Surplus (MW) (- / +)	Peak Not Met/ Surplus (%) (- / +)	Energy Requirement (MU)	Energy Availability (MU)	Energy Not Supplied/ Surplus (Mu) (- / +)	Energy Not Supplied / Surplus (%) (- / +)
2017-18	164,066	160,752	3,314	2.0	1,213,326	1,204,697	8,629	0.7
2018-19	177,022	175,528	1,494	0.8	1,274,595	1,267,526	7,070	0.6
2019-20	183,804	182,533	1,271	0.7	1,291,010	1,284,444	6,566	0.5
2020-21	190,198	189,395	802	0.4	1,275,534	1,270,663	4,871	0.4
2021-22	2,03,014	2,00,539	2,475	1.2	13,79,812	13,74,024	5,787	0.4

### 1.2.4 Plant Load Factor of Thermal Based Power Plant

The national average Plant Load Factor (PLF) of Thermal based power generating stations for the year 2017-22 has been shown in **Exhibit 1.5**