सत्यमेव जयते

CEA ANNUAL REPORT
2022-23

CENTRAL ELECTRICITY AUTHORITY
MINISTRY OF POWER
GOVERNMENT OF INDIA

THE AUTHORITY (As on 31.03.2023)

Sh. Ghanshyam Prasad
Chairperson

Sh. Ajay Talegaonkar
Member (E&C)

Sh. B.K. Arya
Member (GO&D)

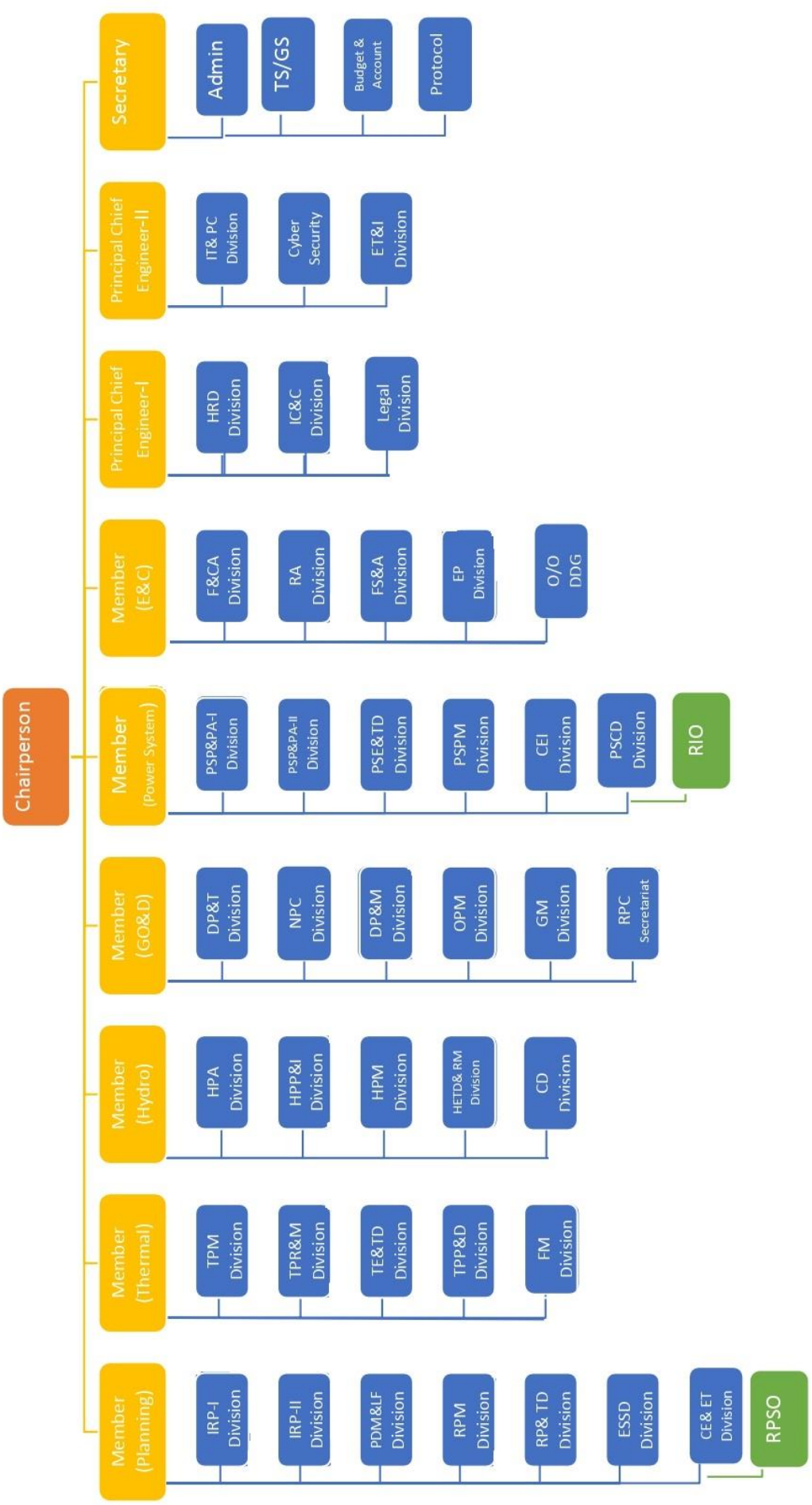
Sh. Ashok Kumar Rajput
Member (Power System)

Sh. Praveen Gupta
Member(Thermal)

Sh. A. Balan
Member (Planning)

Sh. M. A. K. P. Singh
Member (Hydro)

ORGANIZATION CHART OF CEA



CENTRAL ELECTRICITY AUTHORITY
Sewa Bhawan, R.K. Puram, New Delhi – 110066 CEA
Website: www.cea.nic.in

Sub-ordinate Offices

Regional Power Committees

1. **Member Secretary, Eastern Regional Power Committee,** ERPC Building, 14 Golf Club Road, Tollygunge, Kolkata – 700033.
2. **Member Secretary**, **Northern Regional Power Committee,** NRPC Building, 18-A, Shaheed Jeet Singh Marg, New Delhi – 110016.
3. **Member Secretary**, **Southern Regional Power Committee,** 29 Race Course Cross Road, Near Anand Rao Circle, Bangaluru – 560009.
4. **Member Secretary, Western Regional Power Committee,** Plot No. F-3, Opposite SEEPZ Complex, MIDC Area Marol, Andheri (East), Mumbai – 400093.
5. **Member Secretary**, **North-Eastern Regional Power Committee,** Meghalaya NERPC Complex, 3rd Floor, Dong Parmaw, Lapulang, Shillong-793006.

Regional Power Survey Offices (RPSOs)

1. **Deputy Director, Regional Power Survey Office (East),** ERPC Building, 14 Golf Club Road, Tollygunge, Kolkata - 700033.
2. **Deputy Director, Regional Power Survey Office (North),** West Block-II, Wing V, R.K. Puram, Sector-1, New Delhi– 110066.
3. **Deputy Director, Regional Power Survey Office (South),** Post Box No. – 38, 6th Floor, 'F' – Wing, Kendriya Sadan, Koramamgala, Bangaluru – 560034.
4. **Deputy Director, Regional Power Survey Office (West),** 5th Floor, Plot No. F-3, Opposite SEEPZ Complex, MIDC Area Marol, Andheri (East), Mumbai – 400093.

Regional Inspectorial Organisations

1. **Superintending Engineer, Regional Inspectorial Organisation (East),** ERPC Building, 14 Golf Club Road, Tollygunge, Kolkata – 700033.
2. **Superintending Engineer, Regional Inspectorial Organisation (North),** NRPC Building, 18-A, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi – 110016.
3. **Superintending Engineer, Regional Inspectorial Organisation (South),** Block-IV, Floor-III, Shastri Bhawan, Chennai – 600006.
4. **Superintending Engineer, Regional Inspectorial Organisation (West),** Ground Floor, WRPC Building, F-3, MIDC Area Marol, Andheri (East), Mumbai – 400093.
5. **Superintending Engineer, Regional Inspectorial Organisation (North-East),** NERPC Complex, 3rd Floor, Dong Parmaw, Lapalang, Shillong - 793006.

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From the Chairperson

Electricity is one of the most vital components of infrastructure for the inclusive economic. Growth and development of the nations. The sustained growth with continuous transformation according to new challenges has been characteristic of Indian power sector. Central Electricity Authority (CEA) has played key role in this process since many decades. The journey of power sector on growth trajectory has continued in the year 2022-23 with focus on reliable, economic and quality power to all. CEA, as one of the apex organizations in the country, has been carrying out statutory functions including planning, specifying technical regulations, facilitating timely completion of schemes and advising Central Government, State Governments, Electricity Regulatory Commissions as well as other stakeholders on technical matters to ensure sustainable power sector development.

It is our pleasure to bring out this Annual Report of CEA for the year 2022-23. The Report gives an insight into the organization structure. Functions and activities of CEA highlighting the contributions made in the development of power sector in the country during the year 2022-23.

The key development during the year 2022-23 are highlighted below:-

- 20th EPS covering the year wise electricity demand projection for each Discom /State/ UT/ Region and the all-India for the years 2021-22 to 2031-32 as well as the perspective electricity demand projection for the year 2036-37 and 2041-42 was published in November, 2022;
- A plan titled "Transmission System for Integration of over 500 GW RE Capacity by 2030" was launched by Hon'ble Union Minister for Power and NRE in December, 2022. The plan has provided visibility to the Renewable Energy Developers about the potential generation sites and scale of investment opportunity. Further, it will also provide the Transmission Service Providers the vision of growth opportunities available in the transmission sector;
- PUShP Portal for Utilizations of Surplus Power was launched on November, 2022. The main objective is Flexibilisation of PPA for Optimal Utilisation of Resources & Reduction in cost of Power for Consumers;
- Central Electricity Authority (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023 to schedule and operate thermal power plants in flexible manner in light of the increasing RE Generation were notified on January, 2023;
- Guidelines and Best Practices for Operation and Maintenance (O&M) of DTs were released in March, 2023 was prepared covering the best practices for operation and maintenance of Distribution Transformers. It will be useful for the distribution utilities for O&M of DTs;
- Disaster Resource Inventory for Power Sector (DRIPS) launched on National Power Portal in July, 2022;
- Standard Technical Specifications for Steel Monopole Structure for AC Transmission Lines were prepared in July, 2022;
- A Study paper on "Transnational Grid interconnections for Ensuring Energy Security" for the Energy Transition Working Group (ETWG) of G-20 was prepared;
- Guidelines for Procurement and Utilization of Battery Energy Storage Systems were issued in March, 2023;
- Central Electricity Authority (Technical standards for Construction of Electrical Plants and Electrical Lines) Regulations, 2022 were notified in December, 2022;

- CEA Clearance portal was integrated with National Single Window system (NSWS) for grant of Prior approval for installation of overhead transmission lines u/s section 68, grant of Authorization to TSPs under Section-164, grant of approval for energization of Electrical Installations and DPR Approval Process Monitoring System for Hydro Projects;
- Technical Specifications of 5 min configured Interface Energy Meters (IEMs) with Automatic Meter Reading (AMR) and Meter Data Processing (MDP) system issued in July 2022;
- Single window clearance cell" set up in CEA in March 2023 in order to expedite the concurrence process of DPRs of HEPs/ PSPs;
- Provision for mandatory training for the personnel engaged for operation and maintenance at Load Despatch Centres have been made under Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023;
- Guidelines for concurrence of DPR of conventional Hydro have been revised wherein time limit for concurrence has been reduced to 125 days from 140 days;
- Separate guidelines have been prepared for concurrence of DPR for PSPs wherein time limit for concurrence awarded u/s 63 of the Act has been reduced to 50 days and time limit for concurrence of conventional PSPs has been reduced to 90 days;
- Model PPA for procurement of power on FOO basis for medium term notified on in December, 2022;
- Guidelines for competitive bidding for RE-RTC. Solar & Wind modified for allowing participation of existing & under construction plants;

Apart from the above various reports like Optimal Generation Mix, intra-state transmission system requirement in NER by 2030, Requirement of Variable Speed machine vis-à-vis Fixed Speed machine in PSPs, Hydro-electric Potential Reassessment reports for Indus, Ganga, CIR, WFR, EFR and Brahmaputra basin, facilitating power supply to Data Centres, issues related to DSM matters for RE generators, modalities for setting up CSIRT-Power have been prepared/ published during the year. I believe that these developments will promote Ease of Doing Business and ensure orderly growth of the Indian Power Sector.

Ghanshyam Prasad
Chairperson, CEA

CHAPTER – 1

CEA AS AN ORGANIZATION

1.1 Organization of CEA

1.1.1 The Central Electricity Authority (CEA) is a statutory organization originally constituted under Section 3(1) of the repealed Electricity (Supply) Act, 1948 since substituted by Section 70 of the Electricity Act, 2003. CEA was founded in October, 1974 after carved out of erstwhile Central Water and Power Commission.

1.1.2 As per Section 70(3) of the Electricity Act, 2003, the Authority shall consist of not more than fourteen members (including its Chairperson) of whom not more than eight shall be full-time Members to be appointed by the Central Government.

1.1.3 CEA is headed by a Chairperson who as the Chief Executive of the Authority largely oversees the development of Power Sector in the country. A Secretary, appointed by the Authority with the approval of the Central Government under Section 72 of the Electricity Act 2003, assists the Chairperson in discharging of CEA's statutory functions. The Secretary also assists the Chairperson in all matters pertaining to administration and technical matters including concurrence of hydro power projects etc. There are six (6) Wings in CEA namely Planning, Hydro, Thermal, Grid Operation & Distribution, Economic & Commercial and Power System each headed by a Member of the Authority. Under each Member, there are technical Divisions, headed by an officer of the rank of Chief Engineer. At present, there are forty Divisions in CEA headquarter at New Delhi.

1.1.4 Sub-ordinate offices of CEA

There are 14 subordinate offices of CEA viz. five (5) Regional Inspectorial Organizations, four (4) Regional Power Survey Offices and five (5) Regional Power Committees located in various parts of the country.

A) Regional Inspectorial Organization (RIO)

Under Chief Engineer (CEI) in Power System Wing, five (5) Regional Inspectorial Organization (RIO) offices, each headed by an officer of the rank of Superintending Engineer, function at New Delhi, Mumbai, Chennai, Kolkata and Shillong to inspect the HV/MV installations of the Central Government.

B) Regional Power Survey Offices (RPSOs)

Four (4) Regional Power Survey Offices (RPSOs), each headed by an officer of the rank of Deputy Director, function at New Delhi, Mumbai, Bengaluru and Kolkata under Chief Engineer (PS&LF) in the Planning Wing to carry out surveys to forecast the demand of power in their respective regions and are entrusted with the work of gathering information for Captive Power Plants.

C) Regional Power Committees (RPCs)

Five (5) Regional Power Committees (RPCs), each headed by a Member Secretary, an officer of the rank of the Chief Engineer, are functioning at New Delhi, Mumbai, Bangalore, Kolkata and Shillong to facilitate the integrated operation of the Regional Electricity Grids.

1.2 Functions of CEA

The functions and duties of the Authority are delineated under Section 73 of the Electricity Act, 2003. Besides, CEA has to discharge various other functions as well under Sections 3, 8, 34, 53, 55 and 177 of the Act.

Section 73 - Functions and Duties of the Authority

(a) advise the Central Government on the matters

relating to the national electricity policy, formulate short- term and perspective plans for development of the electricity system and coordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity to all consumers;

(b) specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid;

(c) specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines;

(d) specify the Grid Standards for operation and maintenance of transmission lines;

(e) specify the conditions for installation of meters for transmission and supply of electricity;

(f) promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;

(g) promote measures for advancing the skills of persons engaged in electricity industry;

(h) advise the Central Government on any matter on which its advice is sought or make recommendation to that Government on any matter if, in the opinion of the Authority, the recommendation would help in improving the generation, transmission, trading, distribution and utilization of electricity;

(i) collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters;

(j) make public from time to time the information secured under this Act, and provide for the publication of reports and investigations;

(k) promote research in matters affecting the generation, transmission, distribution and trading of electricity;

(l) carry out, or cause to be carried out, any investigation for the purpose of generating or transmitting or distributing electricity;

(m) advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system;

(n) advise the Appropriate Government and the Appropriate Commission on all technical matters relating to generation, transmission and distribution of electricity; and

(o) Discharge such other functions as may be provided under this Act.

In addition to above functions and duties, CEA has to perform the following functions in terms of the under mentioned Sections of the Electricity Act, 2003: -

Section 3 - National Electricity Policy and Plan

(1) The Central Government shall, from time to time, prepare the National Electricity Policy and Tariff Policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy.

(2) The Central Government shall publish the National Electricity Policy and Tariff Policy from time to time.

(3) The Central Government may, from time to time, in consultation with the State Governments and the Authority, review or revise the National Electricity Policy and Tariff Policy referred to in sub-section (1).

(4) The Authority 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 directions, if any, given by the Govt. while granting approval under clause (a).

(5) The Authority may review or revise the National Electricity Plan in accordance with the National Electricity Policy.

Section 8 - Hydro-Electric Generation

(1) Notwithstanding anything contained in Section 7, any generating company intending to set up a hydro-generating station shall prepare and submit to the Authority for its concurrence, a scheme estimated to involve a capital expenditure exceeding such sum, as may be fixed by the Central Government, from time- to time, by notification**.**

(2) The Authority shall, before concurring in any scheme submitted to it under sub-section (1) have particular regard to, whether or not in its opinion:-

(a) the proposed river-works will prejudice the prospects for the best ultimate development of the river or its tributaries for power generation, consistent with the requirements of drinking water, irrigation, navigation, flood- control, or other public purposes, and for this purpose the Authority shall satisfy itself, after consultation with the State Government, the Central Government, or such other agencies as it may deem appropriate, that an adequate study has been made of the optimum location of dams and other river- works;

(b) The proposed scheme meets, the norms regarding dam design and safety.

(3) Where a multi-purpose scheme for the development of any river in any region is in operation, the State Government and the generating company shall co-ordinate their activities with the activities of the person responsible for such scheme insofar as they are inter-related.

Section 34 – Grid Standards

Every transmission licensee shall comply with such technical standards, of operation and maintenance of transmission lines, in accordance with the Grid Standards, as may be specified by the Authority.

Section 53 Provision relating to Safety and Electricity Supply

The Authority may, in consultation with the State Governments, specify suitable measures for-

(a) protecting the public (including the person engaged in the generation, transmission or distribution or trading) from dangers arising from the generation, transmission or distribution or trading of electricity, or use of electricity supplied or installation, maintenance or use of any electric line or electrical plant;

(b) eliminating or reducing the risks of personal injury to any person, or damage to property of any person or interference with use of such property;

(c) prohibiting the supply or transmission of electricity except by means of a system which conforms to the specification as may be specified;

(d) giving notice in the specified form to the Appropriate Commission and the Electrical Inspector, of accidents and failures of supplies or transmission of electricity;

(e) keeping by a generating company or licensee the maps, plans and sections relating to supply or transmission of electricity;

(f) inspection of maps, plans and sections by any person authorized by it or by Electrical Inspector or by any person on payment of specified fee;

(g) Specifying action to be taken in relation to any electric line or electrical plant, or any electrical appliance under the control of a consumer for the purpose of eliminating or reducing the risk of personal injury or damage to property or interference with its use.

Section 55 Use, etc. of Meters

For proper accounting and audit in the generation, transmission and distribution or trading of electricity, the Authority may direct the installation of meters, by a generating company or licensee at such stages of generation, transmission or distribution or trading of electricity and at such locations of generation, transmission or distribution or trading, as it may deem necessary.

Section 177 Powers of Authority to make Regulations

(1) The Authority may, by notification, make regulations consistent with this Act and the rules generally to carry out the provisions of this Act.

(2) In particular and without prejudice to the generality of the power conferred in sub-section (1), such regulations may provide for all or any of the following matters, mainly: -

(a) the Grid Standards under section 34;

(b) suitable measures relating to safety and electricity supply under section 53;

(c) the installation and operation of meters under section 55;

(d) the rules of procedure for transaction of business under sub- section (9) of section 70;

(e) the technical standards for construction of electrical plants and electric lines and connectivity to the grid under clause (b) of section 73;

(f) the form and manner in which and the time at which the State Government and licensees shall furnish statistics, returns or other information under section 74;

(g) any other matter which is to be, or may be, specified;

(3) All regulations made by the Authority under this Act shall be subject to the conditions of previous publication.

1.3 Broad Functional Areas of work of Chairperson and the Members of the Authority

Chairperson

Chairperson is the Chief Executive of the Authority.

Member (Planning)

Formulation of National Electricity Plan; integrated resource planning; coordinating the activities of planning agencies for optimization of resource utilization; formulation of short, medium and long term power plans; long and short term demand forecast and sensitivity studies; material and manpower planning; surveys for power demand growth; identification and testing of co-lateral parameters for economic model for demand forecasting; collection, compilation and publication of statistics of Power Sector; securitization of resources/fuel availability and fuel efficiency with the support of emerging technologies; modernization of project management; concepts of skill development; pro- active technology forecasting approaches; research and development in Power Sector, co-ordination with multiple agencies involved in research and development activities, coordination of fuel oil/liquid fuel supplies; coal quantity and quality control; development of renewable energy resources for electricity generation etc.

Member (Thermal)

Overall thermal power development in the country; updating, development and evaluation of thermal technologies; design and engineering of thermal projects; quality assurance standards and plans; preparation of model documents and standards; thermal projects investigation and ash utilization; coal, oil and gas linkages to power projects; energy conservation; energy auditing; environmental

aspects of thermal projects; monitoring of construction and stabilization of thermal projects and suggesting remedial measures to problems involved; renovation, modernization and life extension programs of thermal generating stations; making operating norms for thermal generating stations, development of Ultra Mega Power Projects (UMPPs) etc.

Member (Hydro)

Overall hydro power development in the country; technical appraisal of hydro-electric projects; integrated planning for utilization of water resources; assessment of hydro potential; assistance to States on investigation and project report preparation; construction & investigation, monitoring of hydro projects and suggesting remedial measures to problems involved; updating, development and evaluation of hydro technologies; environmental aspects of hydro projects; quality assurance plans and standardization, design and engineering of hydro projects; renovation, modernization and up rating of hydro stations; co-operation with neighboring countries of Nepal, Bhutan and Myanmar for development of water resources for mutual benefits; etc.

Member (Power System)

Planning and development of transmission system consistent with national power plans; studies for the purpose of appraisal of transmission projects; transmission technology development; design and engineering; standardization and preparation of model document; renovation and modernization of transmission schemes; construction monitoring of transmission projects; coordination of telecommunication system and power lines; matters related to communication, data acquisition and software support in power sector; inspection of existing electrical installations in Union Territories and Central Government Departments; investigation of accidents on electrical installations and suggesting remedial measures for their minimization and prevention etc.

Member (Grid Operation & Distribution)

Formulation of policies for safe, secure and economic operation of regional grids; integrated operation, co-ordination of five regional grids through Regional Power Committees(RPCs); monitoring of delivery of shares from Central Sector projects; intra and inter-regional exchange of power; regional energy accounting; load generation balance; investigation of grid disturbances; matters related to distribution planning, policy and regulations; monitoring of rural electrification programme and distribution schemes of the Central Government; all matters relating to power development in union territories; operation monitoring and performance review of thermal power stations; updating of maintenance procedures; generation data collection; performance analysis; maintenance monitoring etc.

Member (Economic & Commercial)

Economic evaluation of power policies and projects; appraisal of tariff for Nuclear Power Stations; analysis of financial packages; financial parameters; interest during construction and completed cost; performance of power sector utilities, Examination of Power Purchase Agreement, advice and legal matters, amendments in Electricity Act, 2003 National Electricity Policy, Tariff Policy and Electricity Rules, etc.

Secretary

The Secretary (CEA) appointed by the Authority with the approval of the Government of India, assists the Authority in discharge of CEA's statutory functions. The Secretary also assists the Chairperson (CEA) in all matters pertaining to administration and technical matters including techno-economic appraisal and concurrence of hydro power projects, planning of budget and expenditure control etc.

1.4 Personnel and Administration

1.4.1 Staff strength of CEA

The staff strength of CEA as on 31.03.2023 was 716 as against the sanctioned strength of 1219 leaving 503 posts vacant. The summarized position of staff strength is shown in the table below:

Category	Sanctioned Strength			Filled Strength		
	Head-Quarters	Sub-Office	Total	Head-Quarters	Sub-Office	Total Strength
Chairperson/Members	07	-	07	07		07
CPES GROUP-A	348	84	432	258	67	325
CPES GROUP-B	90	19	109	52	07	59
Non CPES Group						
Group-A	96	01	97	56	00	56
Group-B	217	13	230	73	05	78
Group-C	90	52	142	42	35	77
Group-C(MTS)	145	57	202	80	34	114
Total	993	226	1219	568	148	716

1.4.2 No. of Women Employees in CEA

Category	No. of Govt. Employees		No. of Women employees In position	% age
	Sanctioned	Filled		
Chairperson/ Members	07	07	00	00
CPES GROUP-A	432	325	40	12.30%
CPES GROUP-B	109	59	07	11.86%
Non CPES Group				
Group-A	97	56	26	46.42%
Group-B	230	78	30	38.45%
Group-C	142	77	16	11.26%
Group-C(MTS)	202	114	18	15.78%
Total	1219	716	137	19.13%

1.4.3 Representation of Scheduled Castes, Scheduled Tribes, OBC & Physically Handicapped Employees

Category	No. of Govt. Employees		No. of SC Govt. employees in position	No. of ST Govt. employees in position	No. of OBC Govt. employees in position	No. of Phy. H. Govt. employees in position
	Sanctioned	Filled				
Chairperson/Member	07	07	03	00	01	00
CPES GROUP-A	432	325	52	23	59	05
CPES GROUP-B	109	59	07	01	10	03
Non CPES Group						
Group-A	97	56	18	05	01	
Group-B	230	78	15	02	11	
Group-C	142	77	15	05	20	
Group-C(MTS)	202	114	26	04	27	
Total	**1219**	**716**	136	40	128	

1.4.4 Representation of Physically Handicapped employees

Group	Total employees as on 31.03.2023	Physically Challenged Employees				Percentage of Physically Challenged
		VD	HD	OD	Total	
Group A (CPES+NON-CPES)	388	-	1	2	3	0.76
Group B	137	-	2	3	5	3.64
Group C	77	2	-	1	3	3.89
Group C (MTS)	114	1	1	2	4	2.77
Total	**716**	**3**	**4**	**8**	**15**	**2.09**

1.4.5 Hiring of Consultants

CEA has acute shortage of technical manpower as well as non-technical staff and to cope up with this situation 10 Consultants were engaged for the period of April-2022 to June-2022, 11 Consultants were engaged for the period of July-2022 to August-2022, 12 Consultants were engaged for the period of September-2022 to December-2022 & 11 Consultants were engaged for the period of January-2023 to March-2023 in the Financial year 2022-2023.

1.5 Annual Budget

1.5.1 Budget of CEA during the year 2022-23.

Rs. In Crores

BUDGET OF CENTRAL ELECTRICITY AUTHORITY (CEA)			
Budget Estimate of CEA for the Year 2022-23		**Revised Estimate of CEA for the Year 2022-23**	
Salary	103.60	Salary	107.48
Non-Salary	17.40	Non-Salary	17.39
Total	**121**	**Total**	**124.87**
Allocation of Budget Estimate 2022-23		**Allocation of Revised Estimate 2022-23**	
Admin. Of Electricity Act	99.12	Admin. Of Electricity Act	105.62
Hydel Generation	3.44	Hydel Generation	2.62
Transmission & Distribution	18.44	Transmission & Distribution	16.63
Total	**121**	**Total**	**124.87**
Expenditure Status as on 31.03.2023			
Salary Head	107.09		
Non Salary	17.10		
Expenditure as % of RE	99.45%		

1.5.2 Consultancy services by CEA

CEA renders Consultancy Services for design and Engineering of thermal and hydro projects to various SEBs and power utilities. Bill raised by towards consultancy services render to various Departments/Organizations during the year 2022-23 is Rs.1.85 Crores and payment received is Rs. 0.41 Crores.

1.6 Progressive use of Hindi in Official work of CEA

Central Electricity Authority was notified in the Official Gazette in pursuance of sub-rule 4 of Rule 10 of the Official Language Rules 1976 and under sub-rule 4 of rule 8, officers possessing proficiency in Hindi were specified to do all their official work in Hindi.

1.6.1 Quarterly Meetings of Official Language Implementation Committee:

During the year following four meetings of Official Language Implementation Committee were held:

- 1st meeting - 24nd Jun, 2022
- 2nd meeting - 23 Aug, 2022
- 3rd meeting – 15th Dec, 2022
- 4th meeting - 21st Mar, 2023

During these meetings, action are taken for implementation of official language policy.

i. All works such as noting, drafting, office orders, letters, etc. in all the divisions/sections throughout the year were done as per Section 3(3) of the Official Language Act.

ii. Full efforts were also made to meet the goal of Hindi correspondence in all divisions/sections.

iii. All the letters received in Hindi were answered in Hindi itself. Thus, Rule 5 of the Official Language Rules, 1976 was complied with.

1.6.2 Letters sent in Hindi during the financial year 2022-23:

Quarterly percentage of Letters sent in Hindi during the year 2022-23 is as follows:-

Quarter	Letters sent in Hindi Region (‘A ’+ ‘B(’	% of Hindi letters
1st	8,743	94.68%
2nd	10,641	94.17%
3rd	8,864	95.62%
4th	10,653	96%

- In the 'C' Region, the target of the letter sent in Hindi was 100 percent.

1.6.3 During the year, following Reports/ Documents were issued in bilingual form:

1. Translation of the reply to the questionnaire into Hindi with amended & additional questions - -Standing Committee -2021- Contribution of CEA in the steady development of the Electricity Sector.
2. Annual Report 2021-22 of CEA.
3. Approved reply of Standing Committee on Energy (2022-23) for Demands for Grants (2023-24).
4. Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations 2022.
5. PPT on "Development of Floating Solar Power in India".
6. Standing Committee of Energy Meter.
7. Central Electricity Authority (Flexible Operation of Coal-based Thermal Power Generating Units) Regulations 2022.
8. Central Electricity Authority (Safety Requirements for Construction, Operation, and Maintenance of Electrical Plants and Electric Lines) Amendment Regulations, 2022.

1.6.4 Hindi Fortnight Celebrations, 2022:

As per the instructions given by the Department of Official Language, Ministry of Home Affairs, Government of India a Hindi fortnight was organized at Central Electricity Authority Headquarters from 14th September 2022 to 29th September 2022. The Hindi fortnight in all the offices of the Central Government was to be inaugurated with the celebration of Hindi Day, 2022 as also the second All India Official Language Conference organized in Surat (Gujarat) on 14th and 15th September 2022 under the chairmanship of the Honorable Union Home and Cooperative Minister Shri Amit Shah following the instructions received from the Department of Official Language. Accordingly, three officers overseeing the implementation of the official language of CEA participated in the above celebrations. Besides, as per the directions of the Chairman, CEA, the first prize winners of Hindi competitions last year were nominated to participate in the ceremony to encourage them.

Following the ceremony held at Surat, a Hindi workshop was first organized on September 19, 2022, on the topic "Inspiration and encouragement to work in Hindi" under the series of various events in the auditorium of CEA head-quarters. More than 65 officers/employees participated in the workshop. Five (5) competitions namely Hindi Essay Writing, Hindi Noting & Drafting, Hindi Article Writing (Only for MTS), Official Language Rules/Acts and Hindi Language/Literature General Knowledge Competition, and Hindi Debate Competition for Officers were organized during Hindi fortnight. A total of 114 officers and employees participated enthusiastically in these competitions.

On September 29, 2022, a closing ceremony of Hindi Fortnight along with the declaration of the prize for the winners was organized under the president ship of Chairman, CEA. In this function, 15 winners were given cash prizes and certificates. Also, eight personnel, who did noting and drafting originally in Hindi, were awarded under the incentive scheme for the year 2021-22. Apart from this, the HPA Division and Administration-II section of CEA performing best in the promotion of Hindi in official work was awarded the "Rajbhasha Trophy".

1.6.5 Arranging of Hindi Workshop:-

The office regularly conducts Hindi workshops for keeping in view the implementation of the Official Language Policy. A series of Hindi workshops were organized regularly during the year to overcome the hurdles in the progressive use of Hindi in the office as also the difficulties faced by the officers and employees of CEA in doing their work in Hindi. In this sequence, four workshops were organized in all four quarters during the year 2022-23. As many as 77, 65, 74, and 146 officers and employees actively participated in these four workshops respectively.

1.6.6 Publication of "Vidyut Vahini":-

During the last year, the first and second issues of CEA's official Hindi quarterly magazine "Vidyut Vahini" were published and distributed and for the third issue, the digital publication was done.

1.7 Welfare Activities in CEA

1.7.1 Welfare of SC /ST /OBC

Shri S K Dotan, Director (NPC Division) has been designated as Liaison Officers in CEA to look after the welfare of SC/ST/OBC and PwD employees.

1.7.2 Activities related to Women employees

Women employees of CEA have been participating in various activities viz. sports, recreation & cultural activities.

An Internal Complaints Committee (ICC) has been constituted in CEA for handling the cases of Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal). The 7 member of ICC is headed by Smt. Vandana Singhal, Chief Engineer, CEA as Chairman and includes Ms. Vibha Maurya, All India Democratic Women's Association as the independent member.

1.7.3 Recreation and Sports:

The employees of CEA are actively participating in the Sports & Cultural Tournaments/Competitions at All India Civil Services (A National Status), Inter-Ministry and Inter-CPSU levels every year regularly. For the year 2022-23, the following Sports Team/Individuals of CEA have participated in the AICS/Inter-Ministry/Inter-CPSU Tournaments and brought the laurels to CEA by winning the medals. The achievements of these Sports/Cultural Teams/Individuals are as under:

1. **ATHLETICS:**

Ms. Nidhi Chauhan, Assistant Director-I, TE&TD Division, CEA has won the following Medals in the Inter-CPSU Athletics Tournament 2022-23 organised by NHPC at Faridabad (Haryana) under the aegis of Power Sports Control Board, Ministry of Power from 08.12.22 to 09.12.22:

1. High Jump : **Silver Medal**
2. 800 Mtr. Race : **Bronze Medal**

2. **CARROM:**

Shri Sumeet Kumar, Deputy Director, RPSO, Mumbai, CEA and Shri Saurabh Parth Sarthi, Assistant Director-II, TPRM Division, CEA have won the **Silver Medal** in Men Doubles Event in the Inter-CPSU Carrom Tournament 2022-23 organised by SJVN under the aegis of Power Sports Control Board, Ministry of Power held at Shimla (Himachal) from 13.06.22 to 17.06.22.

2. CHESS:

Shri Lalrinsanga, Director, RA Division, CEA has been selected as Coach of Central Secretariat Men & Women Chess Team, who were participated in the All India Civil Services Chess Tournament 2022-23 **(A National Importance**) held at Viswanathan Anand, International Chess Hall, KIIT University, Bhubaneswar from 11.03.2023 to 19.03.2023

S.No.	Name & Designation Smt./Km.	Section/Division
WOMEN TEAM		
1.	Aarti Singh, Assistant Dir.I--- **(Captain)**	EPD Division
2.	K. Neetu, PS	TCD Division
3.	Deepa Sharma, Stenographer	RT&I Division
4.	Kamlesh Pal, Sr. PPS	O/o Member(HE)
5.	Archana, PPS **(Coach)**	PSPA-II Div.
6.	Sujata, PS **(Playing Manager)**	O/o Member(Planning)

Shri Gurujit Medhi, Director, ES&SD Division, CEA has won the **Silver Medal** in the Men Single Event in the Inter CPSU Chess Tournament 2022-23 held at Shillong (Meghalaya) from 19.09.22 to 21.09.22.

Women Chess Team of CEA has won the **Bronze Medal** in the Women Team.

Championship in the Inter-CPSU Chess Tournament 2022-23 organised by Grid-India under the aegis of Power Sports Control Board, Ministry of Power held at Shillong (Meghalaya) from 19.09.22 to 21.09.22. The following are the Women Team Members:

4. **VOLLEYBALL:**

Shri Anish, LDC, RPSO(N), presently posted at , CEA has been selected to represent the Central Secretariat Volleyball Team in the All India Civil Service Volleyball Tournament 2022-2023 **(A National Importance)** held at Thiruvananthapuram from 22.03.2023 to 26.03.2023 and won the **Bronze Medal**.

1.8 Vigilance Activities/Disciplinary Cases in CEA

1. The Vigilance Division, CEA is headed by Chief Vigilance Officer (CVO) and is the nodal point in Vigilance set up of the Authority and its Subordinate Offices. The Division deals with various facets of vigilance mechanism and functions for carrying out investigations into complaints, suggesting corrective measures for improving the control system, compliance of laid down procedures and

also for carrying out preventive vigilance exercise.

2. As part of preventive vigilance, the Vigilance Division conducts Periodic inspections of Subordinate offices under CEA from time to time. Scrutiny of Immovable Property Returns (IPRs) filed by Officers of CEA are being carried out by this Division at regular intervals. Workshop / training were conducted for CEA employees. Vigilance Awareness Week – 2022 was observed in Central Electricity Authority and its subordinate Offices from 31st October 2022 to 06th November, 2022.The Vigilance Awareness Week was observed to highlight the theme "corruption free India for a developed nation": भ्रष्टाचार मुक्त भारत विकसित भारत |

3. Complaints other than anonymous/ pseudonymous were taken up for investigation promptly and after completion of investigations, reports submitted to the prescribed competent authority. As on 31.03.2023 no disciplinary case is pending in the Vigilance Division. Prescribed periodical returns were sent to Ministry of Power and Central Vigilance Commission on time.

1.9 Electric Power Information Society

The Electric Power Information Society (EPIS) was established in June, 1996 under the aegis of Central Electricity Authority on no-loss-no profit basis for bringing out various CEA publications. These are also available for sale for general public.

1.10 Grievance Cell

Chief Engineer (RT&I) has been entrusted with the task of Grievance Officer of Ministry of Power. In this regard, the Progress Report of the grievances handled for the period 01/04/2022 to 31/03/2023 is as below:

Total grievances received during the period: **60**
Total grievances disposed during the period: **52**

1.11 Right to Information Act, 2005

Under the Right to Information Act, 2005, the Chief Engineer (Coordination) acts as the Nodal Officer for RTI for CEA. 938 applications were received during the year 2022-23 (i.e. up to 31.03.2023), under the Act and were disposed of by various CPIOs in CEA. Out of 938 applications, 83 applications were received in hard copy format while the remaining were received through RTI MIS portal. Further, 29 applicants filed appeal to the First Appellate Authority (FAA), 29 of which were received in hard copy format while remaining were received through RTI MIS portal. All 29 appeals have been disposed off.

Section 4 of the RTI Act provides a comprehensive framework for promoting openness in the functioning of the public authorities. RTI suo moto disclosure in the format specified by the Central Information Commission (CIC) and approved by the Chairperson, CEA was uploaded on the website of CEA. The detailed information as per the specified format was also forwarded to CIC for transparency audit.

Third Party Audit on "Proactive Disclosures" of CEA, as mandated by Central Information Commission for facilitation of suo moto disclosure of information under section 4 of RTI Act 2005, was conducted in the month of Oct, 2022 in CEA Head Quarter by National Power Training Institute (NPTI).

1.12 Parliament Questions/Assurances, VIP references

(A) Works relating to various assignments given below were carried out:

1. Parliament Questions
2. Parliamentary Assurances
3. Oral evidence
4. PMO/VIP/MOP references
5. Consultative Committees
6. Standing Committee on Energy
7. Material for Calling Attention Motion
8. Material for Economic Survey 2022-23
9. Major Achievements in Power Sector
10. Annual Report of the MOP for 2022-23
11. Material for interview of Power Minister and

Secretary (power) to various press media

12. Monitorable targets for the year 2022-23 and Achievements

13. Power Ministers' Conference

14. Material for various speeches.

15. International Cooperation with various countries

16. Inputs for regional meeting relating to power matters of the regions

17. Action taken reports were prepared based on the inputs received from various divisions.

18. Niti Aayog Dashboard

19. Examination of DPRs

20. Material for President's Address to both the Houses of Parliament and Finance Minister's Budget Speech.

21. Compilation and processing of material for matters such as:

i) Power sector reform,

ii) Private Sector participation including action taken reports, and

iii) Ministers meeting on power scenario etc.

1.13 During the year 2022-23 (till 06.04.2023) there were three Parliament Sessions and the Admitted version of Questions were dealt with as follow

Sr. No.	Session	Starred	Un-starred
1.	Monsoon Session 2022	08	90
2.	Winter Session 2022	01	57
3.	Budget Session 2023	07	68

1.14 Reports Prepared in Coordination

The CEA receives data regularly on various aspects of Indian Power Sector, such as generation, transmission and distribution of power. The information received is incorporated in the following regular reports:

- Summary report for Council of Ministers on important developments in Power Sector during the month.
- Monthly Executive Summary
- Annual Report of CEA

CHAPTER – 2

PLANNING FOR POWER DEVELOPMENT

2. Power Planning

2.1.1 National Electricity Plan

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

Accordingly, CEA prepares National Electricity Plan (NEP) Vol-I Generation and Vol-II Transmission. NEP Vol-I Generation 2022-32 was prepared and gazette notified after approval of Ministry of Power. NEP cover the review for the period 2017-22, detailed plan for the period 2022-27 and perspective plan for the period 2027-32. NEP Vol-II Transmission is in draft stage.

2.1.2 Generation Planning Studies

Following studies were carried out using the state of the art, sophisticated energy system planning Software "ORDENA" modeling tool:

i) Studies for Preparation of 'National Electricity Plan 2022-32' Vol-I Generation.

ii) Revised studies for preparation of report on the Optimal Generation Capacity Mix for the year 2029-30 for preparation of OGCM report.

iii) Resource Adequacy studies for 8 States, Assam, Chhattisgarh, Kerala Uttarakhand, Madhya Pradesh, Odisha, Tamil Nadu, and Punjab.

iv) Studies for preparation of Power portfolio Management Plan for BSES (BRPL &BYPL).

2.1.3 Generation Capacity addition during the Year 2021-22 and 2022-23

i) For the Year 2021-22, against a schedule capacity addition of 11,478 MW, 4,878 MW Capacity addition was achieved comprising of 393 MW Hydro, 4,485 MW Thermal, and 0 MW Nuclear.

ii) For the Year 2022-23, against a schedule capacity addition of 5,410 MW, 1,580 MW Capacity addition was achieved comprising of 120 MW Hydro, 1460 MW Thermal, and 0 MW Nuclear.

2.1.4 Interaction, collaboration in the field of Generation Planning.

i) CEA is jointly working with DEA in the field of energy planning, modelling and forecasting scenarios.

ii) Director (IRP) was member of the committee to give report on power demand/supply position and power procurement planning of Uttarakhand.

2.1.5 Resource Adequacy

i) Draft Guidelines for Resource Adequacy Planning framework for India was published on 28th September, 2022 for stakeholder comments. Based on the comments received the draft guidelines was finalised and sent to MoP.

ii) A National workshop on "**Resource Adequacy- Need and way forward**" was organized by Central Electricity Authority on 22nd September, 2022 in New Delhi.

iii) Four Regional workshops were held on Resource Adequacy to present the need of Resource Adequacy in Indian context and to discuss the key features of the draft RA guidelines for the State Regulatory Commissions, State Load Dispatch Centres (SLDCs) & Distribution Companies of respective region.

iv) Committees were formed for purchase of Resource Adequacy modelling tool and development of Indigenous Resource Adequacy modelling tool with Chief Engineer (IRP) as Member Secretary.

2.2 National Level Data Registry System

Section 74 of Electricity Act, 2003 and Regulation 4 & 5 of CEA (Furnishing of statistics, returns and information) Regulations, 2007, mandates every licensee, generating company, or person(s) generating electricity for its or his own use to furnish the statistics, returns or other information relating to generation, transmission, distribution, trading to CEA.

In accordance with the above provisions, a framework of National Level Data Registry System (NLDRS) has been devised to collate the statistics of the power generation projects. The framework provides for mandatory registration of each power generating unit of the country having installed capacity of 0.5 MW or above with CEA.

In order to facilitate the registration process, a web portal (https://egen.cea.gov.in) has been developed that is now operational in public domain. The registration with the portal is now one of the mandatory conditions for availing grid connectivity w.e.f. 20.11.2020 as per CEA Regulations "Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019" issued vide Notification No. 12/X/STD (CONN)/GM/CEA/2018 dated 06.02.2019 and CEA Order No. No. CEA-PL-15-13(11)/1/2020-PSLF dated 05.11.2020.

2.3 Electricity Demand Forecasts

The electricity demand of the country is reassessed periodically, once in five years, for the medium term and long term period. The demand projection exercise is carried out by obtaining inputs from Regional Power Survey Offices located in various regions, along with data obtained from various organizations/ utilities. The electricity demand forecast is the basic input for the formulation of Developmental Plans and Programmes & Schemes concerning generation, transmission, trading, distribution and utilization of electricity.

So far, 19 such exercises viz. Electric Power Survey (EPS) have already been conducted. The 19th EPS report has been brought out in four volumes.

The Volume-I of the 19th EPS report covering Discom-wise, state/UT-wise, region-wise, and all- India electricity demand projection was published in January 2017.

The electricity demand projection of the National Capital Region (Volume-II of EPS) was published in December 2019.

The Volume-III of 19th EPS report covering electricity demand forecasts of Mega Cities was brought out into two parts. The part I & part II of the report were prepared in September 2018 & August 2020 respectively.

The report titled "Report on Nineteenth Electric Power Survey of India (Econometric Method)", i.e. Volume-IV of EPS Report was published in August 2019. The Report contains electricity demand projection by two econometric models (i) Partial Adjustment Model (PAM) and (ii) Seemingly Unrelated Regression Estimation (SURE) model. The independent variables used for carrying out the electricity demand projections comprise of Gross Domestic Product (GDP), electricity pricing, temperature, rainfalls and past electricity consumptions.

Now, the 20th edition of EPS is in progress. The Volume –I report of 20th EPS covering the year-wise electricity demand projection for each Discom/State/ UT/ Region and the all-India for the years 2021-22 to 2031-32 as well as the perspective electricity demand projection for the year 2036-37 and 2041-42 was published in November, 2022.

2.4 Crisis and Disaster Management Plan

CEA prepares "Disaster Management Plan" for the whole Power Sector on behalf of Ministry of Power to fulfil its obligations under the

provisions of section 37 of the Disaster Management Act, 2005 and revises it on regular basis to keep it abreast with the new challenges and issues coming up with changing time. The document has recently been revised in accordance with the National Disaster Management Plan 2019 prepared by National Disaster Management Authority (NDMA). The plan is consistent with the three landmark global agreements reached in 2015 – (i) the Sendai Framework for Disaster Risk Reduction, (ii) Sustainable Development Goals of United Nations and (iii) Climate Change Agreement (COP21) that together represent a nearly complete agenda for Disaster Risk Reduction. The plan also aims at achieving the contemporary national priorities set within Prime Minister's Ten Point Agenda for Disaster Risk Reduction.

Also, as per the Crisis Management Plan (CMP) of the Government of India prepared by the Cabinet Secretariat, each Central Nodal Ministry is required to prepare a detailed Crisis Management Plan for dealing with crisis situations falling in the areas of their responsibility. The plan indicates Ministry of Power as the nodal ministry for crisis situations arising out of disruption in generation, transmission, distribution and supply of electricity. Accordingly, CEA has also prepared "Crisis Management Plan for the Power Sector" on behalf of Ministry of Power. Apart from that, sector-specific generic documents on crisis and disaster management for thermal, hydro, renewable, transmission and distribution sector are also prepared and updated periodically by CEA. Crisis Management Plans for Cyber Security for each such sector have also been prepared separately.

These crisis and disaster management plans provide broad guidelines to the power utilities to prepare their own documents for crisis and disaster management encompassing the emergency situations to which their establishments are vulnerable.

2.5 Publications on All India Electricity Statistics – General Review & Growth Electricity Sector in India

In fulfillment of its duties and functions under section 73 (i) & (j) and exercising powers vested under Section 74 of the Electricity Act, 2003, CEA publishes following documents containing annual electricity statistics.

2.5.1 All India Electricity Statistics – General Review

In General Review-2022, Nationwide electricity statistics relating to Generation, Transmission, Distribution, Consumption and Trading are included along with important information relating to growth of the Indian Electricity Sector, organizational structure of Electricity Supply Industry in India and reforms carried out by Utilities are incorporated.

The General Review incorporates important statistics/ data on installed capacity, electric energy generation and utilization of electric energy along with the transmission and distribution losses, per capita consumption.

This publication will also contain energy utilization by various categories of electricity consumers like domestic, commercial, irrigation, industries (LV /MV, HV /EHV), public lighting, public water works, etc. The various Chapters/Tables of the publication indicate the above Information State wise/ Sector wise/ Category wise/ Mode wise etc.

In addition to the above, the GR-2022 also contains information about the Installed Capacity and generation of captive power plants of about 8556 Nos. General Review-2022 containing the data for the year 2020-21 was published in May 2022. General Review 2023 containing data for the year 2021-22 is under process of approval.

2.5.2 Growth of Electricity Sector in India

Publication titled "Growth of Electricity Sector in India from 1947-2022" was published in June, 2022 containing data for the year 2020-21 and provisional /estimated data for the year 2021-22 in respect of Indian Electricity Sector. The data for these publications has been sourced from various Utilities and Non-utilities and various National & International sources. This publication illustrates the growth of vital development indicators like installed generating capacity, electrical energy production, transmission and distribution network, captive power plants in industries and pattern of consumption of electricity etc. The important statistics have been compared with the International data with respect to some of the developed and developing nations. The publication also contains charts indicating state of basin wise and region wise Hydro Electric Potential development in the country.

The booklet contains maps and charts presenting a panoramic view of the growth of Indian Electricity Sector.

2.6 Implementation of initiative of Working Group III on NMEEE for retirement of old and inefficient Thermal Units

Ministry of Power, under National Action Plan on Climate Change (NAPCC) has initiated National Mission on Enhanced Energy Efficiency (NMEEE). Working Group -III under NMEEE had inter-alia recommended retirement of old and inefficient Thermal Units.

2.7 Standing Committee on Derating, Uprating and Retirement of installed capacity of Generating Stations

A Standing Committee is constituted under the chairmanship of Member (Planning) for considering the proposals of de-rating, uprating & retirement of electricity generating units. The Committee considers the performance of the units for de-rating & uprating, analyses the performance data and the overall generation throughout the life of the plant/unit and carries out detailed scrutiny of technical parameters of proposed units.

A total of 18362.24 MW have been retired from 10^{th} Plan onwards. Out of which 701.50 MW during 10^{th} Plan, 2398 MW during 11^{th} Plan, 5082.44 MW during 12^{th} Plan and 10180.3 MW after 12^{th} Plan (out of which 2550.38 MW during the year 2017- 18, 2409 MW during the year 2018-19, 2462.92 during 2019-20 797.50 MW during 2020-21, 1604.5 MW during 2021-22 and 356 MW during 2022-23) was retired.

During the year 2022-23, 7 Nos. of thermal generating units with aggregate capacity of 356 MW have been retired.

The list of the generating units retired during the year 2022-23 is given below: -

Sl. No.	Name of Station/Plant	State	Unit No.	Retired (MW)	Retired on
1.	Siliguri GPS	West Bengal	1	20.00	26.05.2022
2.	Rokhia GT	Tripura	3,4,5,6	32.00	02.06.2022
3.	OBRA TPS	Uttar Pradesh	7	94.00	13.10.2022
4.	DURGAPUR TPS	West Bengal	4	210.00	19.12.2022
	Total		**7**	**356.00**	

Plan wise and Fuel wise summary of retired capacity

Plan	Coal		Lignite		Gas		Diesel		Plan wise Total	
	No.of Units	MW	No.of Units	MW	No.of Units	MW	No.of Units	MW	No.of Units	MW
10th Plan	**9**	629.50	0	0.00	2	72.00	0	0.00	**11**	**701.50**
11th Plan	**38**	2135.00	0	0.00	11	261.00	5	2.00	**54**	**2398.00**
12th Plan	**49**	4721.50	0	0.00	7	205.00	9	155.94	**65**	**5082.44**
After 12th Plan	**85**	8759.38	11	740.00	24	353.00	10	327.92	**130**	**10180.30**
Total	**181**	**16245.38**	**11**	**740.00**	**44**	**891.00**	**24**	**485.86**	**260**	**18362.24**

2.8 Research & Development in Power Sector

2.8.1 R&D activities in Power Sector: -

The Central Electricity Authority (CEA) under Section 73(k) of the Electricity Act, 2003 is vested with the function to promote research in the matters related to the generation, transmission, distribution and trading of electricity.

Thus, Research and Development (R&D) for the Indian Power Sector is promoted and coordinated by CEA. Research & Development Schemes of the MoP are implemented by Central Power Research Institute (CPRI).

Standing Committee on R&D (SCRD) in Power Sector: The SCRD, under the Chairmanship of Chairperson, Central Electricity Authority, identifies and prioritize important strategic areas of research and development, which are to be implemented under various research schemes of Ministry of Power. The SCRD identifies leading Researchers and Domain Experts in diverse areas of Power Sector and engage them in the Research Schemes.

The Technical Committees in specific fields of power, namely, Thermal Generation, Hydro Generation, Transmission and 'Grid, Distribution & Energy Conservation' constituted to assist the SCRD in evaluation of new research proposals as well as in monitoring of the on-going research projects till their completion. The committees have representation from Academia, Industry, Utilities and Policy making bodies as well as experts from CEA.

Further, Research projects from eminent Institutions across India like IIT Kharagpur, IIT Kanpur, IIT Madras, IIT Bombay, CPRI, etc. have been supported on various thrust areas pertaining to Generation, Transmission, Distribution, Clean Energy and Renewables.

CEA oversees and promotes the activities of research and development in the Power Sector through coordination with multiple agencies involved in research and development activities.

Currently, following are the "Research Schemes of Ministry of Power being implemented through CPRI" for power sector development that are being facilitated by CEA through the SCRD:

i) **National Perspective Plan (NPP)** aimed at improving design of an individual plant component, evolving cost-efficient overall process in the plant, improving control & monitoring for system performance parameters, etc.

ii) **Research Scheme on Power (RSoP)** for need based research in power sector including solving of operational problems encountered in the power system.

iii) **In-house Research and Development (IHRD)** scheme for Central Power Research Institute (CPRI).

iv) **Uchhatar Avishkar Yojana (UAY)**, an initiative of Ministry of Education to promote innovation of a high order that directly impacts on and meets the needs of the industry and thereby improves the competitive edge of Indian manufacturing. It may be noted that from phase 3 onwards the UAY scheme will be merged with the Impacting Research Innovation & Technology (IMPRINT) scheme.

v) **Impacting Research Innovation & Technology (IMPRINT)** scheme, which is a national initiative of Ministry of Education for promoting high quality research and innovation in the higher educational institutions covering 10 domains which address the most relevant engineering challenges faced by the Nation with the aim to translate knowledge into viable technology (products or processes) for achieving inclusive growth and self-reliance.

2.8.2 Action taken for implementation of R&D for power sector:

Eleven (11) meetings of the Technical Committees were held during the FY 2022-23 for monitoring of the on-going research projects as well as for evaluation of new research proposals. Also, Three (3) meetings of SCRD were held during the FY 2022-23 wherein the research proposals cleared by the respective Technical Committees were further reviewed. A total of 41 research proposals with an outlay of Rs 26.62 crores were approved (9 under NPP Scheme, 26

under RSoP and 6 under IHRD) by the SCRD. These include projects on some of the priority areas of research in Power Sector like Clean Energy (co-firing of biomass in Thermal Power Plants), Cybersecurity, Hydrogen fuel cell, Nano-materials, and Energy Storage etc. The projects have been initiated by the Project implementing organizations.

2.8.3 Updation of thrust areas for R&D in power sector and identification of high priority areas of power sector:

The thrust areas for R&D in power sector were updated and high priority areas were identified/updated for dissemination to the power sector organizations under the Central /State/Private Sector.

In this context, the details of new areas related to power sector where R&D is needed were sought from concerned stakeholders of the sector. Numerous responses were received in this regard and some of the important topics are related to R&D in Green Hydrogen, Green Ammonia, CRGO, Alternate Bio fuels, waste to energy, development of smart system to control the hydro power plant, Ash utilization technique, battery storage, hydrogen co-firing in gas turbine, Carbon Capture Utilization & Storage (CCUS) and application of short term weather forecast in generation planning etc.

2.8.4 Other R&D initiatives in CEA (MoU with IIT, Delhi):

CEA, being an apex technical organization for the development of power sector, its human resources need to be developed inter-alia through enhancing their technical knowledge and exposure to R&D activities.

In this regard, Central Electricity Authority (CEA) has in place a Memorandum of Understanding (MoU) with Indian Institute of Technology, Delhi (IITD) for the development of CEA's Human Resources by virtue of enhancing their technical education/ knowledge and R&D exposure.

Under the provisions of MoU, one Chair Professorship for CEA has been instituted at IIT Delhi. M. Tech/MBA/Ph.D. programmes are being made available to the officers of Ministry of Power (MoP), CEA and NPTI & CPRI on the recommendation of CEA/MoP as per rules of the Institute. The fees and charges for the courses are borne by the respective organization.

Presently, eight officers of CEA are pursuing part time M. Tech/MBA/Ph.D. programmes from IIT Delhi.

2.8.5 Other R&D initiatives where CEA played important role and provided comments/inputs:

Manthan Platform

The "Manthan Platform" is a web portal established under the aegis of Principal Scientific Adviser (PSA) for selection of researchers and innovators for the research activities undertaken under various line Ministries of the Government. The objective is to get best proposals from across the India's scientific spectrum. This will empower the Ministries to source cutting-edge R&D solutions from India's eminent researchers and innovators by facilitating in gathering good numbers of expressions of interest against each problem statement at better terms and will offer more cost effective solutions due to the spirit of competition among the researcher's pool, from India and also those from abroad.

CEA was at the central stage during several rounds of discussions and deliberations held with O/o PSA, CPRI, CSIR, etc. Later on, a meeting was held under the chairmanship of Additional Secretary, Ministry of Power with the officers from O/o Principal Scientific Adviser along with officers from CEA & CPRI. It was decided that CPRI (and also other utilities under the administrative control of Min. of Power) are supposed to use "Manthan Platform" for selection of researchers and innovators for the research activities.

In this context, CEA is coordinating with the O/o PSA and respective power sector CPSEs/Organizations so as to make full use of the Manthan Platform. CEA has written to the CPSEs/Organisations under the Ministry of Power, to upload the problem statement in the prescribed template, on Manthan Platform.

2.9 Standardization activities

2.9.1 Standardization activities and efforts to enhance the implementation of standards in the field of Power Sector:

I. The Ministry of Commerce and Industry has developed the Indian National Strategy for Standardization (INSS) for acknowledging the standards for goods and services critical to the establishment of robust 'Quality Ecosystem' in India. In pursuance to the strategic consideration envisaged in INSS, Bureau of Indian Standards (BIS) has brought out a 'Standards National Action Plan (SNAP)'. In order to fulfill the above objective with respect to Power Sector, a Standardization Cell has been established in CEA under the Chairmanship of Chief Engineer (R&D), CEA, under the aegis of Ministry of Power.

II. The Standardization Cell is envisaged to act as a channel of communication among the Government, Industry and BIS to facilitate the identification of new subjects and relevant experts for standardization and enhance implementation of Indian standards.

III. Experts from CEA are contributing in formulation/revision of standards through various Sectional Committees of BIS constituted for developing national standards on products, processes and services related to Power Sector from time to time.

IV. Examined the Draft Standards National Action Plan (SNAP) 2022 document received from BIS for Public Comments and provided suggestions to include high priority areas such as 'Recycling of Solar PV panels after their useful life, Door to door waste collection and proper disposal of the same' where standardization is needed.

V. Examined the Review of IS 7752 (Part 1)-1975 on 'Guide for improvement of Power Factor in Consumers' Installations of the BIS and other standards' and views communicated to the BIS.

VI. Keeping in view the significance of Nitrogen Injection Fire Prevention System (NIFPS) in protection is one of the most important and expensive equipment i.e. transformer installed at power plants and sub-stations for which no IS exists at present, the matter of formulation of Indian Standards (IS) on NIFPS was taken up with BIS.

VII. Suggestions on 'Draft Domestic Electric Clothes Washing Machines for Household Use — Specification (First Revision)' were provided.

VIII. Dealt with the 'Draft RDSO specifications for High Volume Low Speed (HVLS) fan' and suggestions provided.

2.9.2 In addition to above, following references receivedconcerning formulation/revision/updation of standards, Quality Control Orders (QCO) were dealt with:

1) Drafts of the Quality Control Orders (QCO) in respect of various electrical items/equipment of mass consumption such as conductors used in transmission and distribution of electricity, fans and regulators, submersible pumps, electric motors, etc. were prepared.

2) As per Hon'ble PM's call for "Zero Defect-Zero Effect" manufacturing, DPIIT is in the process of formulating Quality Control Orders (QCOs) for various products. In their endeavor to issue about 50 QCOs by the second quarter of 2023-24, DPIIT has formulated 16 no. of QCOs. The QCOs were examined and views provided thereon.

3) Reference regarding Extension of Quality Control Order in respect of Steel provided was vetted and views furnished thereon.

2.10 Make in India (MII) and Aatma Nirbhar Bharat Abhiyan (ANBA) initiatives:

Chief Engineer, R&D Division, CEA is the Nodal Officer for MoP in respect of all the matters related to Make in India (MII) initiative of Government of India (GOI). Chief Engineer (R&D), CEA is acting as an interface between the Ministry of Power and Department for Promotion of Industry and Internal Trade (DPIIT)/PSUs/ Organizations/Autonomous Bodies under the administrative control of the Ministry of Power as well as the Industry Associations. The

grievances received in respect of non-compliance of provisions of PPP-MII Orders against the power sector procuring entities are also being handled in this division. Matters related to relaxation in Local Content and matters seeking exemption for Global Tender Enquiry (GTE) under Public Procurement (Preference to Make in India) Orders pertaining to power sector were also dealt. Handling of applications for registration of bidders from countries sharing land borders with India.

2.10.1 Major activities undertaken by CEA in relation to the implementation of the provisions of Public Procurement (Preference to Make in India), Order 2017 (PPP-MII) Order, 2017:

Some of the major activities undertaken by the R&D Division in this regard are given as under:

I. Dissemination of the PPP-MII Orders/Amendments and related references issued from time to time to concerned stakeholders for their information and for necessary compliance.

II. The cases of registration as bidders from the countries sharing land border with India were dealt with in compliance of the Department of Expenditure (DoE) Order dated 23.07.2020 and that of DPIIT orders related to it.

III. Implementation of Para 13 (a) of Public Procurement (Preference to Make in India) Order 2017 by Nodal Ministries. As per the Standing Committee meeting under the chairmanship of Secretary, DPIIT to review the implementation of Public Procurement (Preference to Make in India) Order 2017, the matter in respect of items where there is substantial quantity of public procurement but not sufficient local capacity is available was examined in consultation with power sector procuring entities and an analysis was carried out and recommendations in this regard were sent to Ministry of Power.

2.10.2 Action taken by CEA in relation to the scheme formulated by the MoP for creation of Manufacturing Hub/Zone for Power Sector:

Creation of Manufacturing Zone, the scheme envisaged by the Ministry of Power for Power & Renewable Energy Equipment under the Phase Manufacturing Programme (PMP) in line with Make in India initiative.

Proposals for setting up of manufacturing zone in the states of Tamil Nadu, Odisha, Bihar, Telangana, Madhya Pradesh, Gujarat, Andhra Pradesh and Maharashtra were received which were examined and evaluated on the basis of the evaluation criteria as per the scheme.

The proposal of Madhya Pradesh Industrial Development Corporation's (MPIDC) was selected by MOP and MNRE for setting up a pilot manufacturing zone at Mohasa Babai, Narmadapuram, near Bhopal, Madhya Pradesh for Power & Renewable Energy Equipment.

2.10.3 Action taken by CEA in relation to the scheme formulated by the MoP for Phased Manufacturing Programme (PMP) for Transmission and Distribution equipment/components:

1) CEA in consultation with all the stakeholders of the power sector including industry associations has identified items/components along with their estimated demand projections for next ten (10) years in respect of Transmission Sector and Distribution Sector and recommended for the proposed Production Linked Incentive (PLI) Scheme for Transmission and Distribution (T&D) Goods & Services through Phased Manufacturing Programme (PMP) for Power Sector.

2) CEA carried out various deliberations with industry/manufacturer representatives and after analyzing the National/International demand-supply scenario for the identified items, and recommended in its report various policy interventions for providing financial and policy level assistance/ support to manufacturers under PMP for indigenous manufacturing of the identified items.

2.10.4 Handling of grievances related to non-compliance of Public Procurement (Preference to Make in India) Orders pertaining to power sector:

The grievances related to non-compliance of Public Procurement (Preference to Make in India) are being examined in consultation with stakeholders and recommend appropriate actions to the Competent Authority in the Ministry.

In this context, 17 grievances against non-compliance of Public Procurement (Preference to Make in India) Order were received in CEA through DPIIT during the financial year 2022-23. Inputs were gathered from respective power sector procuring entities and other concerned stakeholders/State Governments, Industry Associations and a comprehensive analysis with respect to each grievance was carried out by the CEA and furnished to the Ministry/ DPIIT.

2.10.5 Handling of matters related to relaxation in Local Content and matters seeking exemption for Global Tender Enquiry (GTE) under Public Procurement (Preference to Make in India) Orders pertaining to power sector:

As per Para 14 of the DPIIT Order dated 16.09.2020 exemption can be granted for particular items or Minimum Local Content can be reduced below the prescribed level with the approval of Hon'ble Minister-in-charge. Accordingly, the procuring entities those who are not getting Class -I local supplier for the listed items or otherwise are seeking relaxation from the competent authority. The cases from different procuring entities under Ministry of Power seeking relaxation received during 2022-23 were examined and analyzed as per Standard Operating Procedure (SOP) prescribed by the DPIIT in this regard and accordingly recommendations were forwarded to the Ministry of Power.

2.10.6 Inputs/comments on various other references/ issues concerning Make in India and Aatma Nirbhar Bharat initiatives of Government of India were taken up from time to time are:

I. Demand consolidation of Borosilicate glass and its related products in respect of CPSEs under Ministry of Power was undertaken from the point of view to get advantage of economies of scale for developing indigenous manufacturing.

II. A note on the need for manufacturing CRGO Electrical Steel in India was prepared for Ministry of Power.

III. A note was prepared for the MoP on Inter-Ministerial meeting to discuss the strategy to reduce dependence on imports.

IV. Views were furnished for the Cabinet Committee on Economic Affairs regarding approval for development of Trunk Infrastructure Components for Integrated Manufacturing Clusters (IMCs) at:

   a. Palakkad Node under Extension of Chennai Bengaluru Industrial Corridor (CBIC) to Kochi via Coimbatore.

   b. Dighi Port Industrial Area (DPIA) in Maharashtra under Delhi Mumbai Industrial Corridor (DMIC).

   c. Khurpia Farm in Uttarakhand under Amritsar Kolkata Industrial Corridor (AKIC).

   d. Rajpura-Patiala in Punjab under Amritsar Kolkata Industrial Corridor (AKIC).

2.11 Works related to Electric Vehicle Charging Infrastructure (EVCI):

i) Report of the Committee constituted in CEA to determine the ceiling limit for the service fee to be charged from EV consumers on yearly basis submitted to the MoP.

ii) Examination of the subject 'Evaluation of Electric Vehicle (EV) Policy' pertaining to the Ministry of Heavy Industries- inputs on 'Post Evidence List of Points' was carried out and view were furnished.

iii) Views/inputs were provided related to the following:

   a. Ministry of Power reference on ASPIRE Programme regarding initiative to be taken for E-Mobility segment.

   b. Draft notification by Urban Development Department regarding charging Infrastructure for Electric Vehicles as per Unified Building Bye-Laws (UBBL), 2016.

2.12 Matters related to Hydrogen Mission/Policy, Energy transition, net zero emission status, carbon neutrality, Renewable Energy Development etc.:

Comments/inputs on following references related to Energy transition, Net Zero, Carbon Neutrality, and RES were furnished from time to time:

- Preliminary Project Report - (PPRID – 11957- Co-Finance) reg. Accelerating India's Green Energy Transition.
- Development of the 'National Energy Storage Scheme' (NESS).
- Issues related to availability of round the clock (RTC) RE power for production of Green Hydrogen/ Green Ammonia.
- Request for issuance of extension to solar projects on account of withdrawal of NIFPS specifications by CBIP from its Manual and development of new standards by BIS.
- Action Plan to meet one billion CO_2 reduction target by 2030.
- Thematic Task Group for preparation of India's Long-Term Low Greenhouse Gas Emissions Development Strategy. Energy Transitions Working Group (ETWG) for India's G20 Presidency 2023.
- CPRI proposal on recycling of waste generated from end of life energy storage batteries and Solar Panels.

2.13 The following references were also dealt with:

I. Proposal of PFC PPR (ID-12000) to seek funds from AfD to demonstrate positive impact on climate change mitigation.

II. Issues raised by Hon'ble Members of Parliament during the meeting of the Parliamentary Standing Committee on Energy held on 24.11.2022.

III. "Draft Guidelines for Resource Adequacy Planning Framework for India".

IV. NITI Aayog and Danish Energy Agency (DEA) proposed joint research study project on Hydrogen transmission and storage & Biomass role for hydrogen production.

V. Approval of the new Scheme "Prime Minister's Development Initiative for North-East Region (PM-DevINE)" for the remaining 4 years of the 15th Finance Commission period (2022-23 to 2025-26).

VI. 'Vision 2047' document of MoP.

VII. Permission for other green fuels like Hydrogen etc. at sites allotted by DDA for running/establishing the fuel filling stations (Diesel/Petrol/CNG) in Delhi.

VIII. Distribution System Operators (DSO) in India - Need, Institutional Frameworks, Regulatory and Policy Considerations.

IX. Draft Note for the Cabinet to amend Public Procurement Policy for Micro and Small Enterprises 2012.

2.14 Nominations of officers of R&D Division, CEA in various Committees:

I. CE (R&D) was nominated as a Member of the Standing Committee constituted for examination of Public comments on CEA Regulations.

II. Chief Engineer (R&D) is a member of the Task Force constituted to formulate testing standards & procedure and identify requirement of infrastructure upgradation for creating a separate test bed for Cyber Security.

III. Chief Engineer (R&D), CEA was the chairman of the Committee to review R&D project proposal of Indian Institute of Technology (IIT) Bhubaneswar in collaboration with Power Grid Corporation of India Limited.

IV. Chief Engineer (R&D), CEA nominated as a member of the committee on 'Determining (on yearly basis), the ceiling for the service fee to be charged from EV consumers'.

2.15 Progress of Grid connected Renewable Energy (Excluding Large Hydro) Projects:

As on 31.03.2023, India has successfully achieved installed capacity of 171.99 GW in respect of Renewable Energy (including Large Hydro) generation projects comprising of 42.63 GW of Wind Power, 66.78 GW of Solar Power, 10.80 GW of Bio Power, 4.94 GW of Small Hydro and 46.85 GW of Large Hydro.

2.16 Generation from Renewable Energy Sources:

Generation from Renewable Energy (RE) Sources (including Large Hydro) and Conventional sources, for the years 2019-20, 2020-21, 2021-22 & 2022-23 and the share of RE to total generation for the above period, are as under:

Year	Conventional Generation	RE Generation (excluding Large Hydro)	Large Hydro Generation	Total Renewable Energy Generation (including Large Hydro)	Total Generation	% of RE Generation (including Large Hydro) w.r.t. Total Generation
	(MU)	(MU)	(MU)	(MU)	(MU)	
2019-20	1089220.31	138377.02	161563.60	299940.62	1389160.93	21.59
2020-21	1075542.62	147247.51	159065.02	306312.53	1381855.15	22.17
2021-22	1161826.54	170912.30	159120.53	330032.83	1491859.37	22.12
2022-23	1252071.76	203552.17	168841.17	372393.34	1624465.10	22.92

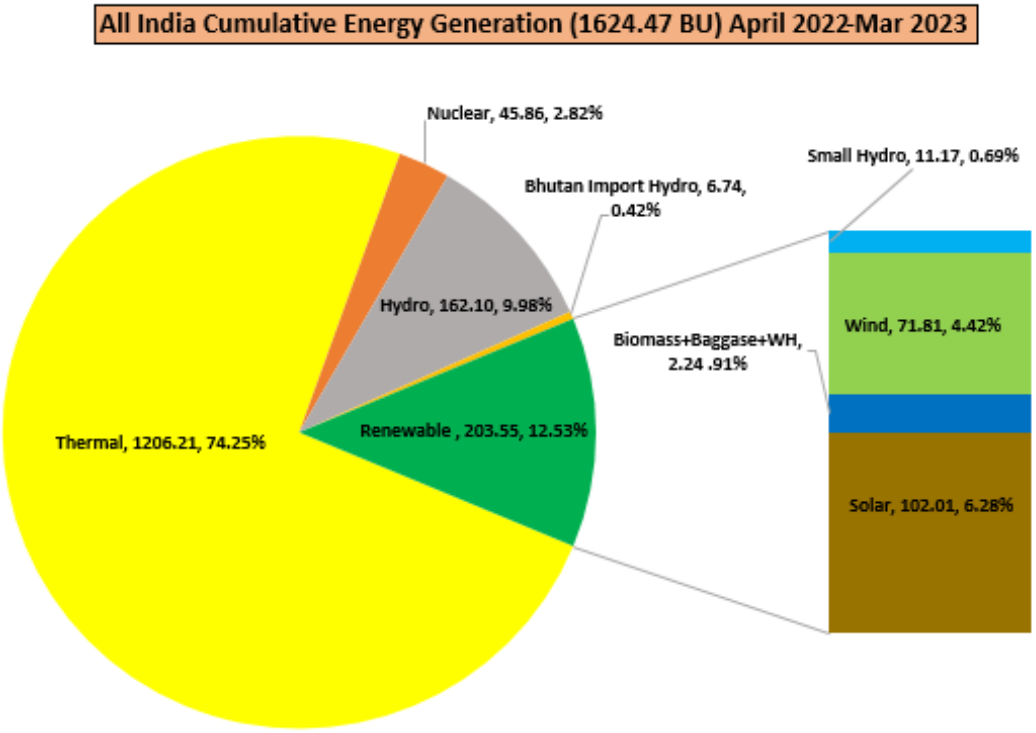
Renewable energy generation share during the year 2022-23 was about 22.92 % of total energy generation in the country. Year wise generation from renewable energy sources (RES) indicating the growth rates is given below:

Year	Generation from RE (including Large Hydro) (BU)	Year-wise growth (%)
2018-19	261.65	
2019-20	299.94	14.63
2020-21	306.31	2.12
2021-22	330.03	7.74
2022-23	372.39	12.84

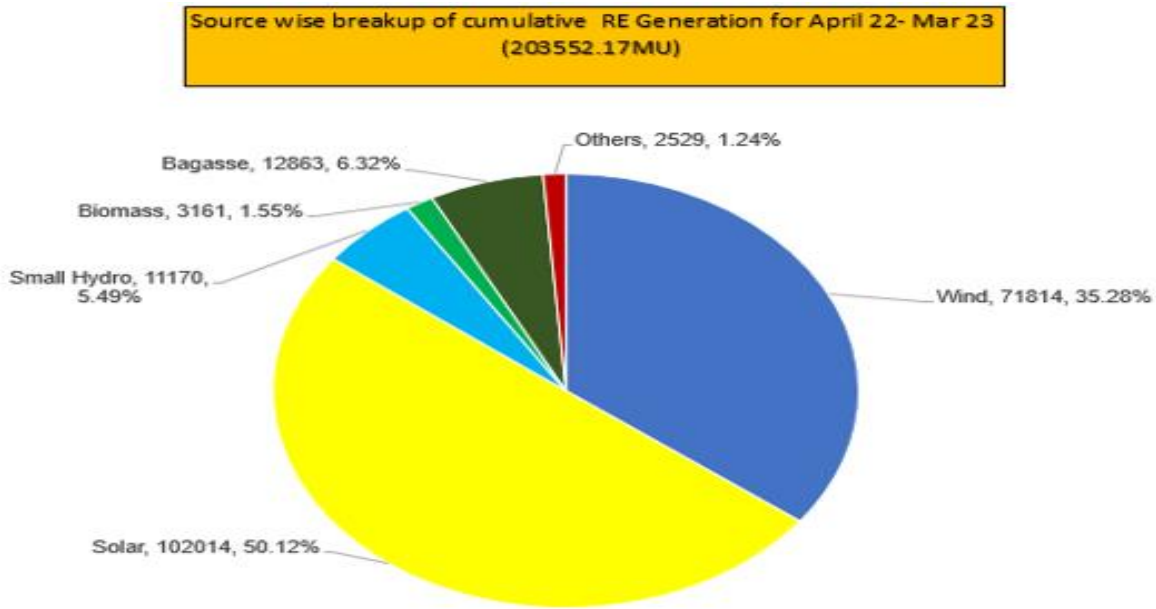
The Graphical representation of the source-wise All India Energy Generation and the source-wise

breakup of RE generation (excluding Large Hydro), for the year 2022-23 is attached as **Annexure I**. The details of State/UT-wise and Source-wise RE Generation (excluding Large Hydro) for the year 2022-23 are given at **Annexure II**.

Annexure I.



Annexure II



2.17 Development of Renewable Energy (RE) Sources

For sustainable development and economic growth, focus of the Government of India is towards de-carbonization of Indian Power Sector and shifting from the fossil fuels based energy to the renewable sources based energy which is cleaner, safer, environment friendly and more sustainable.

The Renewable Technology and Integration (RT&I) Division in the Planning Wing of the CEA has been entrusted with responsibility to assist in promotion of renewable sources of energy, development of new RE technologies, preparation of construction standards for RE power plants, to make Regulations and Guidelines for the smooth and rapid integration of RE in Indian Power Grid and to assist MoP, MNRE, States and other stakeholders on policy and regulatory matters. CEA is actively participating in faster development of RE sources and reduction of dependency of power sector on fossil fuels to ensure smooth energy transition and contributing to achieve India's international commitments.In Order to achieve the aforesaid objectives, the tasks accomplished by RT&I Division of CEA during the year 2022-23 are as under:

2.17.1 Formulation of Renewable Energy Power Plants Construction Standards

Central Electricity Authority (CEA), in exercise of powers conferred by subsection (2) of Section 177 of the Electricity Act, 2003, is formulating "Technical Standards for construction of RE Power Plants [(Solar Power Plants, Wind Power Plants and Battery Energy Storage Systems (BESS)] on the line of Central Electricity Authority (Technical Standards for construction of Electrical Plants and Electric Lines) Regulations 2022. The regulations will promote uniformity in RE Power Plant construction practices, facilitate smooth development of RE capacity in the country and help meet the Government of India's target to achieve 50% of total installed capacity through non fossil fuel by 2030.

A Committee in this regard has been constituted in CEA under the Chairmanship of Member (Planning), CEA for the preparation of draft for the aforesaid Technical Standards with members comprising from MNRE, SECI, NIWE, NISE, NTPC RE, CTU, Grid Controller of India, Gujarat Energy Development Agency (GEDA), Maharashtra Energy Development Agency (MEDA), Tamil Nadu Energy Development Agency (TEDA), Karnataka Renewable Energy Development Agency Ltd. (KREDL) and Chief Engineer, RT&I Division of CEA. Two meetings of this committee have already held during the year 2022-23.

2.17.2 RE Policy/Guidelines/references related matters

RT&I Division has handled various references pertaining to Policy/Regulation/Guidelines in respect of RE Sector and provided its valuable inputs on the same. Some of these are as below:

- Compliance regarding RPO of Captive Generation Plants (CGPs) commissioned prior to 1st April 2016.
- Treatment of power drawn by Grid Connected Solar Power Project during non-generation night hours, shutdown periods.
- Uniform Slab of GST on various components / equipment used in deployment of Clean Energy Technologies
- Draft Guidelines for Procurement and Utilization of Energy Storage Systems for various end-use applications including standalone storage capacity.

- Waiver of Inter State Transmission System (ISTS) charges after bifurcation of State of Andhra Pradesh into Andhra Pradesh & Telangana State.
- Captive Renewable Energy power projects - issues related to verification of captive status for ISTS project.

2.17.3 Establishment of Renewable Energy Management Centers (REMCs) in RE Rich States and other parts of the Country

Ministry of Power (MoP) has entrusted the task of third party evaluation/ inspection of all commissioned/upcoming Renewable Energy Management Centers (REMCs) across the Country to CEA.

Accordingly, RT&I Division carried out the same and the report of evaluation/inspection for 11 Renewable Energy Management Centre was submitted to MoP in the month of February, 2021. However, the third party evaluation/inspection in regard to REMC at Telangana and EMC at South Andaman was carried out during in the month of February, 2023 and report for the same has been submitted to MoP in the month of April, 2023. Further, this Division is also collecting the monthly status report from all REMCs regularly.

CE&ET Division was formed in CEA keeping in view of the increasing importance of promotion of **Clean Energy** and **Energy transition from fossil fuel to non-fossil fuel** based Power.

In this pursuit the reports published by CE&ET division are as follows: -

1) Annual CO_2 Baseline Report.
2) Monthly Environmental Emission status report.
3) Monthly Report on EV power consumption of public charging stations.

1. <u>CO2 baseline data base for FY 2021-22</u>:

CEA has been compiling and publishing database containing data on CO_2 emissions for all grid- connected power stations in India since 2006.

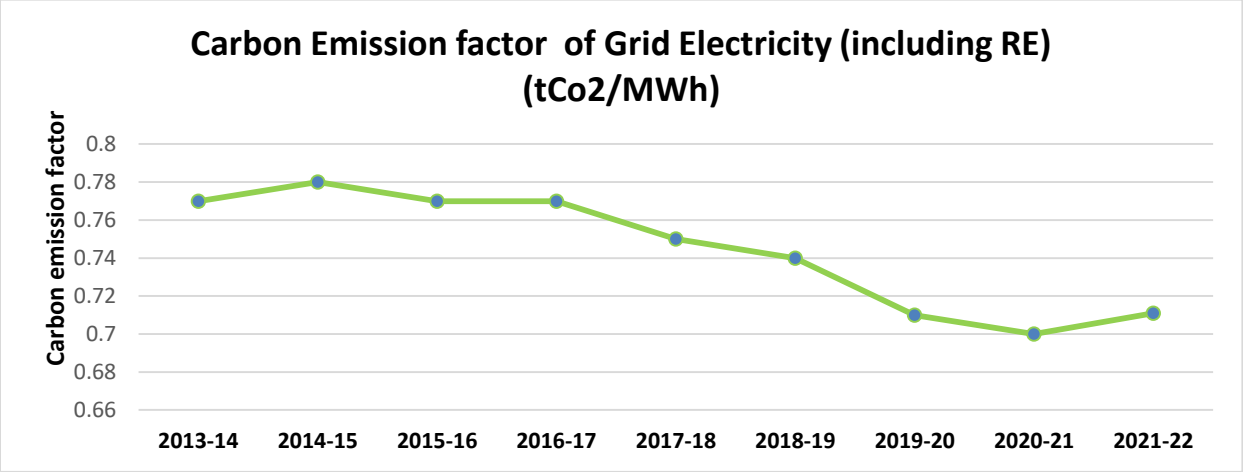
<u>Purpose of CO_2 baseline database</u>:

- Projects involving CO_2 displacement or CO_2 saving relating to grid electricity must calculate their emission reduction based on a grid emission factor, which needs to be determined in accordance with the rules set by CDM Executive Board.
- Emission reductions from CDM projects in the power sector are calculated based on the net electricity generated by the project, and the difference between the emissions factors (in tCO_2/MWh) of the baseline and the project activity.
- The purpose of the database is to establish authentic and consistent quantification of the CO_2 emission baseline which can be readily used by CDM project developers in the Indian power sector. This would enhance the acceptability of Indian projects and would also expedite the clearance/approval process.

<u>Key points from CO_2 baseline database for FY 2021-22</u>:

1. **<u>Emission Intensity Reduction:</u> -** There is a gradual increase in total electricity generation (including RE generation) as well as total CO_2 emission from 2013-14 to 2021-22 i.e. around 49% increase in generation and 37.7% increase in total CO_2 emission but carbon emission factor of grid including

Renewable energy has been reduced by around 7.66% during the same period.



2. Monthly Environmental Emission data of all Coal/Lignite/Gas/Diesel/Naptha Based Thermal Power Plant

CEA has notified "Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations, 2007" on 19th April, 2007 under Section 74 and Sub-Section (3) of Section 177 of Electricity Act, 2003 to collect and record the data concerning generation, transmission, trading, distribution and utilization of electricity and to carry out studies relating to environmental issues and competitiveness and such like matters.

CEA, in fulfillment of its statutory obligations, collects the monthly environment emission data from thermal power plants as per FORMAT-60 and from June 2022 onwards have started publishing the Monthly Environmental Stack Emission Status Report of Indian Power Sector giving summary along with plant wise details of PM, SO2, NOx emissions and Specific Water consumption.

The purpose of this report is to analyze the quantum of emission of Pollutant such as PM, SOx, NOx, Hg and Specific water consumption from various units of Indian Thermal Power Stations, while ensuring the compliance of the norms specified by MoEF&CC vide notification dated 07.12.2015 under Environment (Protection) Act, 1986 is the domain of CPCB/SPCB.

Such analysis will help in identification of major pollution emitter units so that concerned power producers can be sensitized to take immediate corrective and necessary action to reduce the emission within the norms. Thus it helps in achieving the broader objective of ensuring clean & healthy environment and reducing global warming.

3. Verification of NOx emission data in 9 identified thermal power plant units w.r.t. Compliance of Hon'ble Supreme Court Orders in W.P.(c) No. 13029 of 1985

MoEF&CC has notified NOx emission norms of 100 mg/Nm3 for thermal units commissioned after December 2016 in the Environmental Norms on December 2015. The matter is pursuant to the Hon'ble Supreme Court's order dated 29.07.2020 in the matter of W.P. (c) No. 13029 of 1985 titled M.C. Mehta V/s Union of India and Ors. In this regard a Joint meeting with representatives of CAQM, MoEF&CC, MoP, CPCB and NTPC Ltd. was held under the Chairmanship of Member Technical, CAQM on 09.09.2022 wherein it was decided to constitute a joint committee of 2 members each from MoP (including CEA), CPCB and concerned SPCB. This committee would visit 11 units in 9 Nos. of thermal power plants (TPPs) to verify & validate NOx emission level.

Being a technical body, CEA have prepared Terms of Reference required for sample analysis and then, accordingly committee members of CEA, CPCB & SPCB visited these TPPs to analyze the sample for NOx emission and other relevant parameters.

In order to achieve above objective, it is to inform that although CEA have nominated two officers in the committee, two more officers were associated and two teams of two officers each were sent for plant visit to expedite the process. This gives young Assistant Directors a rich field experience of operation of thermal power plants.

CEA have taken the lead role in this joint NOx sampling exercise till the preparation of final report of joint committee. The joint committee has submitted its report to CAQM of NOx emission analysis of 11 Units in 09 TPPs on 01-05-2023. The report would help to correlate variations of NOx values with different operating conditions. Views of CEA on technical inputs are also considered in the report.

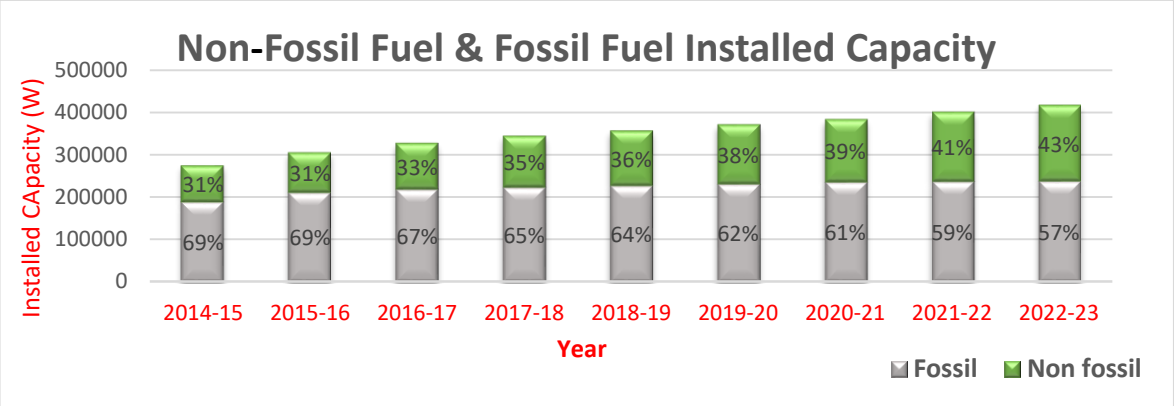
A short glimpse of visit to Thermal Power Plants during NOx Sampling by CEA, CPCB, SPCB

4. Energy Transition from Fossil fuel to Non-Fossil:

i. At COP21, as part of its Nationally Determined Contributions (NDCs), India had committed to achieving 40% of its installed electricity capacity from non-fossil energy sources by 2030. This target is already achieved in Nov-2021.The share of solar and wind in India's energy mix have grown phenomenally. As on 31.03.2023, total non-fossil based installed energy capacity is about 43 % of the total installed capacity.

ii. A depiction chart of Year wise increment in % share of Non-Fossil based Power is tabulated below:

Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
%Fossil	69%	69%	67%	65%	64%	62%	61%	59%	57%
%Non-fossil	31%	31%	33%	35%	36%	38%	39%	41%	43%



iii. India upgraded its Nationally Determined commitments (NDCs) in Glasgow COP26 and in August 2022 communicated its updated NDC to UNFCCC, which includes-

- 'LIFE'– Lifestyle for Environment
- Reduction in Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level.
- To achieve about 50 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 including from Green Climate Fund (GCF).

5. Monitoring and monthly reporting of Biomass co-firing status as per policy formulated by CAQM to abet air pollution in Delhi NCR

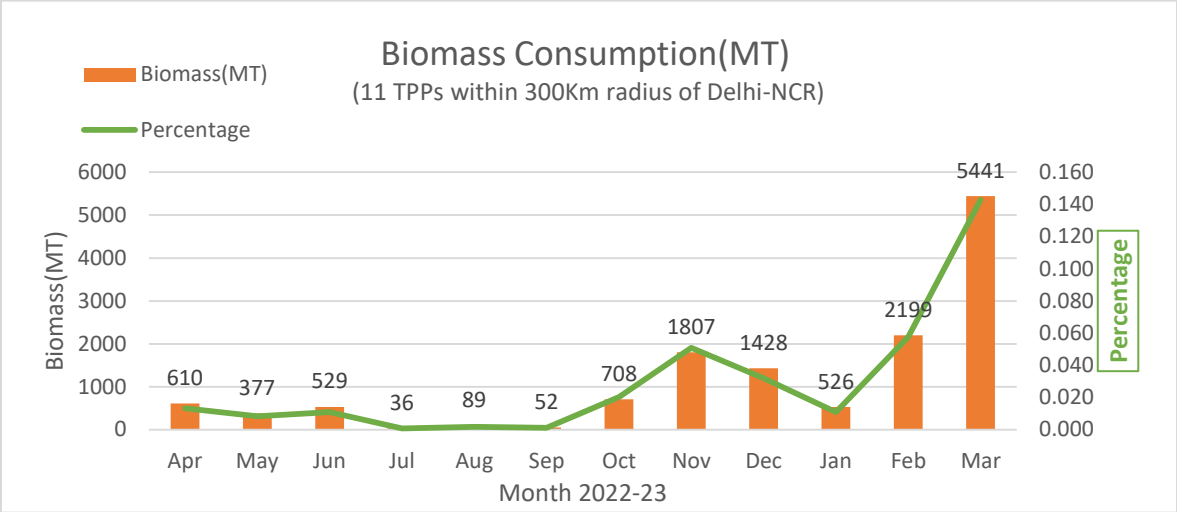
Ministry of Power has issued revised policy on 08.10.2021 for the use of agro residue-based biomass and mandated use of 5-10% of biomass co-fired along with coal for all thermal power plants. Every year, farm-stubble burning is one of the important factors of air pollution across the country especially in Delhi NCR.

In order to address the issue of air pollution and to reduce carbon footprints of thermal power generation, CEA under MoP has monitored and furnished monthly progress report of 11 TPPs within 300 km of Delhi-NCR on compliances of direction to co-fire 5-10% Biomass for onward submission to CAQM.

According to data collected for the period from 01.04.2022 to 31.03.2023, cumulative 13802 MT biomass has been co-fired in 11 TPPs (within 300 km of Delhi-NCR). Biomass utilization by these TPPs resulted in slight improvement in ambient air quality because of reduction in overall PM level. However, there is yet a far way to go because at present, the biomass co-firing is less than 1% against the mandate of 5-10% reason being techno-economical and other constraints.

Month-wise progress of Biomass consumption and Co-firing percentage is tabulated below:-

Month	Apr 22	May 22	June 22	July22	Aug22	Sep 22	Oct 22	Nov22	Dec22	Jan 23	Feb23	Mar23	Total
BM-(MT)	610	377	529	36	89	52	708	1807	1428	526	2199	5441	13802
Coal (kMT)	4575	4568	4826	4462	4861	4279	3503	3546	4460	4824	3813	3810	51527



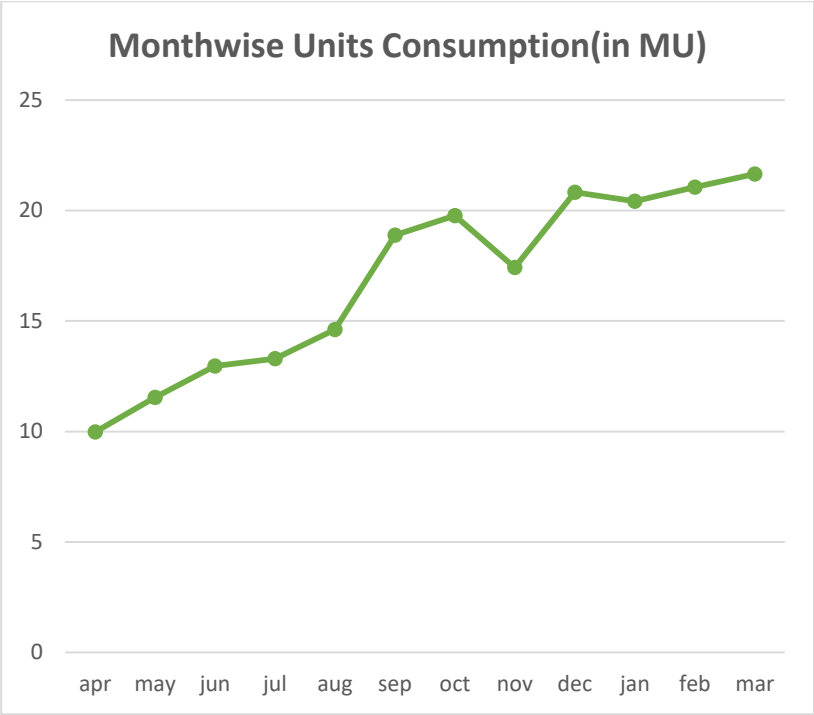
6. Collection of monthly power consumption details of Public Charging Stations (PCS) and publication of Monthly Report.

The data of energy consumption in the EV charging stations is important for the load forecasting, distribution system planning and integrated resource planning in the country. Hence, CEA is collecting data from all DISCOMs regarding monthly power consumption details of Public Charging Stations (PCS) under their area of supply. Currently, EV Power Consumption report covers data received from 34 major DISCOMS of 18 States and UTs and the follow up with the remaining is in progress.

As per information received so far, total power consumed by PCS of various DISCOMs during the period from 01.04.2022 to 31.03.2023 is 202.45 Million-units (MUs).

Month-wise power consumption details are tabulated below: -

Month	**Total Electricity Consumed (in MU)**
Apr-22	9.99
May-22	11.55
Jun-22	12.96
Jul-22	13.30
Aug-22	14.61
Sep-22	18.89
Oct-22	19.78
Nov-22	17.42
Dec-22	20.83
Jan-23	20.42
Feb-23	21.05*
March-23	21.66*
Total	**202.45 MU**



**The actual consumption is more than the given figure as consumption details of few utilities are not received yet.*

7. International and Bilateral Co-operation for development of affordable, reliable & sustainable Power Sector by way of promoting Clean Energy and Energy Transition in the country.

i. Inputs were provided to MOEF&CC regarding topic on "Low Carbon Development of Electricity Systems Consistent with Enhanced Development Benefits" of "Long-Term Low Emission Development Strategy (LT-LEDS) Report", which lay out India's vision and approaches towards reaching net-zero by 2070. The final report was submitted by MOEF&CC to the United Nations Framework Convention on Climate Change (UNFCCC) under Paris Agreement on 14th November 2022.

ii. Inputs/suggestion were furnished to MOP & MOEF&CC regarding matters on bilateral co-operation viz. India-US Strategic Clean Energy Partnership, Technological Co-operation between Australia & India, BIMSTEC energy cooperation, Indo-German Energy Programme (IGEN)-GIZ and South Asia Sub regional Economic Cooperation (SASEC).

iii. Provided valuable inputs to Hon'ble minster to attend World Economic Forum Annual Meeting 2023, Major Economies Forum Leaders Meeting on Energy and Climate and World Green Economy Summit 2022 & the Ministerial Round Table Conference.

iv. Examined and provided inputs on challenges faced by Swedish companies in India in the area of environmental sustainability mapping study.

v. Methodological and Data related issues in preparation of Global Developmental Indices on environment & energy viz. Climate Change Performance Index (CCPI) by German Watch, Energy Transition Index by the World Economic Forum (WEF), were examined and requisite inputs/suggestions were furnished to MOEF&CC for addressing the same which is crucial for just accounting the efforts by developing countries and improving their respective global ranking

vi. Moreover, inputs and detailed state wise power sector data were furnished to nodal ministry for preparation of national developmental indices viz. State Energy and Climate Index by NITI Aayog, Climate Change Performance Index (CCPI).

8. Participation in International Co-operation on Energy Transition

Mr. Ghanshyam Prasad, Chairperson CEA & Mr. Vijay Menghani (CE, CEA) at G20-ETWG Meeting, 2023.

i. Chairperson, CEA along with officers of CEA participated in meeting of Energy Transitions Working Group (ETWG) of G20 and contributed in Priority Area -1 (PA 1) – Energy Transition through Addressing Technology Gaps and PA-3- Energy Security and Diversified Supply Chains and associated with World Bank in preparing presentation on Grid Interconnection for energy security.
ii. The officers from CE&ET Division, CEA participated in Sharm el-Sheikh Climate Change Conference (COP 27).

CHAPTER – 3

POWER SYSTEM PLANNING AND DEVELOPMENT

3.1 Transmission Planning

All issues relating to the planning and development of the Transmission System in the country are dealt in the Power System Wing of CEA. This includes evolving long-term and short-term transmission plans in coordination with the Central Transmission Utility, the State transmission utilities, generating companies and other stakeholders. The electrical network expansion plans are optimized based on power system studies. This also involves formulation of specific schemes, evolving a phased implementation plan in coordination with the Central and State transmission utilities and their implementation, issues pertaining to the development of national power grid in the country, and issues relating to cross border electricity interconnections. Transmission planning studies are being conducted to identify evacuation systems from generation projects and to strengthen the transmission system in various regions.

In addition to this, Member (Power Systems) has been appointed as the Designated Authority (DA) for facilitating the process of approval and laying down the procedure for import/ export of electricity under the guidelines for Import/Export (Cross Border) of Electricity, 2018. Designated Authority has been entrusted the role to coordinate with the respective authority of the neighboring countries for all purposes as stated in the Guidelines which, inter alia, include, planning, monitoring, and commissioning of transmission lines for import/export of electricity as well as the grid security, safety, and operation; accord approval to the participating Entity(ies) proposing to import/export electricity from/ to India (including through Indian power exchange(s)); and accord approval to an Indian generating station, supplying electricity exclusively to neighboring country and proposing to build a dedicated transmission line for connecting to the transmission system of neighboring country.

The Electricity (Transmission System Planning, Development and Recovery of Inter State Transmission Charges) Rules, 2021, notified by the Ministry of Power on 01st October, 2021, inter alia provides that;

"3(1) The Central Electricity Authority shall draw up short term plan every year on rolling basis for up to next five years and perspective plan every alternate year on rolling basis for next ten years for development of the electricity system and co-ordinate the activities of the planning agencies for the optimal utilization of resources to sub serve the interests of the national economy and to provide reliable and affordable electricity in accordance with section 73 of the Act.

3(2) The Central Electricity Authority shall also draw up the perspective plan for development of transmission system after consultation with all the relevant stakeholders such as, Central Transmission Utility, State Transmission Utilities, System Operators, generating and distribution companies, industry associations and the State Governments, etc., and after assessing the rate of growth in demand as well as the growth of generation in different areas of country."

Accordingly, for preparation of short term and perspective plans and for coordinating the activities of planning agencies, CEA vide letter dated 25.10.2022, constituted five regional standing committees namely "Standing Committee on Short Term & Perspective Power System Planning (SCSTPPSP)", one for each region.

3.2 Inter-regional transmission system in India – National Grid.

The national grid in the country has been developed in a phased manner. All the regional grids have been inter-connected synchronously to form One Nation-One grid -One frequency. Inter-regional transmission capacity by the end of the 9th plan was 5,750 MW which increased to 13,450 MW by the end of the 10th plan and to 27,150 MW and 75,050 MW by the end of the 11th and 12th plan respectively. Interregional transmission

capacity added during the period 2017-22 (up to 31st March 2022) was 37,200 MW leading to total inter-regional transmission capacity in the country to 1,12,250 MW. As on 31.03.2023, inter-regional transmission capacity in the country was 1, 12,250 MW. Details of inter-regional transmission lines are given at **Annexure-3A**. The increase in inter-regional transmission capacity would further facilitate the smooth flow of power from surplus to deficit regions.

3.3Transmission planning related works carried out in 2022-23:

3.3.1 Manual on Transmission Planning Criteria, 2023

The manual on Transmission Planning Criteria was first brought out by CEA in 1985, which was revised in 1994 and 2013. Considering large-scale renewable energy integration, growth of load, increasing fault level, right of way issues, technical advancements, notification of Transmission Rules, etc. CEA had issued a Manual on Transmission Planning Criteria, 2023 which is effective from 1st April, 2023.

The Manual is instrumental in planning the Inter-state transmission system as well as the Intra-state transmission system. The manual covers planning philosophy, information required from various entities, permissible limits of parameters, reliability criteria, broad scope of system studies, modelling and analysis etc. and provides guidelines for transmission planning.

3.3.2 BIMSTEC Energy Centre

Memorandum of Association (MoA) among the BIMSTEC Member States (The BIMSTEC is a regional organization comprising seven Member States: five deriving from South Asia, including Bangladesh, Bhutan, India, Nepal, Sri Lanka and two from Southeast Asia, including Myanmar and Thailand) for the Establishment of BIMSTEC Energy Centre (BEC) was signed on 22nd January 2011. According to the MoA, the **BIMSTEC Energy Centre (BEC)** has to be set up in India.

1st meeting of Governing Board of the BIMSTEC Energy Centre (BEC)

The first meeting of the Governing Board of the BIMSTEC Energy Centre (BEC) was held in Bengaluru on 27.02.2023 and was chaired by Mr Ajay Tiwari, Additional Secretary, Ministry of Power. The outcome of the meeting are as below:

(i) Sh Ghanshyam Prasad, Chairperson CEA, Ministry of Power, Govt. of India has been appointed as the first Executive Director of the BIMSTEC Energy Centre.

(ii) The draft Host Country Agreement between the Government of the Republic of India and the BIMSTEC Secretariat was finalized and recommended to be put before the Seventh Meeting of the BIMSTEC Permanent Working Committee for consideration.

(iii) The Office of BEC is being set up and is expected to be operationalized within four months. BEC will temporarily be housed in the premises of the Central Power Research Institute (CPRI), Bengaluru. Permanent infrastructure has also been identified at the Ground Floor of the new Southern Region Load Dispatch Centre (SRLDC) building (CPRI Campus) at Bengaluru which is also expected to come at an early date.

(iv) Rules of Procedure for BIMSTEC Energy Centre, will be finalized in a Special Meeting of Governing Board of BEC.

3.3.3 BIMSTEC Grid Interconnection Coordination Committee (BGICC)

A Memorandum of Understanding (MoU) for establishment of the BIMSTEC grid interconnection was signed between Member States on 31st August, 2018.

Article 3.2 of MoU provides the need for BIMSTEC Grid Interconnection Coordination Committee (BGICC), to actively coordinate, for the successful implementation of grid interconnections and trade in electricity. The First meeting of BGICC was held on 30th June 2021 (in virtual mode).

2nd Meeting of BIMSTEC Grid Interconnection Coordination Committee (BGICC)

The second meeting of the BIMSTEC Grid Interconnection Coordination Committee (BGICC) was held in Bengaluru on 27.02.2023 and was chaired by Sh Ghanshyam Prasad, Chairperson CEA. The outcome of the meeting are as below:

(i) The Meeting considered India's presentation as a discussion paper for the preparation of the draft "BIMSTEC Policy for Transmission of Electricity".

(ii) The Meeting considered India's presentation as a discussion paper for the preparation of the draft "BIMSTEC Policy for Trade, Exchange of Electricity and Tariff Mechanism".

3.3.4 Intra State Transmission System Strengthening requirement of North Eastern States and Sikkim by the year 2030

MoP vide letter dated 16.02.2022 had requested CEA to ascertain further requirements of North Eastern States to augment their transmission systems.

Accordingly, CEA had taken up the exercise of planning the transmission system strengthening requirement in NER and Sikkim up to the year 2030.

A total of 4,975 MVA transformation capacity addition/augmentation and 4,375 ckm of new transmission lines/reconductoring of old lines, at an estimated cost of Rs 6,642 Crs would be required for implementing the intra-state transmission proposals under the present scheme of transmission system augmentation NER States and Sikkim by the year 2030.

3.3.5 Examination of proposals for intra-state transmission planning

18 proposals pertaining to the planning of intra-state transmission systems submitted by States/UTs were examined.

- In compliance with provisions laid down in Tariff Policy dated 6th January, 2006, MoP issued an OM on 9th December, 2010, which provides that since 6th January, 2011, all the ISTS transmission projects are to be implemented through Tariff Based Competitive Bidding (TBCB) route, except some specific category of projects of strategic importance, technical upgradation works, required to be done to cater to an urgent situation on a case to case basis etc.

- The Revised Tariff Policy issued by Ministry of Power on 28th January, 2016 states the following: -

Clause 5.3: "The *tariff of all new generation and transmission projects of company owned or controlled by the Central Government shall continue to be determined on the basis of competitive bidding as per the Tariff Policy notified on 6th January, 2006 unless otherwise specified by the Central Government on case to case basis.*

Further, intra-state transmission projects shall be developed by State Government through competitive bidding process for projects costing above a threshold limit which shall be decided by the SERCs."

Clause 7.1(7): "*While all future inter-state transmission projects shall, ordinarily, be developed through competitive bidding process, the Central Government may give exemption from competitive bidding for (a) specific category of projects of strategic importance, technical upgradation etc. or (b) works required to be done to cater to an urgent situation on a case to case basis".*

- The Empowered Committee on Transmission (ECT) was subsequently dissolved vide office order dated 4th November, 2019 and in place of ECT, MoP has constituted National Committee on Transmission (NCT). The terms of reference of NCT interalia is the recommendation of ISTS scheme to MoP for approval. To further streamline the process of planning and approval of ISTS schemes, MoP vide its office order dated 28.10.2021 has revised the Terms of Reference of the NCT, delegating powers for approval of ISTS system costing between Rs 100 to Rs 500 crores to NCT and for ISTS schemes costing up to Rs. 100 crores to Central Transmission Utility. The ISTS schemes costing above Rs. 500 crores would require approval of MoP.

3.4 Status of the Transmission schemes notified through TBCB:

As far as Inter-State transmission system is concerned, till 31st March, 2023, ninety six schemes have been awarded through Tariff Based Competitive Bidding. The status of the transmission schemes, as on 31.03.2023, is as below:

Projects under TBCB	**96**
Projects commissioned	44
Projects under implementation	33
Stalled projects	04
Projects notified and are under bidding/bidding yet to start	**15**

Stalled projects	**04**
Project cancelled by CERC	01
Projects not taken up & CERC cancelled license	01
Projects under litigation	02

The name of schemes notified through TBCB are at **Annexure-3B**.

3.4.1 Meetings of the National Committee on Transmission (NCT) held during 2022-23:

In the year 2022-23, following four meetings of National Committee on Transmission were held:

- 9th meeting of the National Committee on Transmission (NCT) was held on 28.09.2022.
- 10th meeting of the National Committee on Transmission (NCT) was held on 07.11.2022.
- 11th meeting of the National Committee on Transmission (NCT) was held on 28.12.2022 & 17.01.2023
- 12th meeting of the National Committee on Transmission (NCT) was held on 24.03.2023

The transmission schemes and relevant issues taken up in this meeting are given at **Annexure-3C**.

3.5 Examination of Detailed Project Reports (DPRs) / Feasibility Reports (FRs) of Hydro Electric Projects / Pump Storage Projects for processing of concurrence by CEA – Appraisal of transmission system associated with evacuation of Power

- 12 DPRs / FRs of hydroelectric projects and Pump storage projects were examined for appraisal of power evacuation system of HEPs/PSPs in 2022-23.

3.6 Examination of DPR of Transmission Works for processing of clearance by CEA

- 7 proposals/DPR pertaining to transmission works were examined for processing of clearance by CEA.

3.7 Grant of prior approval of Government to transmission proposals under Section 68(1) of the Electricity Act, 2003 during 2022-23

As per Section 68(1) of the Electricity Act 2003, an overhead line shall be installed or kept installed above ground with prior approval of the Appropriate Government. During the FY 2022-23, total of 54 nos. of transmission schemes were granted approval under Section 68 (1) of the Electricity Act, 2003 by CEA.

3.8 Grant of authorization to Transmission proposals under Section 164 of the Electricity Act, 2003 during 2022-23

In FY 2022-23, total of 26 applications have been granted authorization under section 164 of the Electricity Act, 2003.

3.9 Cross-Border power exchange

3.9.1 Indo-Bangladesh Cross-Border Interconnection and Power Trade

- Bangladesh is connected with the Eastern and North Eastern Regions of India with a power transfer capacity of 1160 MW from India to Bangladesh through the following links:

- 1,000 MW through Baharampur (India) to Bheramara (Bangladesh) 400 kV 2x D/c line

with 2x500 MW HVDC back-to-back station at Bheramara, and

- 160 MW through Surajmaninagar (India) to North Comilla (Bangladesh) – South Comilla (Bangladesh) 400 kV D/c link (presently operated at 132 kV).

- Implementation of the 765 kV D/C Katihar (India) – Parbotipur (Bangladesh) – Bornagar (India) cross border link has been agreed and modalities of its implementation are being finalized.

3.9.2 Indo-Bhutan Cross Border Interconnections and Power Trade

India and Bhutan have MoU on cooperation for the exchange of power between the two countries. Bulk power generated at Hydro Electric Projects at Tala HEP (1020 MW), Chukha HEP (336 MW), Kurichu HEP (60 MW) and Mangdechu HEP (720 MW) in Bhutan is being exported to India through 400 kV, 220 kV and 132 kV lines.

Presently, about 2070 MW power from the existing hydro projects in Bhutan is being imported to India. The associated cross-border transmission system for evacuation and transfer of power from these HEPs is being operated in synchronism with the Indian Grid. Further, associated transmission line works have been completed for upcoming Punatsangchu-I (1200 MW) and Punatsangchu-II (1020 MW) HEPs.

3.9.3 Indo-Nepal Cross Border interconnection and Power Trade

- Presently, power is being exported to Nepal through 11 kV, 33 kV, 132 kV voltage level transmission lines and Dhalkebar (Nepal) – Muzaffarpur (India) 400 kV D/C line.
- For evacuating power from Arun-3 (900 MW) HEP in Nepal and other hydro projects in the vicinity in future, Arun-3 HEP (Nepal) – Dhalkebar (Nepal) – Sitamarhi (India) 400 kV D/c (Quad) line is under implementation.
- 400 kV Gorakhpur – New Butwal D/c (Quad) line to facilitate increased transfer of power between the two countries is also under implementation.
- Further, Inaruwa (Nepal) - Purnea New (India) 400 kV D/c (Quad Moose) line and New Lumki (Dododhara) (Nepal) - Bareilly (India) 400 kV D/c (Quad Moose) line are also agreed.

3.9.4 Indo-Myanmar Cross Border Interconnections and Power Trade

- India is providing about 2-3 MW of power (Since 5th April 2016) from Manipur (India) to Myanmar through 11 kV electric line from Moreh in Manipur (India) to Tamu town in Myanmar.
- Further, a brief scope of works for India – Myanmar high capacity interconnection through Imphal - Tamu 400 kV D/C cross-border interconnection between India and Myanmar with 500 MW HVDC back-to-back terminal at Tamu for drawl of power by Myanmar has been agreed.

3.9.5 Guidelines for Import/Export (Cross Border) of Electricity

- Guidelines for Import/Export (Cross Border) of Electricity were issued by Ministry of Power on 18.12.2018 to facilitate import/export of electricity between India and neighboring countries.
- Procedure for approval and facilitating Import/Export (Cross Border) of Electricity by the Designated Authority was issued on 26.02.2021.
- Verification Mechanism for export of power from eligible fuel by generating stations under Import/Export (Cross Border) of Electricity-Guidelines 2018 were issued by the Ministry of Power on 5th March, 2021.

3.9.6 Approvals granted by Designated Authority for Import/Export (Cross Border) of Electricity during 2022-23.

- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 14.55 MW of power to India from Devighat Hydropower Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 1st May, 2022 – 30th April, 2023
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 23.28 MW of power to India from Trishuli Hydropower Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 1st May, 2022 – 30th April, 2023

- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 51 MW of power to India from Likhu-IV Hydro Electric Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market 2023 through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 1st June, 2022 – 31st May, 2023
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 140 MW of power to India from Kaligandaki 'A' Hydropower Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 1st June, 2022 – 31st May, 2023
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of 60 MW of power to Nepal Electricity Authority (NEA), Nepal, from Indian Power Exchange(s) - Day Ahead Market through Tanakpur-Mahendranagar 132 kV S/c line from 26th April 2022 to 31st March, 2023.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 67 MW of power to India from Marsyangdi Hydropower Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 05.04.2022 to 30.04.2022.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 68 MW of power to India from Middle Marsyangdi Hydropower Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 1st June, 2022 – 31st May, 2023
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of up to 67 MW of power from Marsyangdi Hydropower Project, Nepal to India (Import by India) through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market through Muzaffarpur-Dhalkebar 400 kV D/c line for a period from 1st June, 2022 – 31st May, 2023.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for import of up to 21.44 MW of power from Chilime Hydro Power Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market from 31.10.2022 to 30.04.2023.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for import of up to 22.8 MW of power from Solu Hydro Power Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market from 11.11.2022 to 30.04.2023.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for import of up to 24.25 MW of power from Kabeli B-1 Hydro Power Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market from 26.12.2022 to 30.09.2023.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for import of up to 19.4 MW of power from Lower Modi Hydro Power Project, Nepal through NVVN in Indian Power Exchange(s) (PX) - Day Ahead Market from 26.12.2022 to 30.09.2023.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of upto 30 MW of power to Nepal Electricity Authority (NEA), Nepal, from Indian Power Exchange(s) - Day Ahead Market through Tanakpur-Mahendranagar 132 kV S/c transmission line for a period from 1st April, 2023 to 31st March, 2024.
- Approval to NTPC Vidyut Vyapar Nigam Limited (NVVN) for export of upto 400 MW of power to Nepal Electricity Authority (NEA), Nepal, from Indian Power Exchange(s) - Day Ahead Market through Muzaffarpur - Dhalkebar 400 kV D/C line for a period from 1st April, 2023 to 31st March, 2024.
- Approval to PTC India Limited (PTCIL) for import of upto 600 MW of power on behalf of Druk Green Power Corporation Limited, Bhutan (export from India to Bhutan) through Indian Power Exchange(s) - Day Ahead Market for a period from 09.12.2022 up to 30.04.2023.

3.10 Miscellaneous works

3.10.1 Green Energy Corridor

a) Transmission Works under Green Energy Corridors-I

The report on Green Energy Corridor had been prepared by PGCIL as a comprehensive scheme for evacuation & integration of the renewable energy (RE) capacity addition of 32,713 MW during 12th Plan Period. Total fund requirement of Rs 34,141 Crore was initially assessed for the development of the transmission system and control infrastructure for the addition of RE capacity in the renewable rich States of Andhra Pradesh, Gujarat, Himachal Pradesh, Jammu and

Kashmir, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh and Tamil Nadu.

Intra State transmission schemes are to be funded as 20% equity of the State Govt., 40% grant from National Clean Energy Fund (NCEF) and 40% soft loan, whereas, the Inter State transmission schemes are to be funded as 30% equity by PGCIL and 70% soft loan.

For the funding of green energy corridors in both intra and inter State transmission projects, under the framework of cooperation between Govt. of India and Govt. of Germany, KfW Germany is providing soft loan to the tune of Euro 1 Billion. For Inter-state transmission projects pertaining to Part A, B and C of Green Energy Corridor, Loan agreement for financial assistance of Euro 500 million from KfW, Germany has been signed by PGCIL. For implementation of transmission schemes under Green Energy Corridor-Part D, POWERGRID has taken loan from ADB. All the transmission schemes have been commissioned.

For Intra-State transmission projects under Green Energy Corridor; Tamil Nadu, Rajasthan, Himachal Pradesh, Andhra Pradesh, Gujarat and Madhya Pradesh have signed the loan agreements from KfW, Germany for financial assistance of Euro 76 million, Euro 49 million, Euro 57 million, Euro 68 million, Euro 114 million and Euro 124 Million respectively.

In Green Energy Corridor-I (GEC-I) scheme, under ISTS, around 17,000 MVA substation capacity and 3,200 ckm of transmission lines were planned and the same has been commissioned. Under InSTS around 22,600 MVA substation capacity and 9,700 circuit kilometres (ckm) of transmission lines were planned, most of which have been commissioned. The remaining InSTS schemes which are presently under implementation, are likely to be commissioned by December, 2023.

b) Transmission Works under Green Energy Corridors-II

Intra- state transmission schemes for power evacuation and grid integration of RE generation projects in seven States (Kerala, Uttar Pradesh, Tamil Nadu, Gujarat, Himachal Pradesh, Karnataka and Rajasthan) have been approved by the Government with an estimated cost of Rs 12,031 Crore with Central Financial Assistance (CFA) @33% of project cost to the States. The scheme includes setting up of 10,753 ckm of transmission lines and 27,546 MVA transformation capacity of substations. About 19.4 GW RE capacity is planned to be integrated in to the intra-state system under Green Energy Corridor-II (GEC-II) schemes. The states are preparing packages and are in process of issuing tenders for implementation of intra-state transmission schemes under GEC-II Scheme. Further, Himachal Pradesh, Uttar Pradesh and Rajasthan had proposed some revision in their transmission schemes under GEC-II Scheme. Some of the revised schemes have been approved and some schemes are under examination.

3.10.2 Study, analysis and formulation of policies on specific issues relating to transmission

a) National Electricity Plan (Volume II: Transmission)

Transmission planning studies are being carried out for the year 2026-27 and 2031-32 for preparation of National Electricity Plan (Volume II: Transmission). Studies are being carried out to evolve a composite system for evacuation of power from generation projects, system strengthening schemes etc till the year 2026-27 and 2031-32.

b) Transmission System for integration of over 500 GW non-fossil fuel capacity by 2030

India is moving towards clean energy sources and plans to integrate non-fossil fuel based power generation capacity to the extent of 50% in the installed capacity mix by 2030. The installed electricity generating capacity in the country as on 31st March, 2023, was 416 GW comprising of about 179 GW from non-fossil fuel sources, which is about 43% of the total installed electricity generating capacity.

For evacuation of power from the planned RE capacity by 2030, a robust transmission system needs to be in place in advance as the gestation period of wind and solar based generation projects is much less than that of associated transmission system.

A high level committee under the Chairperson, Central Electricity Authority, and heads of Power Grid Corporation of India Ltd, Grid Controller of India Limited, Central Transmission Utility of India Ltd, Solar Energy Corporation of India, National Institute of Wind Energy and National Institute of Solar Energy was constituted to plan for requisite transmission system under ISTS by 2030. The Committee prepared the Plan titled "Transmission System for Integration of over 500 GW RE Capacity by 2030"

The Plan identified major upcoming non-fossil fuel based generation centres in the country, which include Fatehgarh, Bhadla, Bikaner in Rajasthan, Khavda in Gujarat, Anantapur, Kurnool RE Zones in Andhra Pradesh, offshore wind potentials in Tamil Nadu and Gujarat, RE park in Ladakh etc. and based on these potential generation centres, broad transmission system has been planned.

The planned additional transmission system under ISTS for integration of about 537 GW of RE generation capacity by the year 2030 includes 8,120 ckm of HVDC Transmission corridors (+800 kV and +320 kV), 25,960 ckm of 765 kV lines, 15,758 ckm of 400 kV lines and 1,052 ckm of 220 kV cables. The additional transformation capacity requirement by 2030 is about 4,33,575 MVA. The total estimated cost of additional ISTS transmission scheme for integration of the planned RE capacity is about Rs 2.44 lakh crore.

The plan was launched by Hon'ble Union Minister for Power and NRE on 07.12.2022. The plan will provide visibility to the Renewable Energy Developers about the potential generation sites and scale of investment opportunity. Further, it will also provide the Transmission Service Providers the vision of growth opportunities available in the transmission sector.

Shri R K Singh Union Minister for Power and NRE launches plan "Transmission System for Integration of over 500 GW RE Capacity by 2030". Shri Krishan Pal Gurjar, Minister of State for Power, Shri Bhagwanth Khuba, Minister of State for NRE, Shri Alok Kumar, Secretary Power and Shri Bhupinder Singh Bhalla, Secretary NRE, Shri Ghanshyam Prasad, Chairperson CEA and Shri Ajay Yadav, JS NRE were present.

3.11 Formulation/review of Regulations, Guidelines and audit.

a. Procedure for Shifting of Transmission Lines involving in work by other Infrastructure Developers was published.
b. Specification for Bird Flight Diverter was published.
c. Standard Technical Specification for Steel Monopole Structures for AC Transmission Lines was published.
d. Report of Committee to look into issues raised by Electric Power Transmission Association (EPTA) regarding clarity on Operation & Maintenance (O&M) roles and responsibilities of existing substation owners was issued.
e. Report on technical feasibility of transmission system that can be built in the great Indian bustard (GIB) areas was prepared and sent to MoP.

3.12 Representation/ Nomination in the Committees

a) Chairman of the Standing committee of experts to investigate the failure of
   - Towers of transmission lines of 220kV & higher voltages of power utilities
   - equipment of 220kV and above substation
b) Member of the Committee in CEA to suo moto scrutinize tenders floated for Public Procurement having value Rs. 500 crores.
c) Member of Sub group for Techno- Economic appraisal of DPRs for system improvement under PSDF funding.
d) Member of Technical Committee on Transmission Research for Review, recommendation & monitoring of R&D

proposals under IHRD, RSOP, NPP schemes of MoP, Govt. of India.

e) Member of the committee for creation of manufacturing hub for indigenization of power sector equipment.

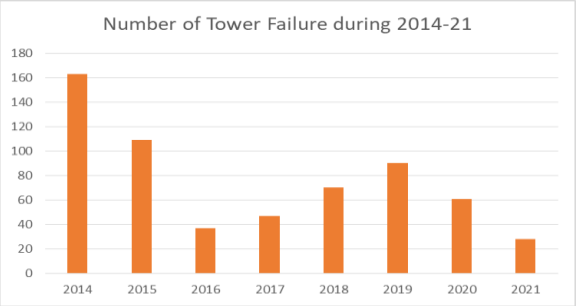
f) Member of various Technical Committees of BIS pertaining to EHV transmission lines (Conductor, Earthwire, insulator & hardware and transmission line towers) and substations (surge arrestor, switchgear, transformer, HVDC, power electronics, high voltage engineering, battery etc.).

g) Member Convener of Committee on Study the suggestion of Telangana to adopt transmission towers with increased height in forest areas to facilitate Forest Clearance

3.13 Analysis of causes of failure of transmission line towers and substation equipment.

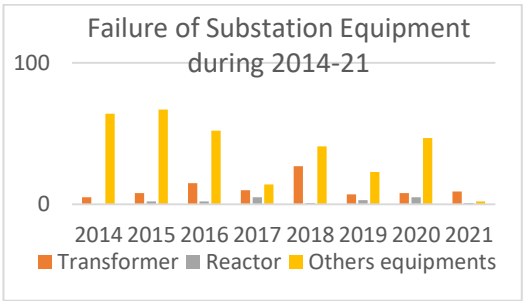
a) Transmission Line Towers:

As a part of the activity of the Standing Committee to assess the causes of failure of various Transmission Line Towers of 220 kV and above voltage levels, CEA officers visit failure sites, investigate the failure and based on these a report is published. The trend of failures as per the report published from 2014 to 2021 is given below.



b) Substation Equipment failures:

As a part of the activity of the Standing Committee to assess the causes of failure of various Substation Equipment of 220 kV and above voltage levels, CEA officer visited failure sites and investigation was carried out. A detailed report suggesting remedial measures is published. The trend of failures from 2014 to 2021 of major equipment as per published report is given below.



3.14 Inputs on various Transmission schemes based on Tariff based competitive bidding

Inputs relating to Specific Technical Requirements for transmission lines and sub-stations in Request for Proposal (RfP) documents of the various projects to be awarded through TBCB is provided. Clarification to bidders on various technical queries is provided and participation in bid evaluation committee is carried out. Cost committee which has been constituted under the Chief Engineer level officer of CEA estimate the cost of the Scheme. In 2022-23 following schemes for which work pertaining to technical specification/cost estimation/ bidders' queries/participation in bid evaluation was carried out.

S. No.	Name of the Transmission Scheme
1.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1), Part-B
2.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1), Part-C
3.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1), Part-D
4.	Transmission scheme for injection beyond 3 GW RE power at Khavda PS1 (KPS1)
5.	Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park
6.	Establishment of Khavda Pooling Station-3 (KPS3) in Khavda RE Park"
7.	Transmission scheme for evacuation of 4.5 GW RE injection at Khavda PS under Phase-II (Part A)
8.	Transmission scheme for evacuation of 4.5 GW RE injection at Khavda PS under Phase-II (Part B)
9.	Transmission scheme for evacuation of 4.5GW RE injection at Khavda P.S. under Phase-II- Part C
10.	Transmission scheme for evacuation of 4.5GW RE injection at Khavda P.S. under Phase-II- Part D
11.	Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under phase III –Part A1
12.	Transmission system for evacuation of

	power from REZ in Rajasthan (20 GW) under phase III –Part A3
13.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part B1
14.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part C1
15.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part D
16.	Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase – III Part F
17.	Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under Phase III–Part G
18.	Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under phase III-Part H
19.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex): Part-C
20.	Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex): Part-D
21.	Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka
22.	Transmission Scheme for Evacuation of power from Neemuch SEZ
23.	Transmission Scheme for integration of Renewable Energy Zone (Phase-II) in Koppal-II (Phase-A) and Gadag-II (Phase-A) in Karnataka
24.	Transmission Scheme for integration of Renewable Energy Zone (Phase-II) in Koppal-II (Phase-B)) in Karnataka
25.	Transmission scheme for evacuation of 1500 MW from Gadag SEZ under Part A Phase- II
26.	Transmission system for evacuation of power from Luhri Stage-I HEP
27.	ISTS Network Expansion scheme in Western Region & Southern Region for export of surplus power during high RE scenario in Southern Region
28.	Transmission Network Expansion in Gujarat associated with integration of RE projects from Khavda potential RE zone
29.	Transmission Scheme for North Eastern Region Expansion Scheme-XVI (NERES-XVI)
30.	Creation of 400/220 kV, 2x315 MVA S/S at Siot (earlier Akhnoor/Rajouri) as ISTS
31.	400 kV Khandukhal (Srinagar) - Rampura (Kashipur) D/c line
32.	Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh

3.15 Technical advice/inputs on Transmission lines and Substation

a) Technical advice to transmission utilities regarding re-routing of transmission lines was provided on regular basis.
b) Examination of Cost Escalation aspect of PMRP-2004 Scheme.
c) DPRs submitted by utilities for funding under PSDF Scheme was examined and participated as member of techno-economic sub-group.

3.16 Construction Monitoring of Transmission Projects

The monitoring of construction of transmission lines and sub-station (220 kV and above) covered under various transmission projects under central/state/private sector is being carried out with a view to achieve timely completion of transmission projects to ensure evacuation of power from new Generation Projects as well as strengthening of existing transmission network required for transmission of power to load centers.

The delay in execution of transmission projects are primarily due to RoW, compensation issues, forest issues, contractual issues, poor financial condition of the executing agencies, land acquisition for substation, delay in getting statutory approval from various agencies like Railways & State / National Highway Authority etc and law and order problem.

In respect of transmission lines, 14,581 ckm was targeted for FY 2022-23 as per the details given below;

Voltage Level (kV)	±800 kV HVDC	±500 kV HVDC	765	400	220	Total
Transmission Line length (ckm)	0	0	1658	6651	6272	14,581
Transmission Line length (ckm)	0	0	1655	3772	9198	14,625

Against the above target of 14,581 ckm, total 14,625 ckm has been commissioned, achieving over 100 % of target during FY 2022-23.

Details of transmission lines commissioned /completed during FY 2022-23 are given in **Annexure-3D.**

Similarly, in respect of substations, 78,959 MVA of transformation capacity was targeted for FY 2022-23 as per the details given below;

Voltage Level (kV)	±800 kV HVDC	±500 kV HVDC	±320 kV HVDC	765	400	220	Total
Sub-Station transformation capacity (MVA)	0	0	0	24,000	33,500	21,459	78,959

Against the above target, total 75,902 MVA transformation capacity has been commissioned during FY 2022-23.

Thus, overall achievement in respect of Transformation capacity in Sub-stations is 96.13%. Details of substations commissioned / completed during FY 2022 are given in **Annexure-3E.**

Voltage-wise/Sector-wise program V/S achievement for the financial year 2022-23 in respect of transmission lines and sub Stations (220 kV and above voltage level) are given in **Charts I to VII** and **VIII to XV** respectively.

Growth of Transmission lines (in ckm) and Transformation capacity in Sub-stations (in MVA) since FY 2014-15 to FY 2022-23 is as under:

Year	Transmission Lines (in ckm)	Transformation Capacity (in MVA)
2014-15	313437	596100
2015-16	341551	658949
2016-17	367851	740765
2017-18	390970	826958
2018-19	413407	899663
2019-20	425071	967893
2020-21	441821	1025468
2021-22	456716	1104450
2022-23	**471341**	**1180352**

A national grid in the country has been developed in a phased manner. All the regional grids have been inter-connected synchronously to form One Nation-One grid — One frequency. Inter-regional transmission capacity by the end of 9th plan was 5,750 MW which increased to 13,450 MW by the end of 10th plan and to 27,150 MW and 75,050 MW by the end of 11th and 12th plan respectively. Interregional transmission capacity added during plan period 2017-22 is 37,200 MW. As on 31.03.2023, inter-regional transmission capacity in the country is 1, 12,250 MW. Details of interregional transmission lines are given at **Annexure-3A**. The increase in inter-regional transmission capacity would further facilitate smooth flow of power from surplus to deficit regions.

Voltage Level (kV)	±800 kV HVDC	±500 kV HVDC	±320 kV HVDC	765	400	220	Total
Sub-Station transformation capacity (MVA)	0	0	0	19,500	32,635	23,767	75,902

Total 14,625 ckms of transmission line and 75,902 MVA of transformation capacity in substations (220 kV and above voltage levels) have been added during the financial year 2022-23 resulting in all India transmission lines network of 4,71,341 ckms and 11,80,352 MVA of the transformation capacity (220 kV and above voltage level) as on 31st March 2023.

For the year FY 2023-24, Programme for Transmission Lines and Transformation Capacity (Substations) is as under.

Annual Target for FY 2023-24:

Transmission line (ckm)	16,602
Substation (MVA)	78,109

3.17 Inspection of Electrical Installation:

The Chief Electrical Inspector and Electrical Inspectors appointed by the Central Government under section 162 of the Electricity Act, 2003 discharge the functions described in "The Qualifications, Powers and Functions of Chief Electrical Inspector and Electrical Inspectors Rules, 2006". These rules stipulate the statutory inspection of electrical installations as per Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended). The Chief Engineer of Chief Electrical Inspectorate Division is appointed as Chief Electrical Inspector to the Government of India

and is assisted by the Electrical Inspectors and the officers from five Regional Inspectorate Organizations (RIOs) in discharging the various responsibilities, briefly described as under:

(a) Periodic inspection of electrical installations for compliance under Regulation 30 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended).
(b) Inspection of new electrical installations under Regulations 43 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended) for according approval for first time charging of electrical installation of voltage exceeding the notified voltage.
(c) Amendment of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 (as amended) as and when necessitated.
(d) Inquiry of fatal and non-fatal electrical accidents.
(e) Collection of Statistics, Return & information relating to electrical accidents in Format-19 & 20 under "Furnishing of Statistics, Returns & Information rules 2007".
(f) Advising stakeholders in the matter related to the electrical safety.
(g) Conducting electrical safety awareness workshops/seminars.

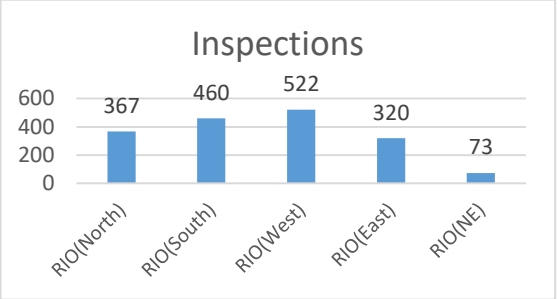
3.18 Review of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010:

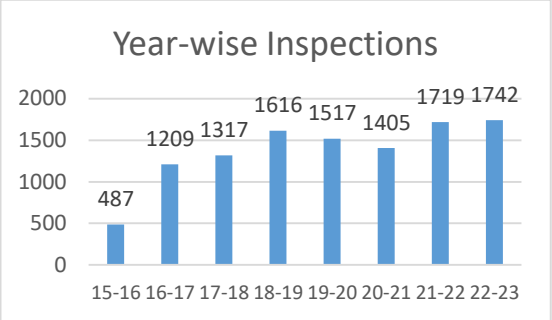
A comprehensive review of the above mentioned regulations is under process and Regulations are likely to be notified in June 2023 as Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023.

3.19 Major achievement in terms of Inspections during the year 2022-23:

3.19.1 New electrical installations/ apparatus inspected under Regulation 43 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended): -

A. The region wise summary of total inspections carried out during 2022-23 is given below: -





B. Major Power System Elements inspected:

1) Substations:

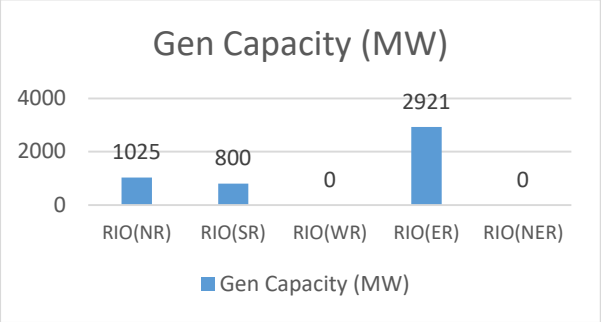
- Substations of the capacity 765 kV, 400 kV, 220 kV, 132 kV and HVDC are being inspected by the Electrical Inspector.
- Summary of capacity of substation electrical apparatus inspected at different voltage levels during the year 2022-23 is as follows: -

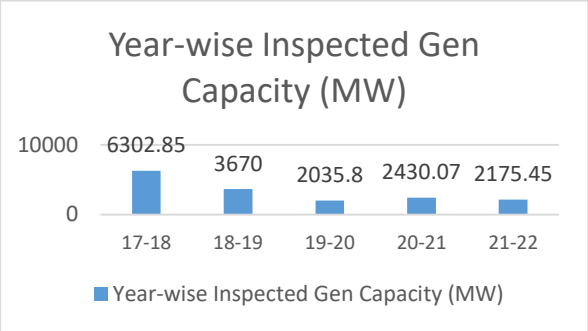
Apparatus and Voltage level	Transformer/ ICT (MVA)	Reactors (MVAr)	Capacitors (MVAr)	Bays (nos)	Bus (nos)	Stat com (nos)
765 kV	14079	5803	NIL	44	62	NIL
400 kV	13535	3971	NIL	139	51	1
220 kV	3816	510	NIL	149	19	NIL
132 kV	285.5	NIL	NIL	6	NIL	NIL
66 kV	197.5	NIL	NIL	21	NIL	NIL
33 kV & Below	8950	NIL	603	23	7	NIL

(The data above are based on the cumulative inspections carried out by all RIOs).

2) Generating Units:

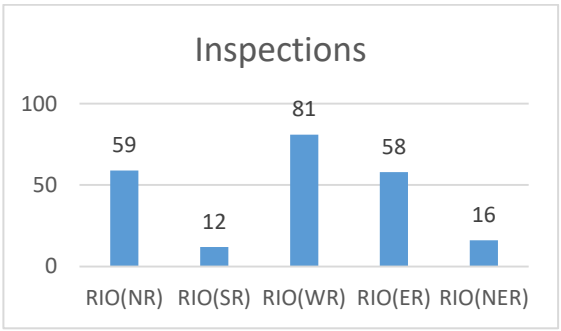
- The region wise summary of inspections carried out is given below: -

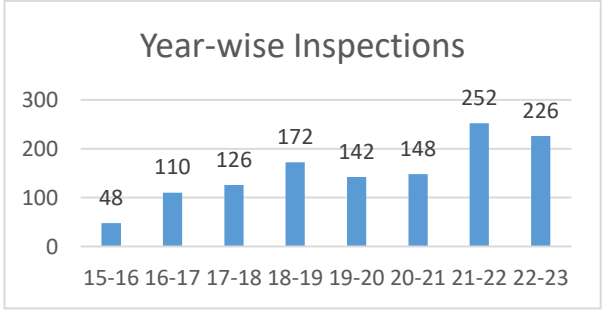




3) Transmission Lines:

- Transmission Lines of the capacity of 765 kV, 400 kV, 220 kV, 132 kV and HVDC are being inspected by the Electrical Inspector.
- The region wise summary of inspections carried out is given below: -





- Circuit kilometers of transmission lines inspected at different voltage levels: -

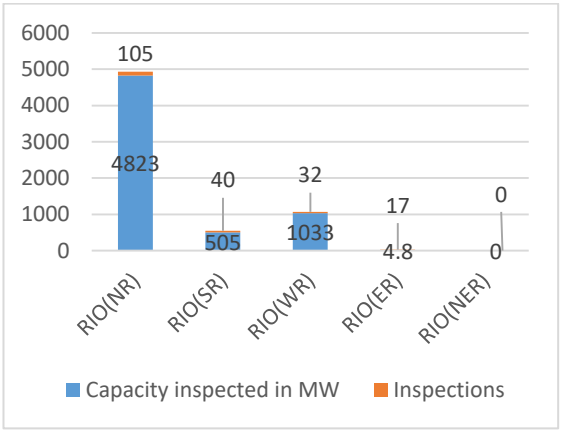
(in ckm)

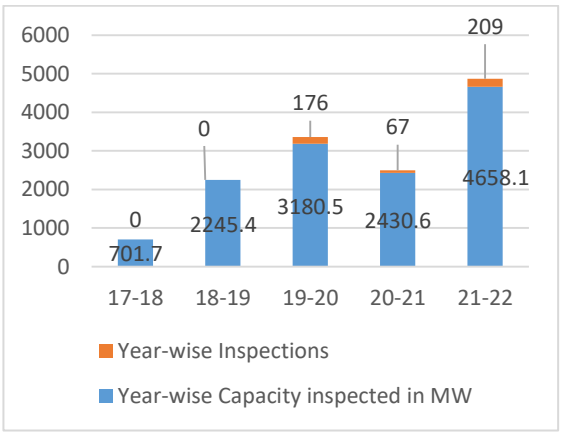
RIOs	NR	SR	WR	ER	NER
765 kV	NIL	NIL	910	NIL	NIL
400 kV	215	NIL	11	519	365
220 kV	294	63.5	194	539	115
132 kV	NIL	NIL	23	NIL	249
110 kV	NIL	NIL	NIL	NIL	NIL
66 kV	NIL	NIL	NIL	NIL	NIL
33 kV	238	1	2	14	NIL
11 kV	4.5	4	23	1	NIL
800 kV HVDC	NIL	NIL	NIL	NIL	NIL

The data above are based on the cumulative inspections carried out by all RIOs

C. Inspections carried out in respect of Renewables:

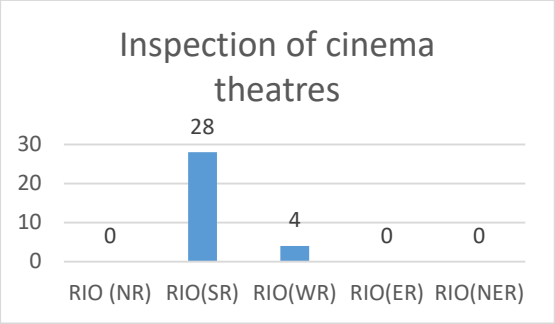
The region wise summary of inspections carried out is given below:-

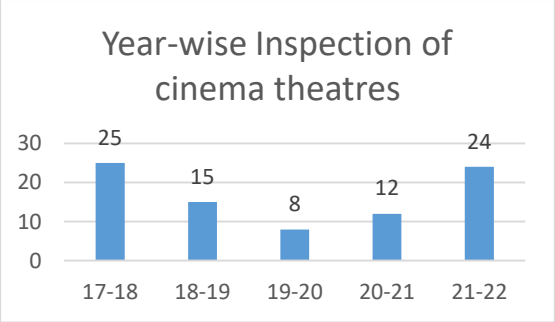




D. Cinema Halls/ Theatres inspected: -

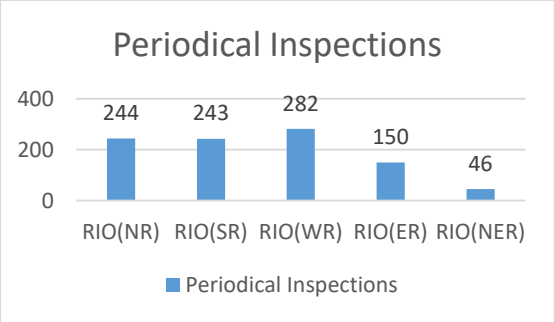
A summary of Cinemas/Theatres inspected during the year 2022-23 is given below:

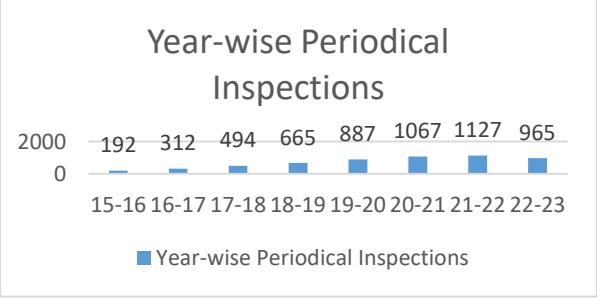




3.19.2 Periodic Inspections under Regulation 30 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010

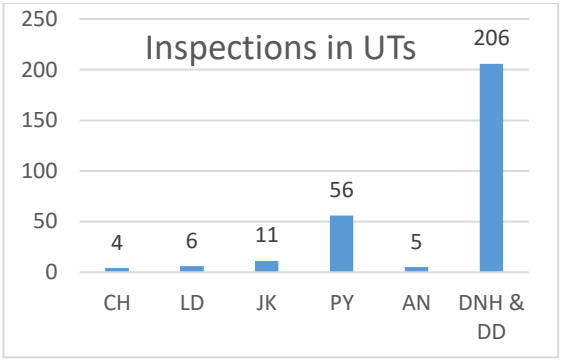
Summary of Periodic Inspections carried out during the year 2022-23 is given below:

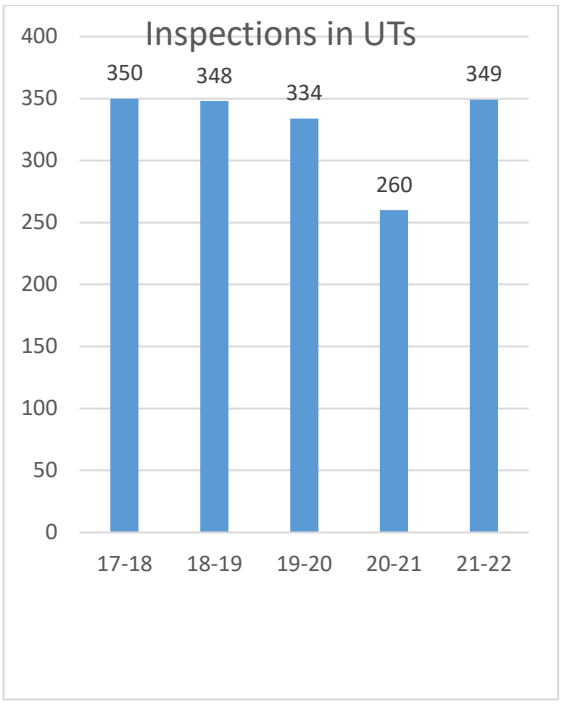




3.19.3 Inspections carried out in Union Territories

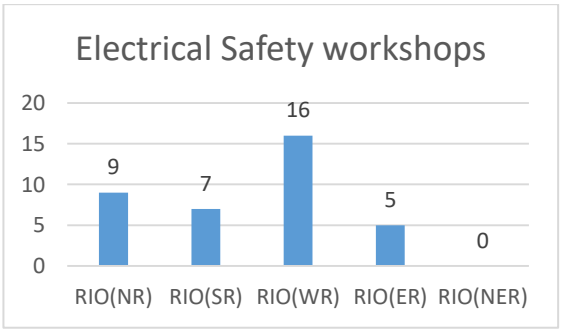
A summary of Inspections done in Union Territories during the year 2022-23 is given below:

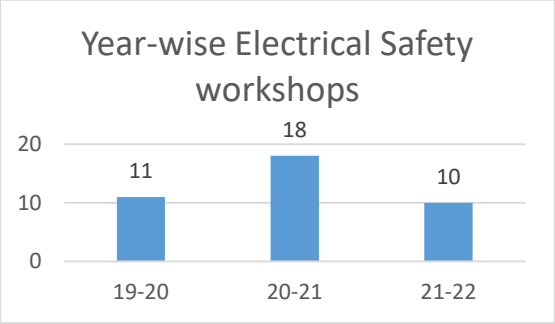




3.19.4 Electrical safety awareness workshops/seminars

Summary of Electrical safety awareness workshops/seminars conducted during the year 2022-23 is given below:





3.20 Preparation of Manual of Communication Planning in Power System Operation

In order to ensure safe, secure, stable and reliable operation of the grid as well as the economical and integrated operation of the electricity system, the Communication System plays a critical role. Accordingly, a need is felt to carry out the planning for the Communication System in Power Sector.

In view of the above, it was envisaged that a Manual of Communication Planning in Power System Operation should be formulated which will help in efficient, coordinated and uniform planning of the Communication System by CTU/STUs/Users. Central Electricity Authority (Technical Standard for Communication System in Power System Operations) Regulations, 2020 under clause 8 (3) also mandates that design and planning of the communication system shall be in accordance with communication planning criteria.

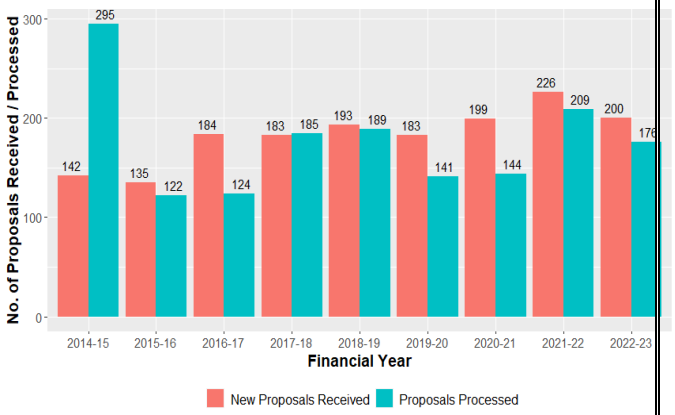
Accordingly, Manual of Communication Planning in Power System Operation which covers planning philosophy, planning criteria, guidelines, planning tools, security and interoperability was approved by the authority on 31.03.2022.

<u>Power & Telecommunication Co-ordination Committee (PTCC)</u>

Section 160 of the Electricity Act, 2003 provides all reasonable precautions to be taken by the operator in laying down and placing his electric lines or electrical plant so as not to injuriously affect by induction, the working of telephonic and electric signaling lines.

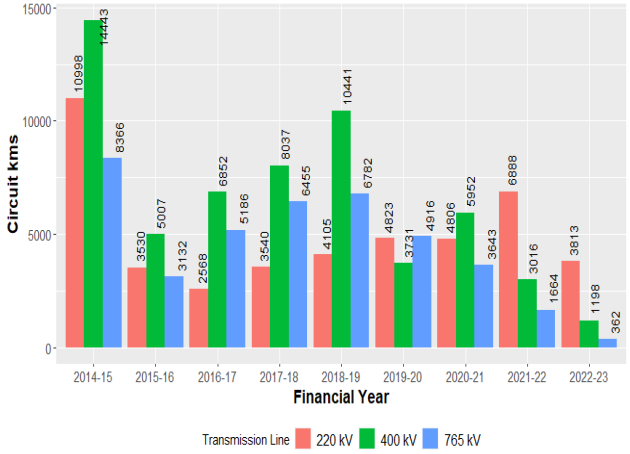
To ensure safe co-existence of Power & Telecommunication System, Central level Power and Telecommunication Coordination Committee (CLPTCC) was constituted.

During the year 2022-23, 200 nos. of new cases of EHV power lines (220 kV and above) were received and Induced Voltage Calculation for 176 nos. of cases have been processed for PTCC route approval. A bar chart indicating the number of cases received/processed for PTCC route approval from 2014-15 to 2022-23 financial years is given below:



During the year 2022-23, Induced Voltage Calculation for about 3813 Circuit kilometers of 220 kV lines, 1197 Circuit kilometers of 400 kV lines and 362 Circuit kilometers of 765 kV lines have been done. It is pertinent to mention that during 2022-23, due care has been taken to process PTCC cases of those transmission lines which were required to be charged on urgent basis; and with the result there has been no delay of charging of any line for want of PTCC approval.

A bar chart indicating the Circuit kilometers of 220kV, 400kV and 765kV transmission lines, for which Induced Voltage Calculations were done from 2014-15 to 2022-23 is given below:



Power Communication Development Division continues to strive for prompt computation of Induced voltages for PTCC clearance of EHV transmission lines of voltages 220 kV and above. Regular follow-up has been done with Bharat Sanchar Nigam Ltd. (BSNL), Railways, Defense and SEBs/Power Utilities to expedite PTCC clearances. The Division also rendered assistance to the State Power Utilities in resolving PTCC cases of voltage level of 132 kV and below.

3.21Providing technical advice for Reliable Communication System in Power Sector

PCD Division provides technical advices related to Communication System in Power Sector and its up gradation. PCD Division is involved in vetting of proposals from transmission licensees, finalization of RfPs and analyzing feasibility of various communication technologies suitable for power sector.

During the year 2022-23, finalization of following RfPs has been done.

3.22 Frequency Allocation Co-ordination for Power Line Carrier Communication (PLCC)

PCD Division coordinates and follows up with Wireless Planning and Coordination (WPC) Wing of Department of Telecommunications (DoT) to achieve timely frequency allocation for PLCC links of new power transmission lines of power utilities in the country.

S. No.	Name of the transmission line
1.	220 kV D/C Transmission line from 220/132 kV substation at Dehan (Patti), Dist Kangra (H.P) to PowerGrid 400/220 kV substation kankari, Hamirpur (H.P)
2.	400 kV D/C Transmission line HPPTCL's 400/200/33 kV substation at Lahal, Chamba (H.P) to Powergrid 400/220 kV substation Rajera, Chamba (H.P)
3.	220 kV Transmission Line from Kotda Madh Pooling substation to Bhuj Pooling Substation.

CHAPTER – 4

GRID OPERATION AND MANAGEMENT

4.1 Organizational Structure in Grid Operation and Management

The Central Government has established Regional Power Committee (RPC) in each region in accordance with the provisions of Electricity Act, 2003 to facilitate integrated operation of the power system in that region. The real time operation of the power system is looked after by the Regional Load Dispatch Centers (RLDCs) set up in the five Regions and at the national level by National Load Dispatch Centre (NLDC). The Regional Power Committee is a conglomerate of all the players partaking in grid operation, i.e. Regional Load Dispatch Centre, generating companies, transmission utilities, distribution utilities, power traders, etc. Its Secretariat is manned by the officers of Central Electricity Authority (CEA).

The Regional Power Committee(RPC) operates through a number of Sub-Committees, viz. Operation Sub Committee, Commercial Sub Committee, Protection Sub Committee, System Studies Sub Committee and Technical Coordination Sub Committee. The Operation Sub Committee meets every month to review the grid operation in the previous month and plan grid operation for the next month. The Commercial Sub Committee discusses commercial issues viz. energy accounting related matters, matters pertaining to Special Energy Meters (SEMs), settlement of dues, etc. The Protection Sub Committee discusses and analyses the various tripping's which took place since its last meeting and recommends/monitors the corrective actions to avoid recurrence of such trippings. It also finalizes the various protection schemes including protection coordination. The System Studies Sub Committee meets periodically for the purpose of system studies related to assessment of network elements for reactive compensation, operational load flow, transient stability studies etc. The Technical Coordination Sub-Committee (TCC) meets before the Regional Power Committee for deliberating on the various technical, operational and commercial issues and the decisions are placed forth for final resolution in the Regional Power Committee. The RPCs play an important role in planning grid operation, since they are responsible for protection coordination, outage planning of generating units and transmission system, planning reactive compensation etc. Member (Grid Operation & Distribution), CEA is also a Member of the Regional Power Committees and guides the Committees to arrive at amicable solutions with uniformity of approach through unbiased decisions. Apart from RPCs, the Ministry of Power (MoP) had vide Order dated 25th March, 2013, established the National Power Committee (NPC) to evolve a common approach to issues related to reliability and security of the grid.

CEA monitors the power supply position in the country, prepares the All-India monthly power supply position report, harmonizes all matters of grid operation and management between the five Regions, coordinates enquiry of grid disturbances, recommends to the Ministry of Power the quantum of allocation from Central Generating Stations and also facilitates the implementation of the allocation through the Regional Power Committees. The anticipated Power Supply Position for the next year known as Load Generation Balance Report (LGBR), is also prepared every year.

4.2 Power Supply Position

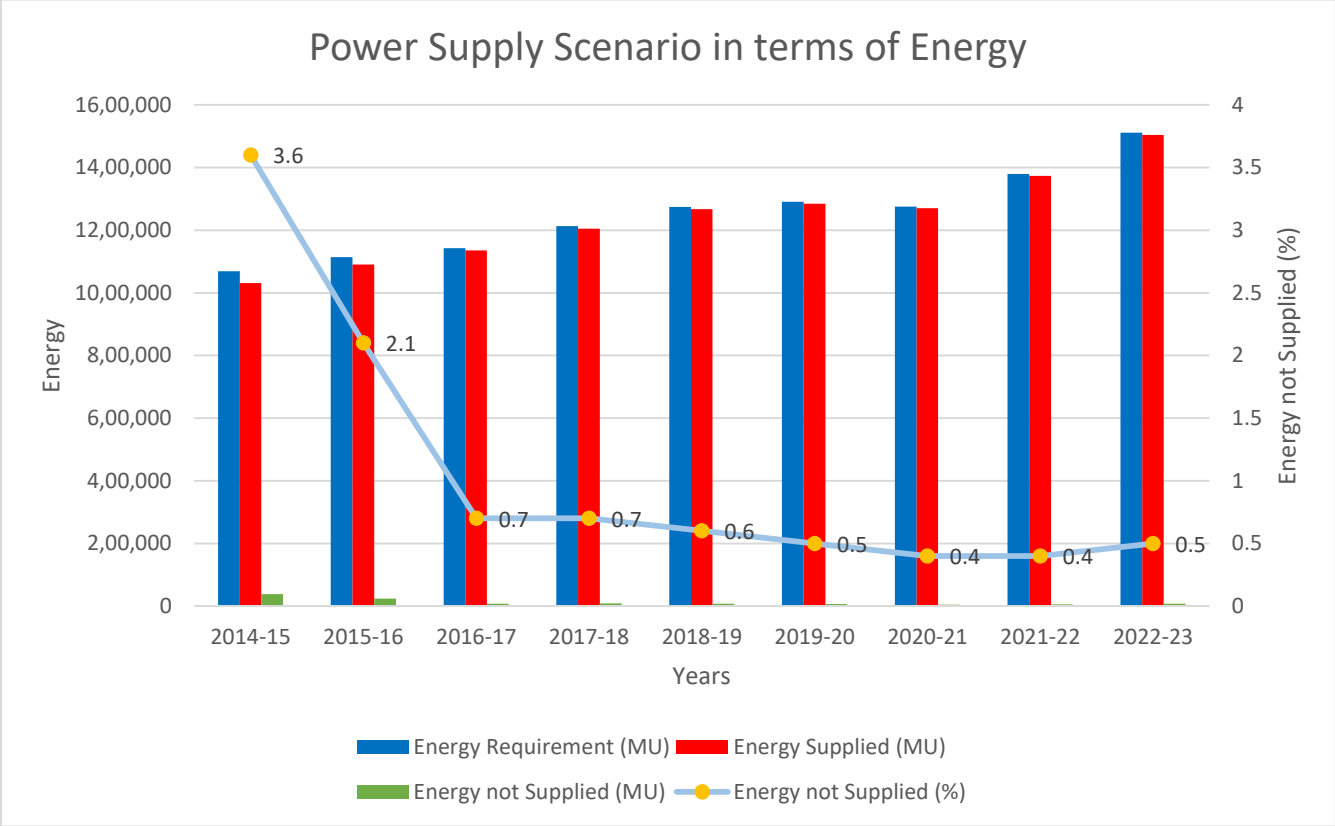
The Central Electricity Authority brings out the All India Power Supply Position on a monthly basis, both in terms of Energy and Peak, giving the Energy Requirement, Energy Supplied in Million Units (MUs) and Energy not supplied in Million Unit (MU) as well as in percentage and the Peak Demand, Peak Met in Mega Watt (MW) and Demand not Met in MW as well as in percentage. The total Energy Requirement in the country during the year 2022-23 was 15,11,8 47 MU as against 13,79,812 MU during the previous year 2021-22, registering a increase of 9.6%. The total Energy Supplied in the country during the year 2022-23 was 15,04,264 MU as against 13,74,024 MU during the previous year 2021-22, registering a increase of 9.5%. The Energy not Supplied during the year 2022-23 was 7,583 MU (0.5%) against 5,787 MU (0.4%) during the previous the year 2021-22. The Peak Demand during the year 2022-23 was 2,15,888 MW as against 2,03,014 MW during the previous year 2021-22, registering an increase of 6.3%. The Peak Met during the year 2022-23 was 2,07,231 MW as against 2,00,539 MW during the previous year 2021-22, registering an increase of 3.3%. The Demand not Met during the year 2022-23 was 8,657 MW (4%) as against 2,475 MW (1.2%) during the previous year 2021-22.

In the context of power supply, it may be mentioned that there is adequate availability of electricity in the country. The marginal gap between demand and supply of electricity is generally on account of factors other than inadequacy of power availability in the country e.g. constraints in distribution network, financial constraints, commercial reasons, forced outage of generating units etc.

The Power supply position since 2014-15 is as under:

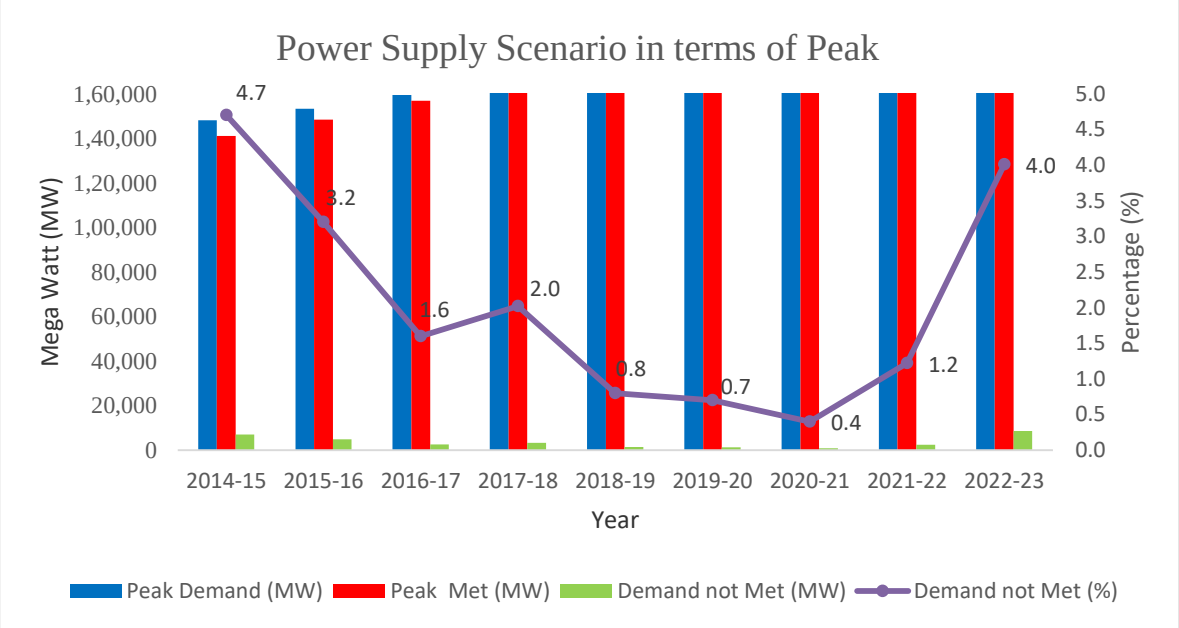
ENERGY:

Year	Energy Requirement (MU)	Energy Supplied (MU)	Energy not Supplied	
			(MU)	(%)
2014-15	1,068,923	1,030,785	38,138	3.6
2015-16	1,114,408	1,090,850	23,558	2.1
2016-17	1,142,928	1,135,332	7,596	0.7
2017-18	1,213,326	1,204,697	8,629	0.7
2018-19	1,274,595	1,267,526	7,070	0.6
2019-20	1,291,010	1,284,444	6,566	0.5
2020-21	1,275,534	1,270,663	4,871	0.4
2021-22	1,379,812	1,374,024	5,787	0.4
2022-23	1,511,847	1,50,4264	7,583	0.5


Power Supply Scenario in terms of Energy
16,00,000
14,00,000
12,00,000
10,00,000
8,00,000
6,00,000
4,00,000
2,00,000
0
Energy
4
3.5
3
2.5
2
1.5
1
0.5
0
Energy not Supplied (%)
3.6
2.1
0.7
0.7
0.6
0.5
0.4
0.4
0.5
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22
2022-23
Years
Energy Requirement (MU)
Energy Supplied (MU)
Energy not Supplied (MU)
Energy not Supplied (%)

PEAK:

	Peak Demand (MW)	Peak Met (MW)	Demand not Met	
			(MW)	(%)
2014-15	148,166	141,160	7,006	4.7
2015-16	153,366	148,463	4,903	3.2
2016-17	159,542	156,934	2,608	1.6
2017-18	164,066	160,752	3,314	2.0
2018-19	177,022	175,528	1,494	0.8
2019-20	1,83,804	1,82,533	1,271	0.7
2020-21	1,90,198	1,89,395	802	0.4
2021-22	2,03,014	2,00,539	2,475	1.2
2022-23	2,15,888	2,07,231	8,657	4.0



The State/UT/Region-wise Power Supply Position in terms of Energy and Peak during the year 2022-23 is enclosed at **Annexure-4A.**

The details of the State/UT-wise allocation from Conventional Central Generating Stations in the country as on 31.03.2023, is enclosed at **Annexure-4B.**

4.3 Region - wise System Operation in the country

4.3.1 Northern Region

The installed capacity in the Northern Region was 118204.26 MW as on 31.03.2023 comprising of 62818.63 MW thermal, 20751.76 MW hydro, 1620.00 MW nuclear and 33013.87 MW from renewable energy sources. During the year 2022-23 as well as 2021-22, there was negligible gap between Energy Requirement and Energy Supplied in the Northern Region. Further, the Northern Region witnessed Peak shortage of 1.0% during the year 2022-23 as against the corresponding figure of 0.5% during the year 2021-22.

4.3.2 Western Region

The installed capacity in Western Region was 135543.18 MW as on 31.03.2023 comprising of 86669.08 MW thermal, 7562.50 MW hydro, 1840.00 MW nuclear and 39471.60 MW from renewable energy sources. During the year 2022-23 as well as 2021-22, there was negligible gap between Energy Requirement and Energy Supplied in the Western Region. Further, the Western Region witnessed Peak shortage of 0.3% during the year 2021-22 while there was no peak shortage in the Western Region during the year 2022-23.

4.3.3 Southern Region

The installed capacity in Southern Region was 123001.21 MW as on 31.03.2023 comprising of 57570.81 MW thermal, 11827.48 MW hydro, 3320.00 MW nuclear and 50282.92 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.2% in the Southern Region during the year 2022-23 as compared to the respective figure of 0.1% during the year 2021-22. Further, in the Southern Region there was no peak shortage during the year 2022-23 while there was Peak shortage of 2.2% during the year 2021-22.

4.3.4 Eastern Region

The installed capacity in Eastern Region was 34357.30 MW as on 31.03.2023 comprising of 27779.70 MW thermal, 4764.42 MW hydro and 1813.18 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 1.0% in the Eastern Region during the year 2022-23 as compared to the respective figure of 0.7% during the year 2021-22. Further, the Eastern Region witnessed shortage of 3.7% between Peak Demand and Peak Met during the year 2022-23 as against the corresponding figure of 3.4% during the year 2021-22.

4.3.5 North-Eastern Region

The installed capacity in North-Eastern Region was 4794.97 MW as on 31.03.2023 comprising of 2311.16 MW thermal, 1944.01 MW hydro and 539.81 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.4% in the North-Eastern Region during the year 2022-23 as compared to the respective figure of 0.3% during the year 2021-22. Further, the North-Eastern Region witnessed Peak shortage of 4.0% during the year 2022-23 as against the corresponding figure of 1.2% during the year 2021-22

4.4 Frequency Profile of National Grid

The five regional grids of the country are operating as an integrated National Grid. The Indian Electricity Grid Code (IEGC) specified by the Central Electricity Regulatory Commission (CERC) mandates the operating band for frequency of grid as 49.90 Hz to 50.05 Hz. The percentage of time during which the power system of the country operated below 49.90 Hz, between 49.90 to 50.05 Hz (IEGC Band) and above 50.05 Hz and the maximum and minimum frequencies of the National Grid along with the average frequency level during the year 2021-22 and 2022-23, are tabulated below:

Frequency Profile of National Grid						
Year	% of Time when Frequency was			Average Frequency (Hz)	Maximum Frequency (Hz)	Minimum Frequency (Hz)
	Below 49.90 Hz	Between 49.90-50.05 Hz (IEGC Band)	Above 50.05 Hz			
2014-15	28.06	52.23	19.72	49.96	50.49	49.47
2015-16	15.08	66.25	18.67	49.98	50.39	49.55
2016-17	8.87	72.55	18.58	50.00	50.33	49.66
2017-18	12.40	76.04	11.56	49.98	50.25	49.66
2018-19	11.92	75.96	12.12	49.98	50.30	49.57
2019-20	6.54	72.59	20.87	50.00	50.34	49.55
2020-21	5.11	78.39	16.50	50.00	50.39	49.57
2021-22	7.52	75.08	17.41	50.00	50.34	49.50
2022-23	11.03	68.74	19.14	49.99	50.55	49.41

It may be seen from the above that the average grid frequency during the year 2022-23 was precisely at the nominal frequency level of 49.31 Hz.

4.5 National Power Committee (NPC)

4.5.1 National Power Committee (NPC) was established by Ministry of Power vide Order dated 25th March, 2013, to evolve a common approach on issues related to reliability and security of the grid, at national level. Chairperson, CEA is the Chairperson of NPC. Member (GO&D), CEA, Member Secretaries and Chairpersons of RPCs, the Chairpersons of Technical Co-ordination Sub Committees (TCC) of five regions, are members of NPC with Chief Engineer (NPC), CEA, as its Member Secretary.

4.5.2 Since its formation, NPC has taken several initiatives for improving the safe and reliable operation of Indian Grid. The methodology of settlement of accounts for bilateral short term and collective transactions, for the period of Grid Disturbance finalized by NPC was submitted to Central Electricity Regulatory Commission (CERC). The methodology/procedure for computing actual drawl/ injection of entities in case of non-availability of Main/Check/Standby Meter Data was also finalized. In addition, the "Guidelines on availability of communication system" was finalized by NPC and submitted to CERC.

4.5.3 During the year 2022-23, two (02) nos. of special meeting and 12th meetings of the National Power Committee were held on 24.06.2022 and 17.10.2022 respectively. In these meetings, the following important Agenda items were discussed:

- National Level Optimization of Surplus Generation Capacity
- Issuance of Regional Energy Account (REA)
- Telemetry of real time active power (MW) data to SLDCs
- Guidelines for locating PMU for URTDSM Phase II project
- Review of Status of Islanding Schemes
- Automatic Under Frequency Load Shedding (AUFLS) Scheme and Mapping of Feeders

- Ensuring Proper Functioning of Under Frequency Relays (UFR) & df/dt Relays
- Implementation of Automatic Generation Control (AGC) in India (at Inter-State level)
- Utilization of PSDF fund for the next 5 years and Monitoring of Schemes Sanctioned Grant from PSDF
- National Energy Account (NEA)
- Power System Stabilizers (PSS) Tuning

4.5.4 As per the decisions taken in the 9th meeting and 10th meeting of NPC, following three sub-committee/ sub-group were constituted:

(a) **Sub-committee to study the AUFLS Scheme and work out a common approach for df/dt relay settings**:

Sub-committee constituted with representatives from POSOCO, all the RPCs and NPC to study the AUFLS Scheme and work out a common approach for df/dt relay settings. The Sub-Committee after due deliberations and considering the comments from members, has submitted its report to the National Power Committee.

(b) **Sub-group constituted to finalize a common procedure for Power System Stabilizers (PSS) Tuning**:

Sub-group constituted with representatives of Protection Sub-Committee of respective RPCs, NPC, NLDC, CTU, NTPC and NHPC to finalize a common procedure for Power System Stabilizers (PSS) Tuning. The preparation of report was under progress.

(c) **Sub-committee on the uniform philosophy of PMU locations, new analytics and requirement of up gradation of Control Centre under URTDSM project:**

Sub-committee constituted under the Chairmanship of Member Secretary, WRPC with representatives from POSOCO, CTU, POWERGRID, all RPCs and NPC on the uniform philosophy of PMU locations, new analytics and requirement of up gradation of Control Centre under URTDSM project. The Sub-Committee after due deliberations and considering the comments from members, has submitted its report to the National Power Committee.

4.5.5 Joint Committee on Technical Specification (TS) of the 5 minute Interface Energy Meters (IEMs), Automatic Meter Reading (AMR), Meter Data Processing (MDP) system: A Joint Committee comprising members from RPCs, CEA, and CTU/POWERGRID, POSOCO and NPC was constituted to finalize the Technical Specification (TS) of the 5 minute Interface Energy Meters (IEMs), Automatic Meter Reading (AMR), Meter Data Processing (MDP) system with real time telemetry of data to SLDC for ISTS at all India basis. The Technical Specifications was finalized by the Joint committee and had been issued on 06.07.2022. The scheme is to be implemented in all the five regions.

4.6 Power System Development Fund (PSDF):

4.6.1 Ministry of Power vide letter No. 29/9/2010-R&R (Vol-II) dated 10th January 2014 circulated a scheme regarding the operationalization of the Power System Development Fund (PSDF) and utilization of funds deposited therein. The total fund transferred from regulatory Pool Accounts to PSDF since the launching of the scheme up to 31.03.2023 was ₹19158.40 Crores. Out of this, ₹1330.94 Crores have been transferred from during financial year 2022-23 **(as of 28.02.2023).** After adding the ₹1159.1 Crores as interest and other credits, the total funds under PSDF **up to 28.02.2023** was ₹20317.45 Crores. NLDC is the Nodal Agency for PSDF.

4.6.2 During the FY 2022-23, the following meetings related to the operation/implementation of PSDF were held:

i) Fifteen (15) meetings of Techno-economic subgroup, headed by Chief Engineer NPC, CEA were held on 04.04.2022, 28.04.2022, 10.06.2022, 11.07.2022, 30.08.2022, 29.09.2022, 12.10.2022, 30.11.2022, 20.12.2022, 16.01.2023, 17.01.2023,

18.01.2023, 16.02.2023, 17.03.2023 and 31.03.2023. In these fifteen meetings, total 134 projects (66 new projects, 67 old projects for which inputs were received from project entities and 1 sanctioned proposal for increasing in grant) were examined. These projects were of various categories like, Operation of Gas Based Power (GBP) Plants, STAMS (State Transmission Asset Management System), ADMS (Advance Demand Management System), Islanding Scheme, Renewable Energy Management Centre (REMC), Installation of capacitor banks and reactors, Scheduling Accounting Metering And Settlement of Transactions (SAMAST), Reliable Communication, Wide Area Monitoring System (WAMS), Renovation & Upgradation of protection systems, Reconductoring of existing transmission line to relieve congestions, Substation Automation System (SAS), etc.

ii) Four (04) meetings of Project Monitoring Group, headed by Member (GO&D) were held on 24.05.2022, 30.08.2022, 19.10.2022 and 20.01.2023 during FY 2022-23. In these four meetings, 59 no. of Time Extension requests and 11 no. of Quantity Variation requests were discussed on case to case basis. Further, the progress of sanctioned projects of Eastern Region were also reviewed.

iii) Five (05) meetings of the Appraisal Committee, headed by Chairperson, CEA, were held on 19.07.2022, 25.11.2022, 14.12.2022, 20.12.2022 and 16.03.2023. In these meetings, 20 no of projects were recommended to Monitoring Committee for sanction grant under PSDF.

iv) Two (02) meeting of the Monitoring Committee, headed by Secretary, power was held on 26.07.2022 and 21.12.2022. In these meetings, 15 nos of projects were sanctioned for funding from PSDF. The 19th Monitoring Committee approved the important projects such as Implementation of Establishment of State Load Despatch Centre (SLDC) cum Renewable Energy Management Centre (REMC) in UT of Ladakh by POWERGRID of estimated cost ₹ 153.96 and the proposal of SECI for the development of the Battery Energy Storage System (BESS) with an Annual PSDF grant of ₹80.00 Cr. for the DISCOM portion and ₹30.00 Cr for the Ancillary portion for 12 years.

4.6.3 One Hundred Ninety-Six (196) nos. of projects for total grant amount of ₹14370.41 Crores have been sanctioned since the operationalization of PSDF (till 31.03.2023). Out of 196 sanctioned projects, 17 projects with an amount of ₹388.05 Crores have been De-sanctioned due to various reasons in the FY 2022-23.

4.6.4 The details of sanctioned grant under PSDF are as given below

S. No	Project Entity	During FY 2022-23		Previous Years (Up to 31.03.2022)		Cumulative (Up to 31.03.2023)	
		No. of Projects	Sanctioned Grant (₹ crores)	No. of Projects	Sanctioned Grant (₹ crores)	No. of Projects	Sanctioned Grant (₹ crores)
1	State/UT	14	614.42	164	7738.06*	178	8352.48
2	RPCs	0	0	9	115.61	9	115.61
3	BBMB	0	0	1	23.27	1	23.27
4	DVC	0	0	2	166.46	2	166.46
5	PGCIL	0	0	4	4159.56	4	4159.56
6	PGCIL/ RECTPCL	0	0	1	233.03	1	233.03
7	Central	1	1320	0	0	1	1320
	Total	**15**	**1934.42**	**181**	**12435.99***	**196**	**14370.41**
No. of De-sanctioned projects and Amount						**17**	**388.05**
Effective No. of Sanctioned projects and Amount						**179**	**13982.36**

*inclusive of increase in grant i.e ₹43.26Cr for UPPTCL-OPGW project.

4.6.5 Out of ₹14370.41 Crores of sanctioned grant, a total amount of ₹ 8543.94 Crores (till 31.03.2023) had been disbursed by MoP for the implementation of the projects under PSDF since the launch of the scheme. ₹388.81 Crores was disbursed during the FY 2022-23.

4.6.6 A total of 65 number of projects have been completed till 31.03.2023. Out of this, 11 projects were completed in the FY 2022-23.

4.6.7 Third party evaluation of Projects sanctioned under PSDF: Expenditure Finance Committee in its meeting held on 30.05.2022, directed to conduct Third party evaluation of PSDF funded projects, to see the impact of these power projects. Accordingly, the Ministry of Power through its OM letter dated 06th June, 2022 has requested Central Electricity Authority (CEA) to carry out the third party evaluation of Projects sanctioned under PSDF on a sample basis and also requested to submit a report. Chairperson (I/c), CEA constituted a PSDF Project Evaluation Committee with the representation of CEA, NLDC and CTU under the Chairmanship of Director (NPC), CEA to carry out the Third-party Evaluation of Projects sanctioned under PSDF. The PSDF Projects Evaluation Committee through its various meetings selected the sample projects from the sanctioned PSDF Projects for evaluation. The Committee has finalized the Questionnaire and that was circulated to entities of selected sample projects. The Project Evaluation Committee Members and other officers from CEA/NLDC site visited twelve (12) numbers of projects selected for evaluation on sample basis. Based on the replies of questionnaire, Site visits of various projects and discussions in the various meetings for PSDF, the PSDF Projects Evaluation Committee has submitted the PSDF projects evaluation Report along with recommendation to the Ministry of Power on 20.09.2022.

4.7 PUShP Portal (Portal for Utilizations of Surplus Power)

4.7.1 A scheme for "National Level Optimization of surplus generation capacity in the country and Development of Online Portal" was approved by Hon'ble Minister of Power and NRE on 19 November, 2022. The main objective of the scheme was for Flexibilisation of PPA for Optimal Utilization of Resources & Reduction in cost of Power for Consumers.

4.7.2 A committee was constituted for the development of the PUShP Portal under the chairmanship of Member Secretary, NRPC with the representatives from Grid-India, NTPC, GM Division (CEA) and Chief Engineer (NPC) as Member Convener. The committee has taken 15 meetings to discuss and finalize Standard Operating Procedure, Flowcharts and Timelines of different activities and Roles and Responsibilities of entities involved for PUShP portal.

4.7.3 PUShP portal (For Flexibilisation of PPA for Optimal Utilization of Resources & Reduction in cost of Power for Consumers) was launched by Hon'ble Minister of Power and NRE on 09th March, 2023.

4.7.4 NPC Division, CEA conducted National Level virtual conference/workshop in association with NTPC and Grid-India on 15th March, 2023 to explain working of portal to all the stakeholders and to encourage them for their participation on the portal.

4.7.5 <u>Main features of the PUShP portal:</u>

a) The Portal would be a single window system providing services to diverse domains of all the entities involved and to reallocate and transfer the power in minimum time from one surplus entity to deficit entity.

b) The scheme shall be implemented for Generating station whose tariff is determined under section 62 & 63 of the EA 2003 like CGS, ISGS, IPPs and State Gencos.

c) Original Beneficiary/seller will be able to indicate the surplus power in block times/days/months on portal.
d) The temporary allocation/transfer of surplus power will be done on
   i. Long term basis (a week, fortnight, month, quarter, annual or any duration).
   ii. short term basis (one day)
e) New buyer to pay both variable charge (VC) and fixed cost (FC).
f) Once power is reassigned, Original beneficiary shall have no right to recall as entire FC liability is also shifted to the new beneficiary.
g) Criteria for reallocation of power on the portal would be as first preference to co-beneficiaries of the CGS and in case of multiple beneficiaries, the surplus power allocation will be on first come first serve basis.
h) Payment settlement will be as per the REAs (Regional Energy Accounts) of RPCs.
i) Transmission charges will be paid as applicable to the concerned transmission service Providers (CTU or STU) or as the case may.
j) The scheme will not disturb the existing arrangements rather an additional avenue shall be provided to stakeholders for optimal use of generating capacity.

4.7.6 Key Benefits of the PUShP Portal:-

a) Flexibilisation of Power Purchase Agreement.
b) Optimal Utilization of Power due to Regional diversity and their increased availability.
c) Availability of power to DISCOMs improves and reduction in power cuts.
d) Meet the power demand of the country especially during the crisis situation in the month of April, May, September and October.
e) Reduction in fixed charge burden on the states having surplus power.
f) Allocation /Transfer of Power at regulated tariff.
g) Reallocation of power in minimum time with automated process.

4.8 Regional Power Committee Comparative data:-

4.8.1 Comparative Data for Annual Report Northern Region (2023 and 2014)

- Total Renewable Installed Capacity is 53.77 GW in Northern Region as on 31.03.2023.
- Capacity growth rate of Renewable energy is 12.71% compared to last year.
- Maximum demand met in the year 2022-23 was 76561 MW on 28th June 2022 at 14:00 Hrs in Northern Region.
- Growth Rate of Maximum Demand Met w.r.t last year is 5%.
- During 2022-23, Northern Region recorded Maximum Energy Consumption of 1737 MU on 28th May 2022.
- Growth Rate Maximum Energy Consumption of NR w.r.t last year is 5.27%.

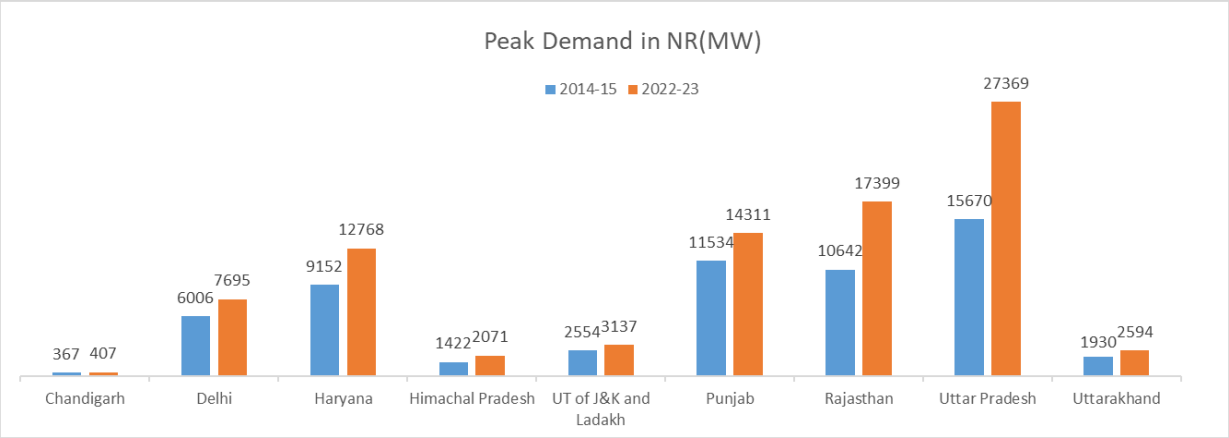
4.8.2 Comparison of Installed Capacity/Power Supply Position in Northern region between FY-2022-23 and FY-2014-15

- Northern region has the installed capacity of 118.205 GW, including Central, State, Private and Independent Power Plants and is approximately 28.4% (As on 31.03.2023) of total installed capacity in India.

NR Region	2014-15	2022-23
Installed Capacity		
Hydro	17067 MW	20752 MW
Gas	5331 MW	5781 MW
Thermal (Coal)	39843 MW	57038 MW
Nuclear	1620 MW	1620 MW
Total (H + G + T + N)	63861 MW	85191 MW
Diesel	13 MW	0 MW
RES	8252 MW	33014 MW
Grand Total	72126 MW	118205 MW
Demand		
Max. Peak Demand Met	47642 MW	76561 MW
Max. Peak Demand	51977 MW	77337 MW
Shortage (MW)	4335 MW	776 MW
Shortage (%)	8.3 %	1%
Energy Generation & Requirement		
Energy Requirement	332453 MU	463088 MU
Energy Supplied	311589 MU	458640 MU
Energy not Supplied (MU)	20864 MU	4449 MU
Energy not Supplied (%)	6.3%	1%

Comparison of Peak Demand between FY-2022-23 and FY-2014-15

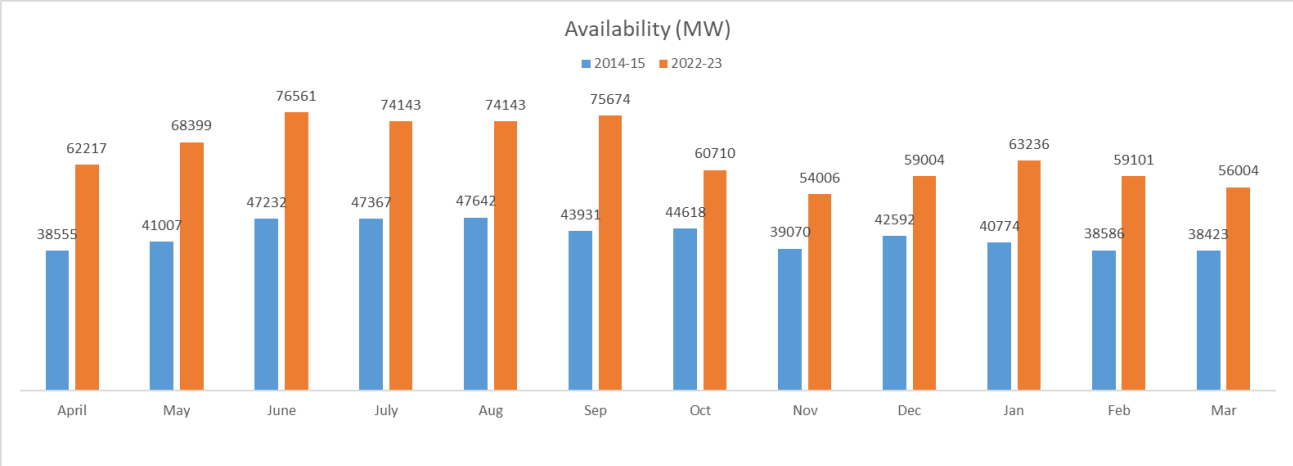
Peak Demand Met (MW)		
	2014-15	**2022-23**
Chandigarh	367	407
Delhi	6006	7695
Haryana	9152	12768
Himachal Pradesh	1422	2071
UT of J&K and Ladakh	2554	3137
Punjab	11534	14311
Rajasthan	10642	17399
Uttar Pradesh	15670	27369
Uttarakhand	1930	2594

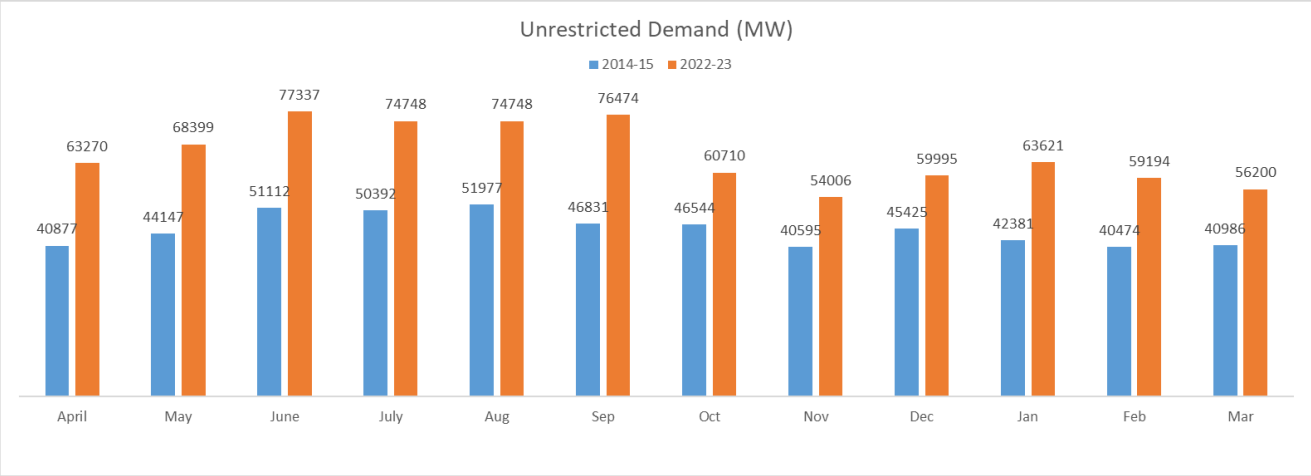


Comparison of Power Supply Position between FY-2022-23 and FY-2014-15

Power Supply Position

Region	NR Demand (in MW)							
Month	Peak Demand		Peak Availability		Shortage		Shortage (in %)	
	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23
April	40877	63270	38555	62217	2322	1053	5.7	1.7
May	44147	68399	41007	68399	3140	0	7.1	0.0
June	51112	77337	47232	76561	3880	776	7.6	1.0
July	50392	74748	47367	74143	3025	605	6.0	0.8
Aug	51977	74748	47642	74143	4335	605	8.3	0.8
Sep	46831	76474	43931	75674	2900	800	6.2	1.0
Oct	46544	60710	44618	60710	1926	0	4.1	0.0
Nov	40595	54006	39070	54006	1525	140	3.8	0.0
Dec	45425	59995	42592	59004	2833	991	6.2	1.7
Jan	42381	63621	40774	63236	1607	385	3.8	0.6
Feb	40474	59194	38586	59101	1888	93	4.7	0.2
Mar	40986	56200	38423	56004	2563	196	6.3	0.3





4.8.3 Comparative Data for Annual Report Western Region (2023 and 2014)

- Total Renewable Installed Capacity is 39.47GW in Western Region as on 31.03.2023.
- Capacity growth rate of Renewable energy is 17% compared to last year.
- Total Wind capacity of 1097 MW and Solar capacity of 4702 MW have been added to Renewable Capacity of Western Region during 2022-23.
- The annual growth of 6.5% and 35.86% recorded for wind and solar capacity respectively.
- Five ISTS connected Wind Plants namely AWEMP1L(Adani Wind Energy Madhya Pradesh One Limited), Powerica, Srijan, Sitac and AWEK4L(Adani Wind Energy Kutchch Four Limited) and Three ISTS connected Solar Plants namely NTPC Kawas Solar, NTPC Gandhar Solar & NTPC Solapur Solar were commissioned in Western Region during 2022-23.
- Total Transmission lines of 3437 circuit kilo metre (ckm) including 765 kV, 400 kV & 220 kV lines and transformation capacity of 16630 MVA added during 2022-23.
- Reactive power compensation in the form of Bus & Line Reactors of 4675 MVAR added during 2022-23.
- Maximum demand met in the year 2022-23 was 71677 MW on 27th Dec 2022 at 10:00 Hrs in Western Region.
- Growth Rate of Maximum Demand Met w.r.t last year is 9.9%.During 2022-23, Western Region recorded Maximum Energy Consumption of 1531 MU on 29th Apr 2022.
- Growth Rate of WR Energy Consumption w.r.t last year is 4.36%.

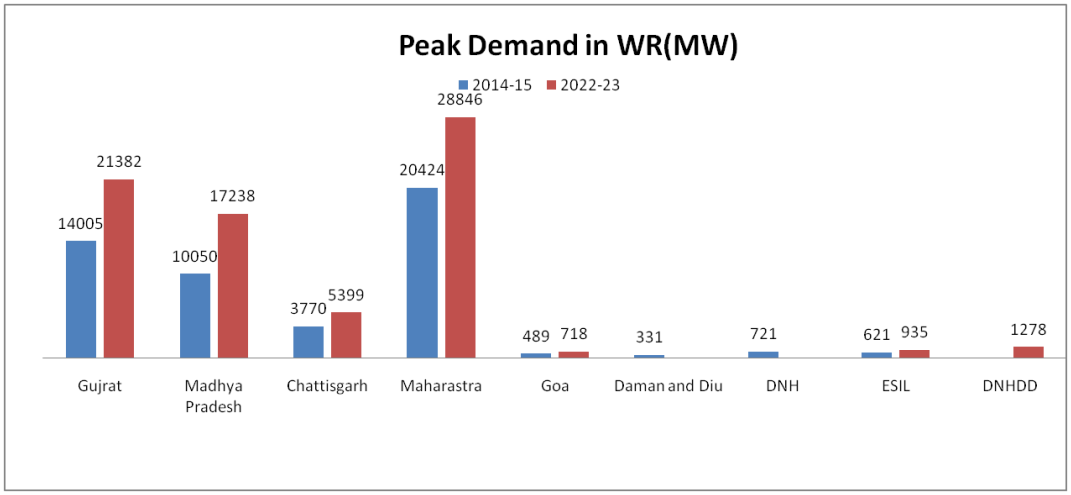
4.8.4 Comparison of Installed Capacity/Power Supply Position in western region between FY-2022-23 and FY-2014-15

- The Western region electricity grid is a part of the synchronous 'NEWS' grid comprising of an area of 9,51,488 sq. kms and population of 309 million.
- It has the highest installed capacity of 135.54 GW, including Central, State, Private and Independent Power Plants and is 33% (As on 31.03.2023) of total installed capacity in India.

WR Region	2014-15	2022-23
Installed Capacity		
Hydro	7448 MW	7563 MW
Gas	10915 MW	10806 MW
Thermal (Coal)	65807 MW	75863 MW
Nuclear	1840 MW	1840 MW
Total (H + G + T + N)	86010 MW	96072 MW
Diesel	17.48 MW	0 MW
RES	12795 MW	39472 MW
Grand Total	98822 MW	135543 MW
Demand		
Max. Peak Demand Met	45283 MW	71677 MW
Max. Peak Demand	46490 MW	71677 MW
Min. Demand	25460 MW	34078 MW
Shortage (MW)	182 to 2481 MW	0 MW
Shortage (%)	0.40 to 5.83 %	0%
Energy Generation & Requirement		
Energy Gen(H+G+T+N)	358926 MU	488580 MU
Wind & Solar Energy Gen	13531 MU	49394 MU
EnergyGen (H+G+T+N+wind +solar)	372457 MU	537974 MU
Net Energy Availability	332278 MU	484407 MU
Net Unrestricted Energy Req.	334712 MU	484987 MU

Comparison of Peak Demand between FY-2022-23 and FY-2014-15

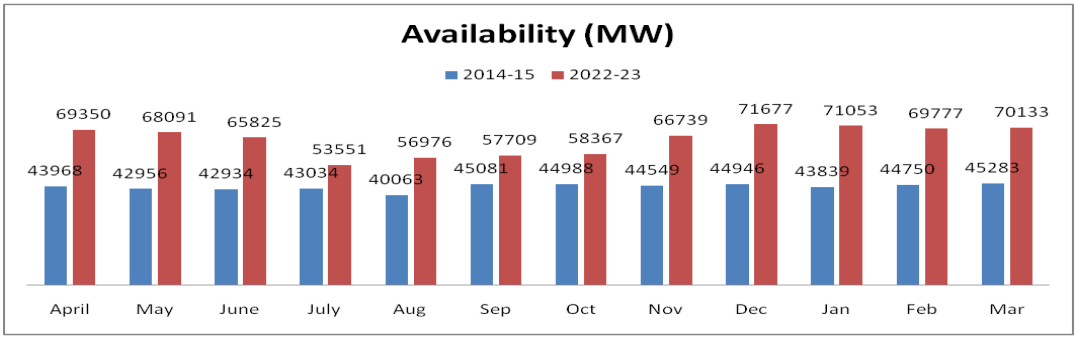
Peak Demand Met (MW)		
	2014-15	**2022-23**
Gujrat	14005	21382
Madhya Pradesh	10050	17238
Chhattisgarh	3770	5399
Maharashtra	20424	28846
Goa	489	718
Daman and Diu	331	
DNH	721	
ESIL	621	935
DNHDD		1278

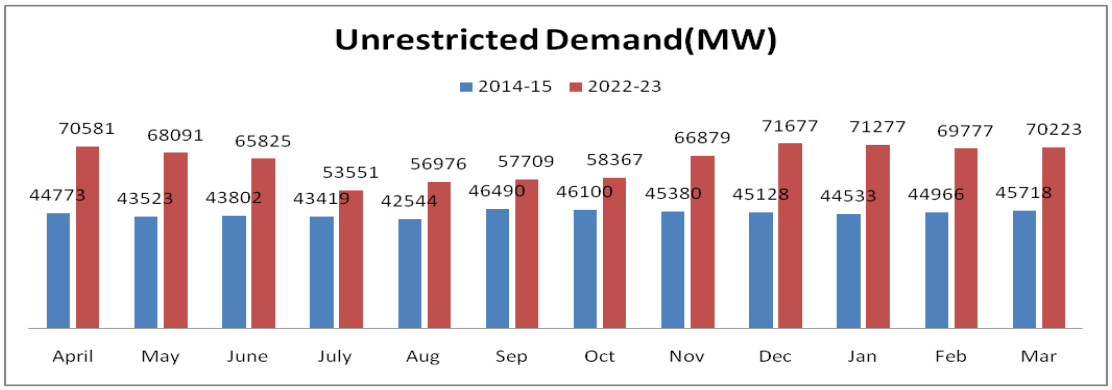


Comparison of Power Supply Position between FY-2022-23 and FY-2014-15

Power Supply Position

Region	WR Demand (in MW)							
Month	Peak Demand		Availability		Shortage		Shortage (in %)	
	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23
April	44773	70581	43968	69350	805	1231	1.80	1.74
May	43523	68091	42956	68091	567	0	1.30	0.00
June	43802	65825	42934	65825	868	0	1.98	0.00
July	43419	53551	43034	53551	385	0	0.89	0.00
Aug	42544	56976	40063	56976	2481	0	5.83	0.00
Sep	46490	57709	45081	57709	1410	0	3.03	0.00
Oct	46100	58367	44988	58367	1112	0	2.41	0.00
Nov	45380	66879	44549	66739	831	140	1.83	0.21
Dec	45128	71677	44946	71677	182	0	0.40	0.00
Jan	44533	71277	43839	71053	694	174	1.56	0.24
Feb	44966	69777	44750	69777	216	0	0.48	0.00
Mar	45718	70223	45283	70133	435	89	0.95	0.13





4.8.5 Comparative Data for Annual Report of CEA Southern Region (between 2022-23 and 2014-15)

- Total Renewable Installed Capacity is 50.28 GW in Southern Region as on 31.03.2023. Capacity growth rate of renewable energy is 67.87 % when compared to that of 2014-15.
- Around 49 elements were newly integrated in the grid at ISTS level during 2022-23. No addition at 765 kV level, but at 400kV level there was increase of 367 ckm of transmission length line, with 4630 MVA transformation capacity and 1435 MVAR reactors added.
- Maximum Demand met in the FY 2022-23 was 64337 MW on 15.03.2023 at 12:20 hrs in Southern Region. Growth rate of Maximum Demand Met w.r.t that of FY 2021-22 is 4556 MW or 7.08 %.
- During FY 2022-23, Southern Region recorded maximum Energy consumption of 1301 MU on 15.03.2023. The growth rate of SR energy consumption with respect to that of FY 2021-22 is 3.54 %.
- A total of 2501 MW RE Capacity (2098 MW Solar and 403 MW Wind) was added during FY 2022-23 in the Southern Region.

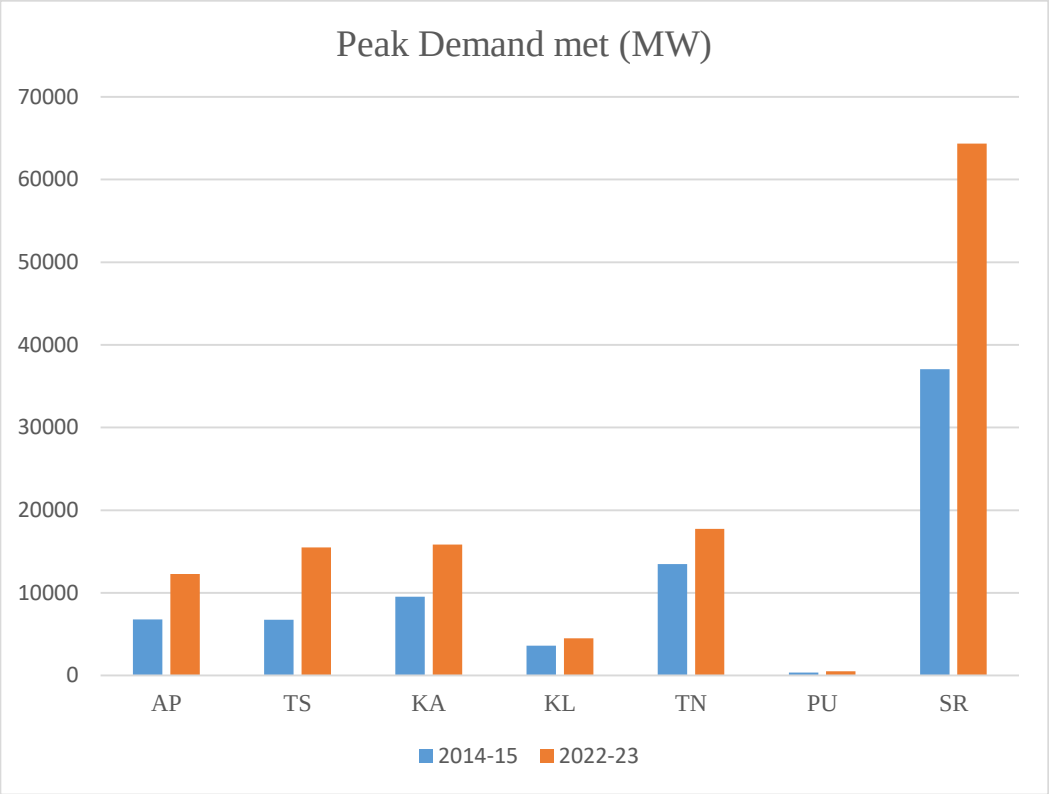
4.8.6 Comparison of Installed Capacity/Power Supply Position in Southern Region between FY-2022-23 and FY-2014-15

- Southern Region comprises of 19.31 % of India's area (635,780 km^2) around 20 % India's population.
- The region has around 30 % of the country Installed generating capacity.
- Southern region is having the highest renewable generating capacity among all regions.
- The Installed capacity of Southern region is 123 GW (second largest region wise installed capacity).

SR Region	2014-15	2022-23
SR Installed Capacity (MW)		
Hydro	11398.03	11827.48
Gas	4962.78	6491.80
Thermal (Coal+ lignite)	30342.50	50645.35
Nuclear	2320.00	3320.00
Total (H + G + T + N)	49023.31	72284.63
Diesel	939.32	433.66
RES	16153.66	50282.92
Grand Total	66116.29	123001.21
SR Demand (MW)		
Max. Peak Demand Met	37047	64337
Max. Peak Demand	39094	64197
Min. Demand	21044	24740
Shortage (MW)	401 to 3396	-140 to 621
Shortage (%)	1.13 to 8.69	-0.22 to 1.18
SR Energy Generation & Requirement (MU)		
Energy Generation(H+G+T+N others)	266633.79	293937.72
Wind +Solar	16914.21	64822.85
Energy Generation (H+G+T+N+wind+solar)	283548	358760.57
Net Energy Availability	274154	375533
Net Unrestricted Energy Req.	285815	376083

Comparison of SR Peak Demand between FY-2022-23 and FY-2014-15

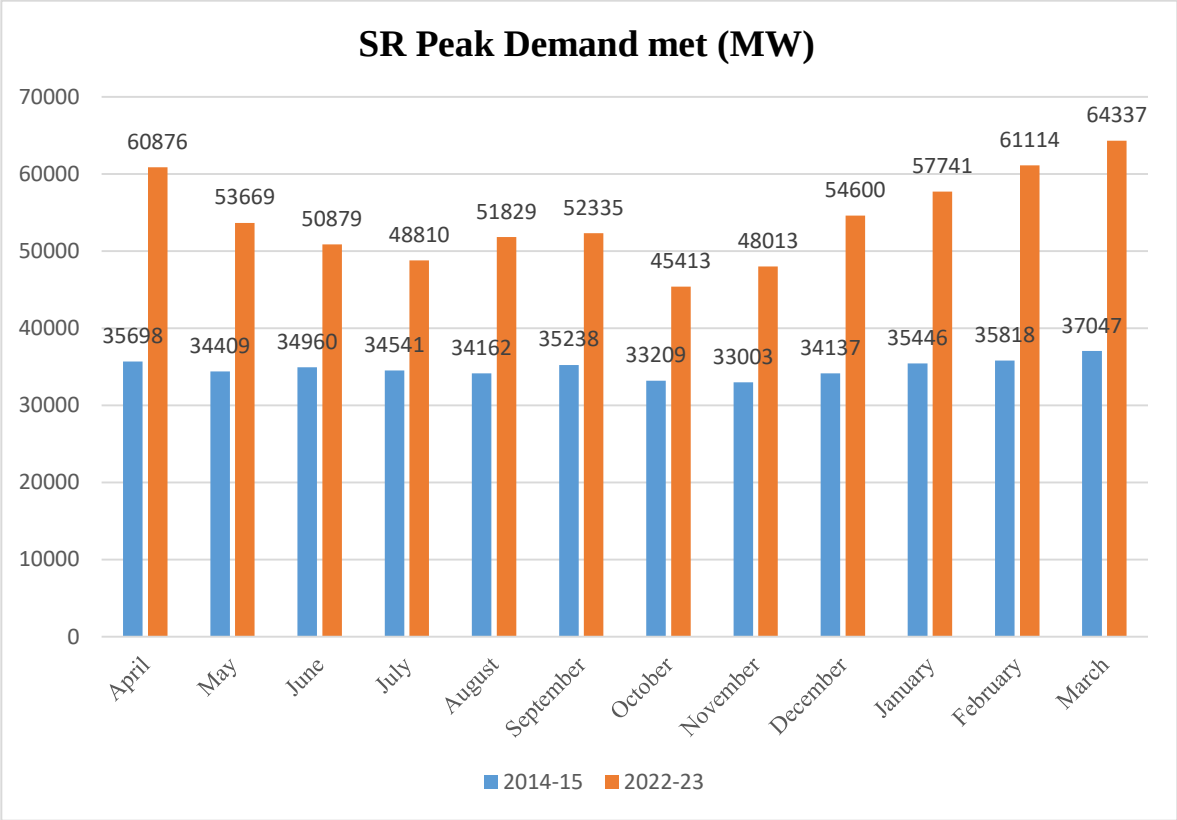
SR Peak Demand Met (MW)		
	2014-15	**2022-23**
Andhra Pradesh	6784	12293
Telangana	6755	15497
Karnataka	9549	15828
Kerala	3594	4504
Tamil Nadu	13498	17729
Puducherry	348	501
Southern Region	37047	64337



Comparison of Power Supply Position between FY-2022-23 and FY-2014-15

Power Supply Position

Region	SR Demand (MW)							
Month	Peak Demand		Availability		Shortage		Shortage (in %)	
	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23
April	39094	61061	35698	60876	3396	185	8.69	0.30
May	36454	53641	34409	53669	2045	-28	5.61	-0.05
June	37383	50797	34960	50879	2423	-82	6.48	-0.16
July	35686	48808	34541	48810	1145	-2	3.21	0.00
August	34784	52450	34162	51829	622	621	1.79	1.18
September	35639	52312	35238	52335	401	-23	1.13	-0.04
October	35977	45413	33209	45413	2768	0	7.69	0.00
November	34953	48048	33003	48013	1950	35	5.58	0.07
December	35818	54497	34137	54600	1681	-103	4.69	-0.19
January	37004	57741	35446	57741	1558	0	4.21	0.00
February	37602	61009	35818	61114	1784	-105	4.74	-0.17
March	38548	64197	37047	64337	1501	-140	3.89	-0.22


SR Peak Demand met (MW)
70000
60000
50000
40000
30000
20000
10000
0
35698
60876
34409
53669
34960
50879
34541
48810
34162
51829
35238
52335
33209
45413
33003
48013
34137
54600
35446
57741
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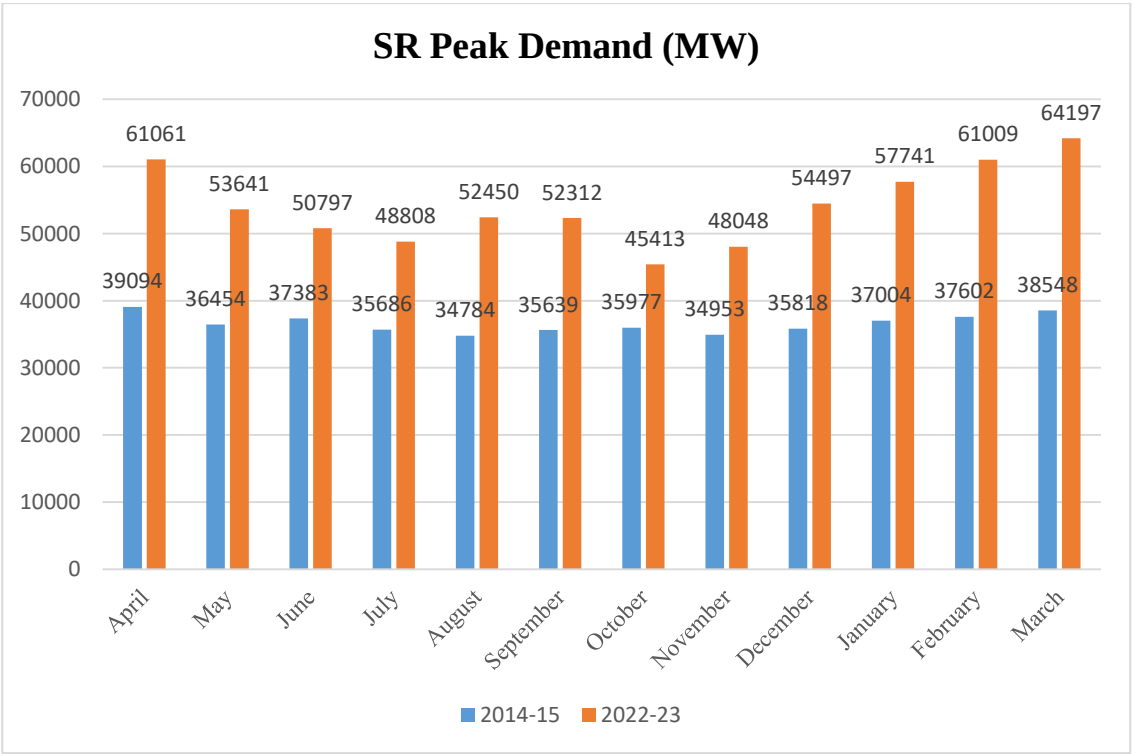
January
February
March
2014-15
2022-23


SR Peak Demand (MW)
70000
60000
50000
40000
30000
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10000
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39094
61061
36454
53641
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50797
35686
48808
34784
52450
35639
52312
35977
45413
34953
48048
35818
54497
37004
57741
37602
61009
38548
64197
April
May
June
July
August
September
October
November
December
January
February
March
2014-15
2022-23

4.8.7 Comparative Data for Annual Report - Eastern Region (2023 and 2014)

- Total Renewable Installed Capacity is 1.81GW in Eastern Region as on 31.03.2023. Capacity growth rate of Renewable energy is 3.9% compared to last year.
- Total Solar capacity of 68 MW have been added to Renewable Capacity of Eastern Region during 2022-23, witnessing an annual growth of 3.9%.
- Total Transmission lines of 2604 Ckt. km including 765 kV, 400 kV & 220 kV lines and transformation capacity of 2760 MVA added during 2022-23. Reactive power compensation in the form of Bus & Line Reactors of 125 MVAR added during 2022-23.
- Maximum demand met in the year 2022-23 was 27218 MW in August'2022 in Eastern Region. Growth Rate of Maximum Demand Met w.r.t last year is 8.2%.
- During 2022-23, Eastern Region recorded Maximum Energy Consumption of 17650 MU in July 2022. Growth Rate of ER Energy Consumption w.r.t last year is 13.61%.

4.8.8 Comparison of Installed Capacity/Power Supply Position in Eastern region between FY-2022-23 and FY-2014-15

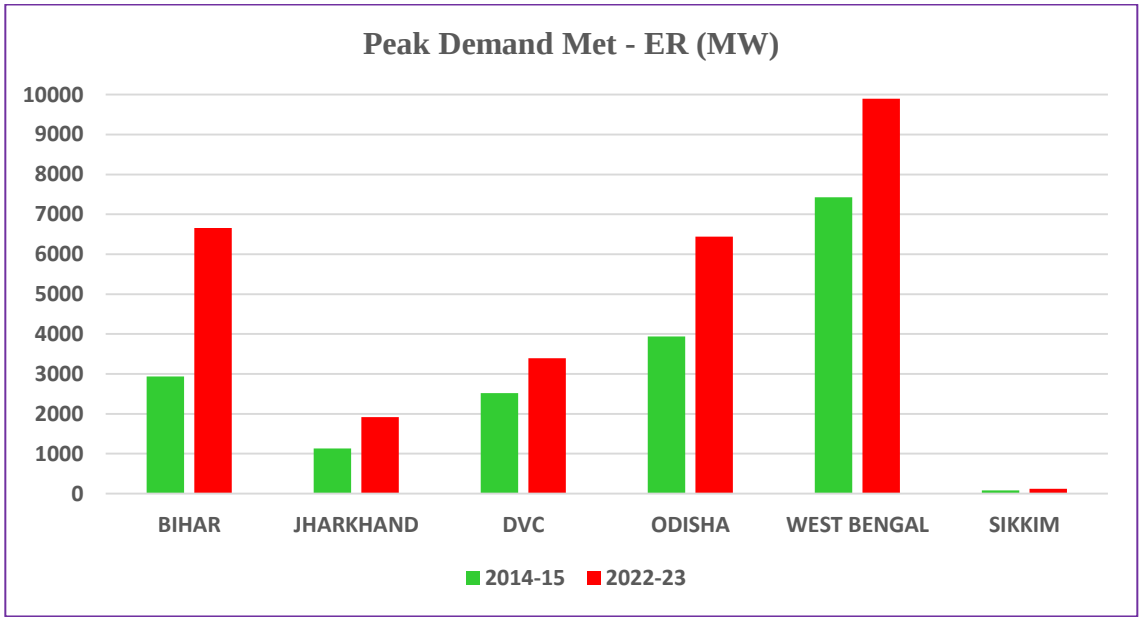
The Eastern region electricity grid is a part of the synchronous 'NEWS' grid comprising of an area of 4,18,323 sq. kms and population of 270.6 million. It has installed capacity of 40.58 GW, including Central, State, Private and Independent Power Plants and is 9.72% (As on 31.03.2023) of total installed capacity in India.

ER Region	2014-15	2022-23
Installed Capacity (MW)		
Hydro	4298	5990
Gas	0	0
Thermal (Coal)	27505	32785
Nuclear	0	0
Total (H + G + T + N)	31803	38770
Diesel	7	0
RES	0	1813
Grand Total	31810	40580
Demand (MW)		
Max. Peak Demand Met	17243	27218
Max. Peak Demand	17243	28275
Min. Demand	15369	21153
Shortage	0	1832
Shortage (%)	0	6.7

Energy Generation & Requirement (MU)		
Energy Generation (H+G+T+N)	147216	241853.7
Wind & Solar Energy Generation	0	1359
Energy Generation (H+G+T+N+wind +solar)	147216	243212.7
Net Energy Availability	119520	182109
Net Unrestricted Energy Req.	119520	182790.7

Comparison of Peak Demand between FY-2022-23 and FY-2014-15

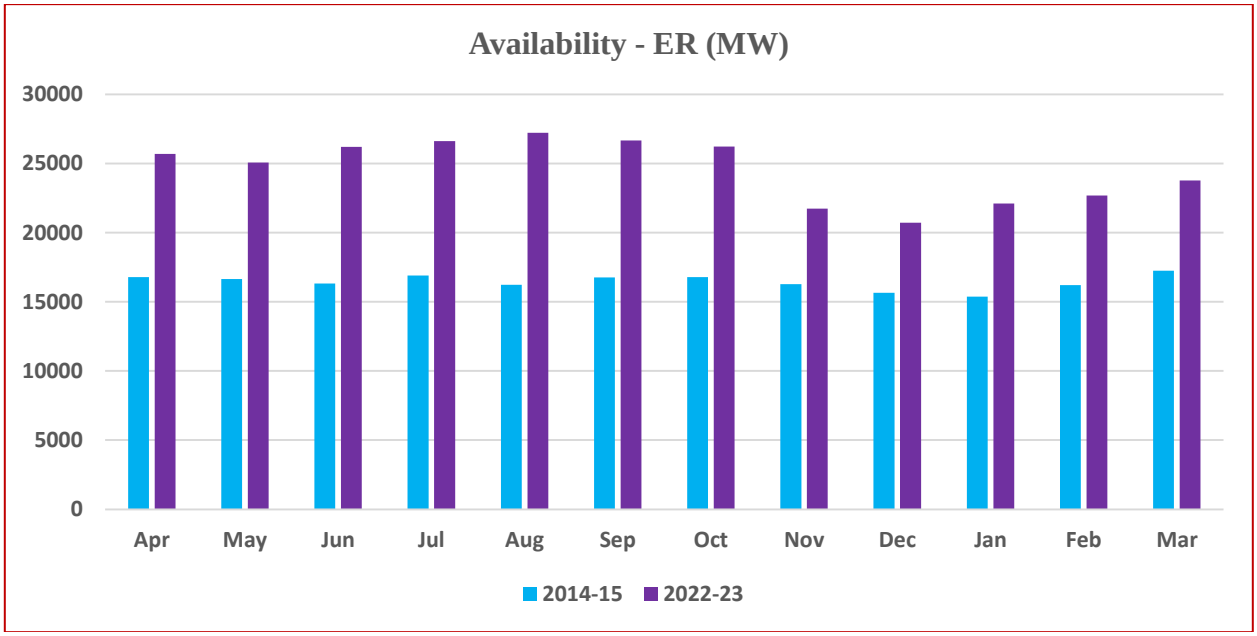
Peak Demand Met (MW)		
Constituent	**2014-15**	**2022-23**
Bihar	2933	6654
Jharkhand	1129	1918
DVC	2517	3396
Odisha	3938	6438
West Bengal	7430	9900
Sikkim	83	124

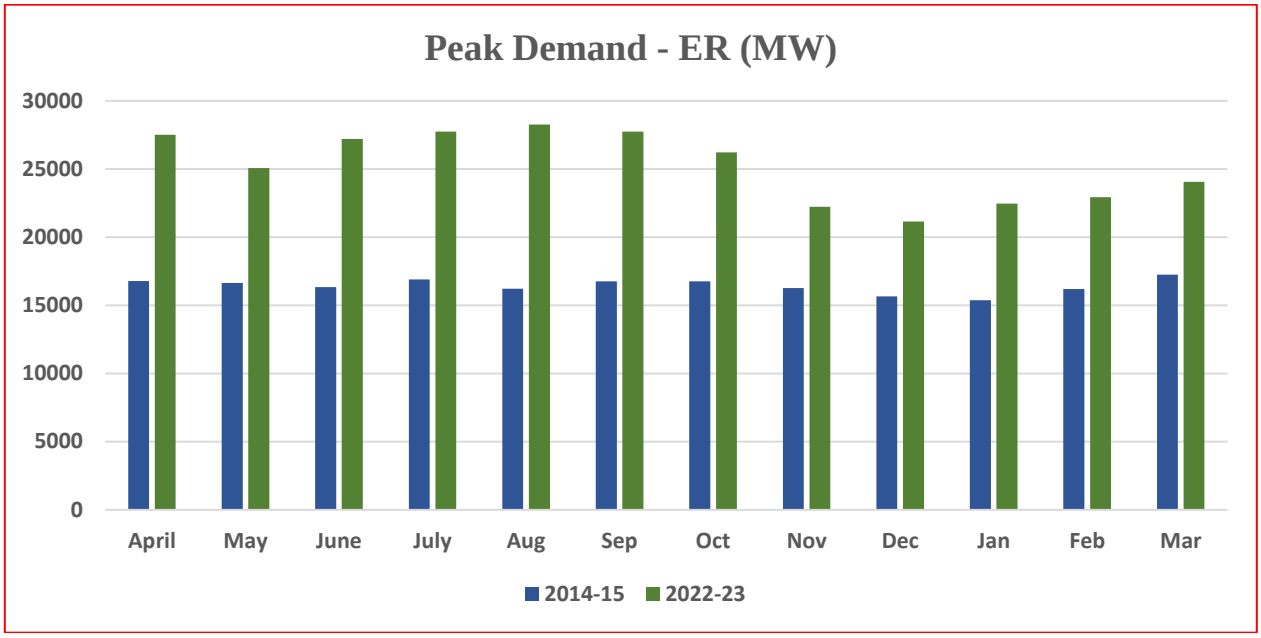


Comparison of Power Supply Position between FY-2022-23 and FY-2014-15

Power Supply Position

Region	ER Demand (MW)							
Month	Peak Demand		Availability		Shortage		Shortage (in %)	
	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23
April	16774	27522	16774	25690	0	1832	0	6.7%
May	16648	25070	16648	25070	0	0	0	0.0%
June	16328	27206	16328	26196	0	1010	0	3.7%
July	16907	27739	16907	26609	0	1130	0	4.1%
Aug	16218	28275	16218	27218	0	1057	0	3.7%
Sep	16768	27754	16768	26650	0	1104	0	4.0%
Oct	16772	26225	16772	26220	0	5	0	0.0%
Nov	16275	22225	16275	21741	0	484	0	2.2%
Dec	15656	21153	15656	20720	0	433	0	2.0%
Jan	15369	22461	15369	22095	0	366	0	1.6%
Feb	16200	22940	16200	22689	0	251	0	1.1%
Mar	17243	24064	17243	23779	0	285	0	1.2%

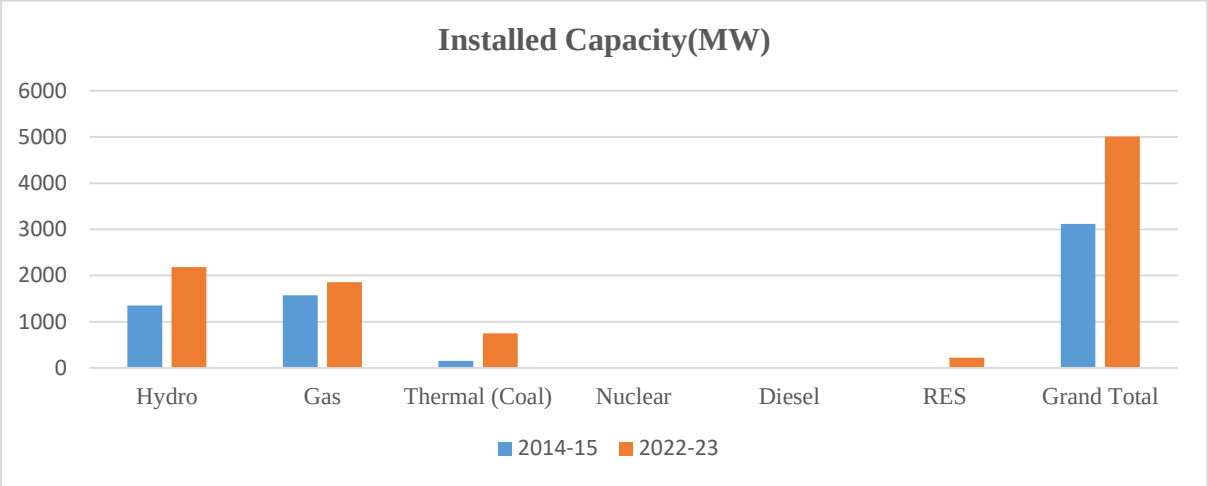




4.8.9 Comparison of Installed Capacity/Power Supply Position in North Eastern Region between FY-2022-23 and FY-2014-15

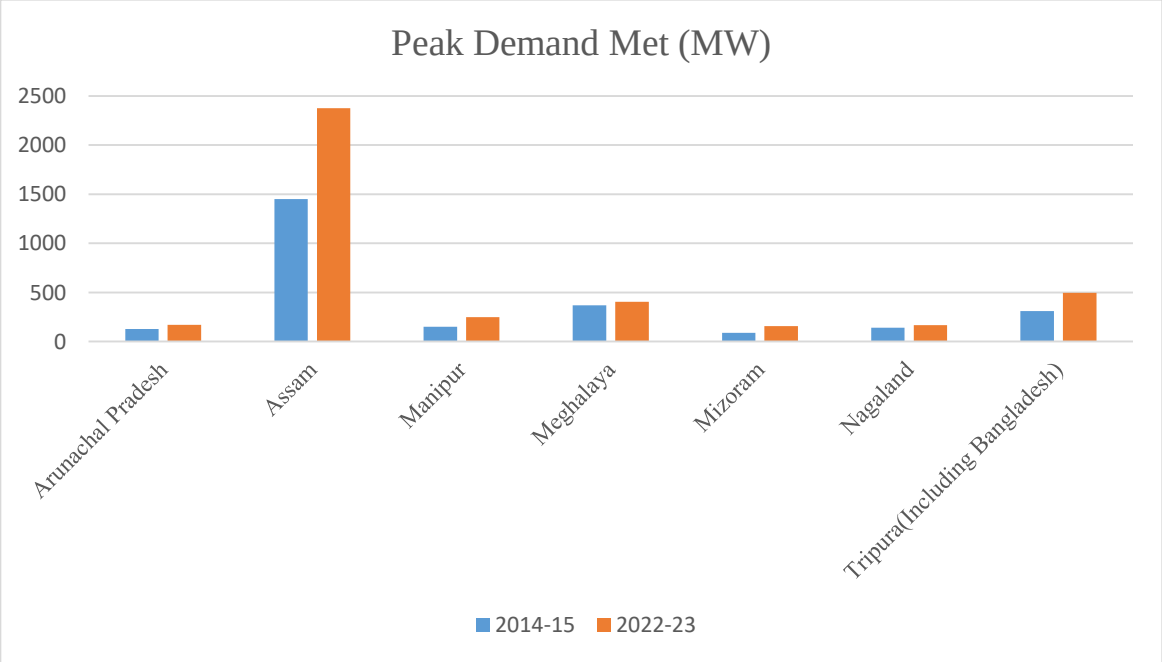
The installed capacity in North-Eastern Region, as on 31-03-2023 (2022-23) is 5011 MW compared to 3115 MW as on 31.03.2015 (2014-15).

NER Region	2014-15	2022-23
Installed Capacity (MW)		
Hydro	1348	2179
Gas	1572	1858
Thermal (Coal)	150	750
Nuclear	0	0
Total (H + G + T + N)	3115	4787
Diesel	0	0
RES	0	224
Grand Total	3115	5011



Comparison of Peak Demand between FY-2022-23 and FY-2014-15

Peak Demand Met (MW)		
	2014-15	**2022-23**
Arunachal Pradesh	130	172
Assam	1450	2376
Manipur	150	248
Meghalaya	370	404
Mizoram	90	159
Nagaland	140	167
Tripura(Including Bangladesh Load)	310	495



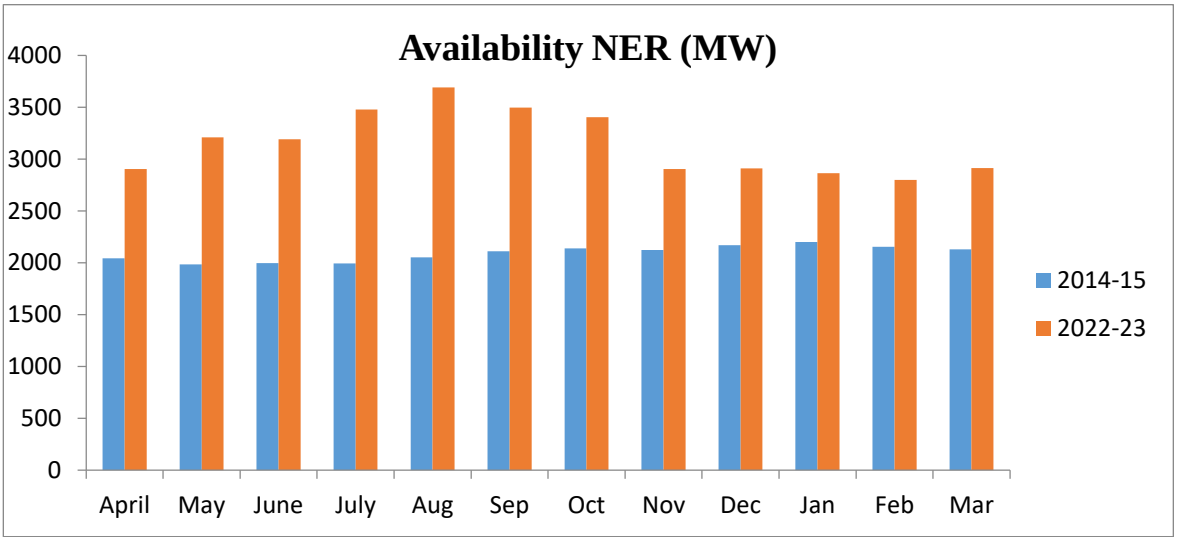
Peak Demand (MW)		
Max. Peak Demand Met	2202	3692
Max. Peak Demand	2528	3692
Shortage	152 to 400	0 to 35
Shortage (%)	6.92 to 15.84	0

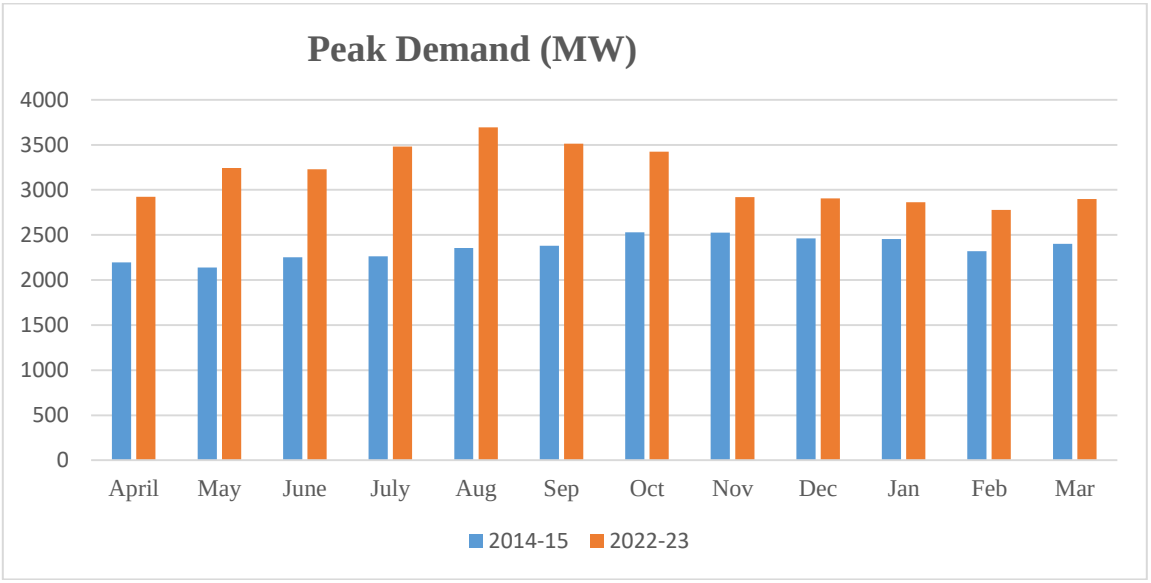
Energy Generation & Requirement (MU)		
Energy Gen(H+G+T+N)	11034	22325
Wind & Solar Energy Generation	0	239.93
Energy Generation (H+G+T+N+wind +solar)	11034	22565
Net Energy Availability	12880	19794
Net Unrestricted Energy Req.	14112	19848

Comparison of Power Supply Position between FY-2022-23 and FY-2014-15

Power Supply Position

Region	NER Demand (in MW)							
Month	Peak Demand		Availability		Shortage		Shortage (in %)	
	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23
April	2197	2924	2045	2906	152	18	6.9185	0.615595
May	2140	3242	1986	3212	154	30	7.1963	0.925355
June	2252	3228	1998	3193	254	35	11.279	1.084263
July	2263	3481	1996	3480	267	1	11.798	0.028727
Aug	2356	3692	2053	3692	303	0	12.861	0
Sep	2380	3512	2112	3497	268	15	11.261	0.427107
Oct	2528	3422	2141	3405	387	17	15.309	0.496786
Nov	2525	2920	2125	2904	400	16	15.842	0.547945
Dec	2460	2905	2170	2911	290	-6	11.789	-0.20654
Jan	2455	2863	2202	2866	253	-3	10.305	-0.10479
Feb	2318	2779	2155	2801	163	-22	7.0319	-0.79165
Mar	2403	2900	2131	2915	272	-15	11.319	0.13





The North Eastern Regional Grid has an energy shortage of 0.40% and a peaking shortage of 2.12% during the year 2022-23 as compared to energy and peaking shortage of 0.25% and 2.17% respectively during the previous year i.e., 2021-22.

North Eastern Regional Grid is connected directly to the Eastern Regional Grid and Northern Regional Grid. The power transfer from North-Eastern Region to Eastern Region is through following 6 lines:

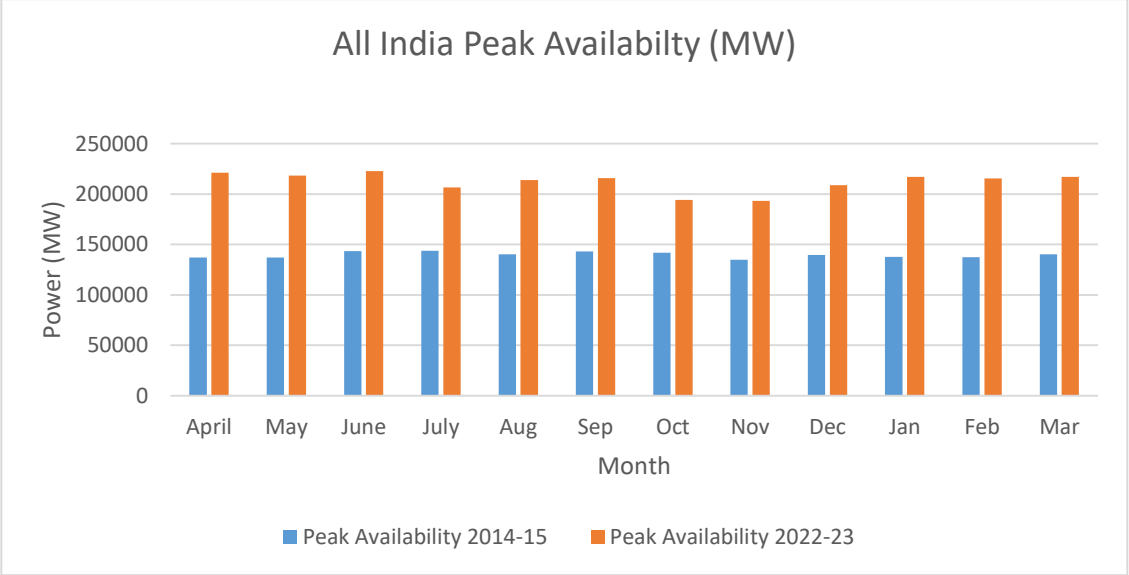
(1) 400 kV Bongaigaon - New Siliguri I
(2) 400 kV Bongaigaon - New Siliguri II
(3) 400 kV Bongaigaon - Alipurduar I
(4) 400 kVBongaigaon–AlipurduarII
(5) 220 kV Salakati - Alipurduar I
(6) 220 kV Salakati - Alipurduar II

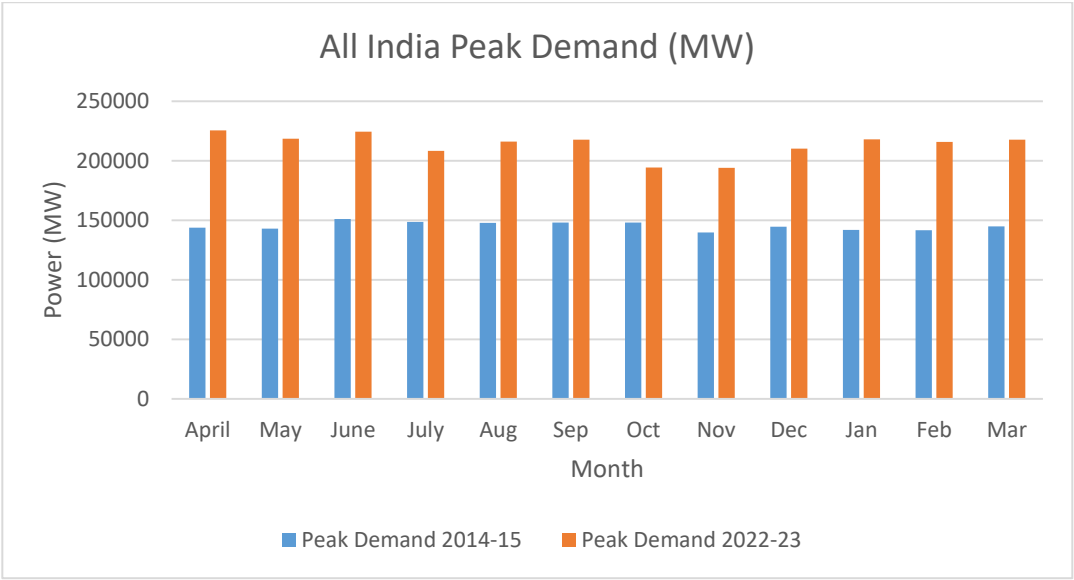
The power transfer from North-Eastern Region to Eastern Region/Northern Region takes place through + / - 800 kV Biswanath Chariali–Alipurduar-Agra Pole-I & Pole–II (HVDC).

Comparison of Power Supply Position between FY-2022-23 and FY-2014-15

All India Power Supply Position

Region	All India Demand (in MW)							
Month	Peak Demand		Peak Availability		Shortage		Shortage (in %)	
	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23	2014-15	2022-23
April	143715	225358	137040	221039	6675	4319	4.64%	1.92%
May	142912	218443	137006	218441	5906	2	4.13%	0.00%
June	150877	224393	143452	222654	7425	1739	4.92%	0.77%
July	148667	208327	143845	206593	4822	1734	3.24%	0.83%
Aug	147879	216141	140138	213858	7741	2283	5.23%	1.06%
Sep	148108	217761	143130	215865	4979	1896	3.36%	0.87%
Oct	147921	194137	141728	194115	6193	22	4.19%	0.01%
Nov	139728	194078	135022	193403	4706	815	3.37%	0.42%
Dec	144487	210227	139501	208912	4986	1315	3.45%	0.63%
Jan	141742	217963	137630	216991	4112	922	2.90%	0.42%
Feb	141560	215699	137509	215482	4051	217	2.86%	0.10%
Mar	144898	217584	140127	217168	4771	415	3.29%	0.19%





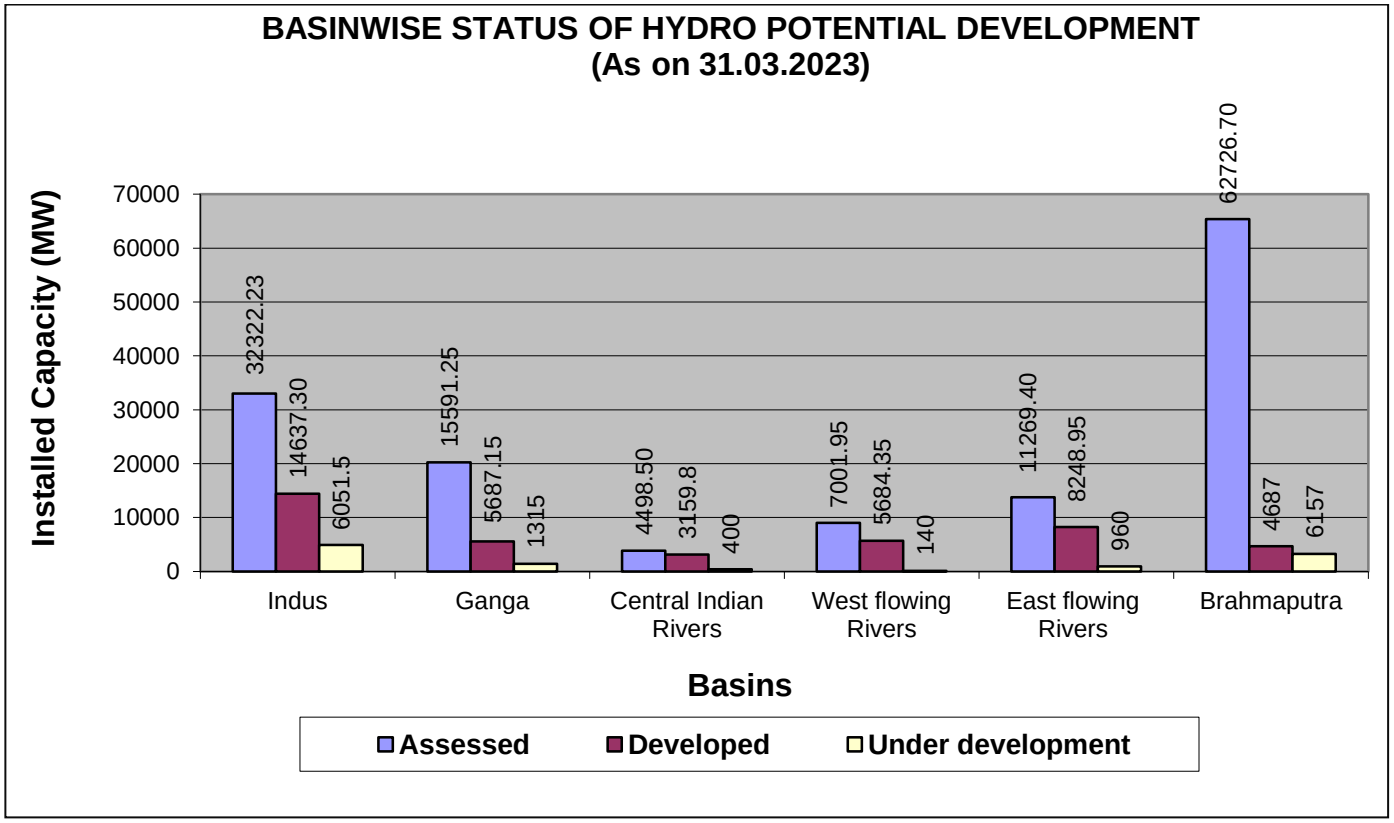
CHAPTER – 5

HYDRO POWER DEVELOPMENT

5.1 Hydro Potential and its Development

The re-assessment studies of hydro-electric potential of the country, completed by Central Electricity Authority during 2017-23, have assessed the economically exploitable hydro power potential in terms of installed capacity as 133410 MW from schemes having capacity above 25 MW.

The basin-wise details of hydroelectric potential development in terms of Installed Capacity are indicated in the table below. As on 31.03.2023, the hydroelectric schemes in operation account for only 31.56% (42104.55 MW) and those under execution for 11.26% (15023.5 MW) of the total potential in terms of installed capacity. Thus, the bulk of the potential (57.18%) remains to be developed.



In addition, at present, 105 sites for development of Pumped Storage Schemes (PSS) with probable total installation of 111060.6 MW have been identified in the country. Out of this, 71 sites (70570.6 MW) are ON River PSPs and 34 sites (40490 MW) are OFF-River PSPs. 8 Nos. Pumped Storage Projects (above 25 MW) having total installed capacity of 4745.60 MW are in operation and 4 Pumped Storage project (2780 MW) are under construction.

5.2 50,000 MW Hydro Power initiative

Under the 50,000 MW Initiative, preparation of Preliminary Feasibility Reports (PFRs) for 162 hydro-electric projects spread over 16 states were taken up by CEA in the year 2003-04 as nodal agency with CPSUs/State agencies as Consultants. The role of CEA includes overall coordination, facilitating collection of data, and quality control by vetting conceptual planning, assessment of power benefits and selection of project parameters, evacuation of power and monitoring of works.

NHPC Ltd., WAPCOS, NEEPCO, SJVN Ltd. and Number of State Power Utilities were associated in preparation of these Preliminary Feasibility Reports. All the 162 Nos. of PFRs were completed in Sept., 2004 for all these projects with an installation of 47,930 MW. Details of these projects are given at **Annexure-5A**.

Out of 162 schemes, DPRs in respect of 35 schemes (18980 MW) have already been prepared. Out of these 35 schemes, 3 schemes (480 MW) has been commissioned while 8 schemes (2068 MW) are under construction in the country. A total of 13 schemes (6551 MW) have been concurred by CEA while 1 scheme (280 MW) is under examination in CEA/CWC. DPRs of 10 HEPs with aggregate capacity of 9601 MW have been prepared but returned for various reasons. A total of 5 schemes (1469 MW) are under Survey & Investigation (S&I) for preparation of DPRs while DPR in respect of remaining 122 schemes (26730 MW) is yet to be prepared due to various issues.

5.3 Construction Monitoring of Hydro Projects:

Hydro Project Monitoring Division is monitoring the progress of construction of on-going sanctioned hydro power projects (above 25 MW) in pursuance to following Sections of Electricity Act, 2003 which is reproduced as under:

Section 73(f). Promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system;

Section 73(i). collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency,competitiveness and such like matters;

Section 73(j). Make public from time to time the information secured under this Act, and provide for the publication of reports and investigations;

The progress of each project is monitored continuously through site visits, interaction with the developers & other stake holders. Chairperson, CEA/ Member (Hydro), Chief Engineer (HPM) holds regular review meetings with the developers/contractors and other Stakeholders.

5.4 Hydro additions during 2021-22:

Hydro capacity addition of 393 MW was achieved against the targets of 493 MW for the year 2021-22. Project-wise details are given at **Annexure-5B**.

5.4.1 **Hydro capacity additions during 2022-23:** 120 MW Hydro capacity has been added against the targets of 1080 MW for the year 2021-22. Project-wise details are given at **Annexure-5C**.

5.4.2 **Hydro capacity programme during 2023-24** Hydro Capacity Addition Monitor able Targets planned for the Year 2023-24 is 2880 MW (2060 MW in Central Sector, 100 MW in State Sector, and 720 MW in Private Sector.). Project-wise details are given at **Annexure-5D.**

5.5 Survey & Investigation (S&I) of Hydro Projects

CEA has been monitoring the progress of Survey and Investigation of all the hydro schemes (above 25 MW capacity) by conducting periodical review meetings with developers. In order to accelerate the pace of hydro development in the country, Guidelines for formulation of DPRs for Hydro Electric Schemes, their acceptance and examination for concurrence have been issued by Ministry of Power in 2014 and accordingly, CEA provides assistance to various Central/ State agencies in the matter of survey, investigation and preparation of DPRs of hydro projects costing more than ₹1000 crores.

In line with the above Guidelines, Consultation Meetings are held by CEA, CWC, Geological Survey of India (GSI) and Central Soil and Materials Research Station (CSMRS) with the project developer and guidance isprovided to him for making a good quality DPR. During the year, consultation meetings were held for Idukki Extension Scheme (800 MW) in Kerala, Naire HPE (909 MW) in Arunachal Pradesh, Sukhpura PSP (2560 MW) & Shahpur PSP (1800 MW) in Rajasthan, Bhavali PSP (1500 MW) in Maharashtra, Paidipalen East PSP (1200 MW), Paidipalem North PSP (1000 MW), Singanmala PSP (800 MW) & Yerravaram PSP (1200 MW) in Andhra Pradesh.

DPRs of 13 nos. of HEPs with aggregate installed capacity of 6918 MW have so far been prepared in consultation with appraising agencies since 2014 and submitted for further examination in CEA/ CWC and out of which DPRs of 9 HEPs with aggregate installed capacity of 4488 MW have been concurred by CEA. DPR of Uri St- II Hydro Electric Project (240 MW) and Upper Sileru Pumped Storage Project (1350) have been prepared and submitted to CEA during the period of 2022-23. In addition, a total of 16 HEPs with aggregate capacity of 4827 MW and 28 Pumped Storage Projects with aggregate capacity of 37550 MW (having cost of more than Rs.1000 Crores) are presently under Survey & Investigation in the country and DPRs of these are to be submitted to CEA for concurrence.

5.6 Project Planning & Optimization Studies

• Power Potential Studies of Owk PSP(800 MW), Gandikota PSP(1000 MW),Yerravaram PSP(1200 MW), Singanamala PSP (800MW) and Chitravathi PSP (500 MW) in Andhra Pradesh, Purthi HEP(287 MW) and Bardang HEP(166 MW) in Himachal Pradesh, Nafra HEP (95 MW), Tawang-I HEP (600 MW), Tawang-II HEP (640 MW) in Arunachal Pradesh, Sela Urthing HEP(114 MW) in Uttarakhand, Warasagaon PSP (1200 MW) and Bhavali PSP (1500 MW) in Maharashtra, Upper Siang(11200 MW) in Arunachal Pradesh, Simsang Dam Project (60 MW) in Meghalaya, Arun-4(630 MW) in Nepal, and Sukhpura PSP(2560 MW) in Rajasthan have been carried out.

5.7 Studies & Other Activities Related to Hydro Power Planning

- A committee has been constituted by MoP under the chairmanship of Chairperson, CEA to discuss the issues related to operationalization of 1200 MW Sardar Sarovar Pumped Storage Project. In this regard, two meeting of the committee have been held.
- Implementation of Early Warning System in Hydro projects is being monitored in CEA on monthly basis.
- Matter related to Internal Committee on Upper Siang MPP constituted by DoWR, RD& GR and prepared report.
- Report on Tentative Capacity Addition of Hydro Projects (Above 25 MW) likely to be commissioned during 2022-23 to 2029-30.
- The draft Guidelines to promote development of Pumped Storage Projects in the country prepared and is under consultation among stakeholders.
- Draft cabinet note on measures to promote hydro power put up in cabinet for approval.
- From FY 2022-23 onwards, the energy from all Hydro Power Projects will be considered as part of Renewable Purchase Obligation (RPO). The Hydro Purchase Obligation (HPO) trajectory, as has been notified earlier with continue to prevail for LHPs commissioned after 8th March 2019. All other HPPs will be considered as part of 'RPO' under category of other RPO".
- Waiver of ISTS charges has been inter-alia extended to Pumped Storage Projects commissioned up to 30.06.2025, subject to certain conditions. Subsequently, part waiver of ISTS charges, in steps of 25% from 01.07.2025 to 01.07.2028, have been extended for PSPs to be commissioned up to 30.06.2028.
- Waiver of ISTS Charges on the transmission of power from new Hydro Power Projects, for which construction work is awarded and PPA is signed on or before 30.06.2025. Subsequently, part waiver of ISTS charges, in steps of 25% from 01.07.2025 to 01.07.2028, have been extended for HEPs for which construction work is awarded and PPA is signed up to 30.06.2028.

- Report on the Possible Measures which can help reduce the occurrence and impact of Geological Uncertainties in Hydroelectric Project submitted to MoP on 12.07.2022.
- The development of Digital Portal for Fast Tracking of S&I of Concurrence of DPR in association with M/s NHPC is under progress.

5.8 Co-operation with Neighboring Countries in Hydro Power

During the year, following works were handled in connection with development of water resources of the common rivers of India and neighboring countries of Bhutan, Nepal etc. for mutual benefits:

- Matter relating to revision of tariff of Chukha HEP in Bhutan. Matter related to handing over of Mangdechhu HEP to Royal Govt. of Bhutan (RGoB).
- Attended meeting with Secretary (Power) in Bhutan (29 October – 1 November, 2022) to discuss impending issues on undergoing projects.
- Joint Hydro Development Committee (JHDC) have been constituted by MoP for joint development of Hydro Projects in Nepal having representation from both the countries. Member (Hydro), CEA would be the chairman of Indian side of the JHDC.
- Meeting under the chairmanship of Secretary, DoWR, RD & GR to discuss issues related to India-Nepal Cooperation in the field of Water Resources.

5.9 Hydro Power Plants Performance & Operation Monitoring

- The report "Review of Performance of Hydro Power Stations" for the year 2019-20, is in the process of completion. Performance of 712 units in 205 Hydro Stations with aggregate Installed Capacity of 45699.20 MW (above 25 MW) has been analyzed in respect of their outages & generation in this report.
- Month-wise/station-wise hydro generation targets for year 2023-24 in respect of all the HE Stations (above 25 MW) in the country were finalized as 156.70 BU in consultation with Midterm review of generation performance of hydroelectric stations of the country for the year 2022-23 was carried out in December 2022 after withdrawal of South-West monsoon by interaction with Power Utilities of Central Sector and the generation programme was reviewed for theremaining part of the year 2022-23. The total generation from hydro stations in 2022-23 would be about 162.09 BU against original programme of 150.67 BU.

5.10 Hydro Power Generation Performance during year 2022-23

Region	Generation (BU)		Deviation (+/-)
	Programme	Actual	(%)
Northern	75.25	77.62	3.15
Western	15.46	19.57	26.58
Southern	30.51	36.87	20.84
Eastern	20.10	20.89	3.93
N-Eastern	8.34	7.14	-14.39
All India	**150.67**	**162.09**	**7.58**

Against programme of 150.67 BU, the actual energy generation during the year 2022-23 was 162.09 BU, which was 7.58 % more than the target.

5.11 RENOVATION & MODERNISATION (R&M) OF HYDRO POWER PROJECTS

Renovation & Modernization, Uprating and Life Extension (RMU&LE) of the existing old hydro power projects is considered a cost effective option to ensure optimization of resources, efficient operations, and better availability and also to augment (uprating) capacity addition in the country.

Recognizing the benefits of R&M of hydro power projects, Govt. of India set up a National Committee in 1987 and a Standing Committee in 1998 and thereafter had identified the projects/ schemes to be taken up for implementation under R&M. The National Perspective Plan document for R&M of hydroelectric power projects in the country was also prepared in CEA during the year 2000. The status of various projects/schemes already identified for implementation/completion till the end of XI Plan, i.e. March, 2012 has been incorporated in the National Perspective Plan.

5.11.1 Achievements During VIII, IX, X XI and XII Plan and Period 2017-22:

The R&M works at 118 (26 in Central and 92 in State Sector) hydro power plants (13 up to the VIII Plan, 20 in the IX Plan, 32 in the X Plan, 18 in the XI Plan, 21 in the XII Plan & 14 during 2017-22) with an aggregate installed capacity of 22634.7 MW had been completed by the end of the year 2017-22 and total a benefit of 4139.56 MW through Life Extension (LE), Uprating (U) and Restoration had been accrued. Table containing data regarding achievement during VIII, IX, X, XI and XII plan and period 2017-22 and 2027-32 are enclosed in **Summary of R&M of Hydro Electric Projects.**

5.11.2 Programme and Achievements during the period 2022-27:

The Renovation, Modernization, Uprating and Life Extension works at 67 Hydro Electric Plants (HEPs) with an aggregate installed capacity of 11935.60 MW is programmed for completion during the year 2022-27 with its break-up as 2641.8 MW through R&M at 13 HEPs, 7377.8 MW through Life Extension at 42 HEPs and 1916 MW through Life Extension and Uprating at 12 HEPs. The 12 HEPs where both Life Extension & Uprating are envisaged, the aggregate installed capacity of 1916 MW shall get uprated after completion of R&M works to 2157.5 MW resulting in additional benefit of installed capacity of 241.5 MW. As such, the revised aggregate installed capacity after completion of RMU&LE works of these 67 projects would be 12177.10 MW. The State-wise list of hydro R&M schemes expected for completion during the year 2022-27 is given at **Annexure-5E.**

Out of these 67 schemes, Seven (7) Schemes with an aggregate installed capacity of about 1469.8 MW have been completed till March, 2023 which has resulted in benefit of extension of operational life for installed capacity of 510 MW.

5.11.3 Programme for the year 2022-23

For the year 2022-23, it was programmed to complete following 7 schemes having capacity under R&M of 1992.6 MW. On completion of these schemes, there was to be a benefit of 1149 MW through Life Extension and 90 MW through Uprating.

S. No.	Name of Scheme, Utility/Agency	Capacity under R&M (in MW)	Category	Cost (in Rs. Crores)	Benefit
1	Bhabha Power House, HPSEB	3x40	RM&LE	43.01	120 (LE)
2	Bhakra LB, BBMB	5x108	RMU&LE	489.77	540 (LE) +90(U)
3	Rihand, UPJVNL	6x50	RM&LE	129.55	300 (LE)
4	Obra, UPJVNL	3x33	RM&LE	58.8	99(LE)
5	Tiloth (Maneri Bhali-I), UJVNL	3x30	RM&LE	171.27	90 (LE)
6	Nagarjuna Sagar Ph-II, TSGENCO	1x110+7 x100.8	R&M	14.34	-
7	Munirabad Dam Power House, KPCL	2x9+1x10	R&M	2.69	-

5.11.4 Achievements during the year 2022-23

R&M works of the following Seven (7) Schemes with an aggregate installed capacity of about 1469.8 MW have been completed during the year 2022-23 which has resulted in benefit of extension of operational life for installed capacity of 510 MW:

S. No.	Name of Scheme, Utility/Agency	Capacity under R&M (in MW)	Category	Cost (in Rs. Crores)	Benefit
1	Bhabha Power House, HPSEB	3x40	RM&LE	43.01	120 (LE)
2	Rihand, UPJVNL	6x50	RM&LE	129.55	300 (LE)
3	Tiloth (Maneri Bhali-I), UJVNL	3x30	RM&LE	171.27	90 (LE)
4	Nagarjuna Sagar Ph-II, TSGENCO	1x110 +7x100.8	R&M	14.34	-
5	Nagarjuna Sagar Left Canal Power House, TSGENCO	2x30.6	R&M	1.50	-
6	Munirabad Dam Power House, KPCL	2x9+1x10	R&M	2.69	-
7	Linganamakki Dam Power House, KPCL	2x27.5	R&M	2.75	-

5.11.5 Programme during the period 2027-32

The Renovation, Modernization, Uprating and Life Extension works at 21 Hydro Electric Plants (HEPs) with an aggregate installed capacity of 2879.20 MW is programmed for completion during 2027-32 through Life Extension and Uprating. The State-wise list of hydro R&M schemes expected for completion during 2027-32 is given at **Annexure-5F**.

Plan-wise summary of R&M of H.E. Projects starting from VIII Plan is given below:

Summary of R&M of Hydro Electric Projects

I Hydro R&M schemes completed up to XII Plan

Sl. No.	Plan Period	No. of Projects			Installed Capacity (MW)	Actual Expenditure (Rs. in Crs)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Upto VIII Plan Schemes	2	11	13	1282.00	127.37	429.00 [39.00(U) + 54.00LE+ 336.00(Res.)]
2.	IX Plan Schemes	8	12	20	4892.10	570.16	1093.03 [339.00(U)+ 423.00(LE) + 331.03(Res.)]
3.	X Plan Schemes	5	27	32	4446.60	1029.24	827.73 [122.05(U) + 701.25 (LE) + 4.43(Res.)]
4.	XI Plan Schemes	4	14	18	5841.20	294.84	735 [12 (U) + 708 (LE) + 15 (Res.)]
5.	XII Plan Schemes	2	19	21	4149.60	1146.02	549.40 [58 (U)+ 476.40 (LE)+15(Res.)]
6.	2017-2022	5	9	14	2023.2	848.68	505.4 [479.2(LE) + 26.2(U)]
	Total	**26**	**92**	**118**	**22634.7**	**4016.31**	**4139.56 [596.25 (U)+ 2841.85 (LE)+ 701.46 (Res.)]**

Abbreviations:
MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension;

II Hydro R&M Schemes during 2022-27:

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	8	59	67	11935.6	9535.30 [9293.80(LE)+ 241.5(U)]
	Completed	0	7	7	1469.8	510 [510 (LE)+ 0(U)]
2.	Under Implementation	4	21	25	3949.75	2505.25 [2367.75(LE)+ 137.5(U)]
3.	Under Tendering	2	4	6	1619	1639 [1619(LE)+ 20(U)]
4.	Under DPR Preparation/ Finalization/ Approval	0	5	5	790	696 [690(LE)+ 6(U)]
5.	Under RLA Studies	2	22	24	4107.05	4185.05 [4107.05(LE)+ 78(U)]

III Programme of R&M works during 2027-32:

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	3	18	21	2879.2	2890.03 [2879.2(LE)+ 10.83(U)]
2.	Under Implementation	0	0	0	0	0
3.	Under Tendering	0	0	0	0	0
4.	Under DPR Preparation/Finalization/ Approval	0	1	1	115	125.83 [115(LE)+ 10.83(U)]
5.	Under RLA Studies	3	17	20	2764.2	2764.2 [2764.2(LE)+ 0(U)]

Abbreviations:
MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension;
RLA- Residual Life Assessment

5.11.6 Appraisal of DPR for existing R&M schemes based on direction/ request of MoP/ CERC/ State Power Utilities during the year 2022-23:

Examination of Detailed Project Report (DPR) for Renovation & Modernization and Life Extension (RM&LE) works of 2x23 MW Khandong Power Station, NEEPCO.

Examination of Proposal for Renovation & Modernisation and Life Extension (RM&LE) of Maithon Hydel Power Station Unit 1&3 (2x20 MW) of Damodar Valley Corporation (DVC).

5.12 Concurrence / Appraisal of Hydro Schemes:

During the year 2022-23 (till 31.03.2023), DPR of 4 HE Schemes with an installed capacity of 2609 **MW** has been concurred by CEA. Details are given as under:

DPR Concurred during the year 2022-23

S. No.	Name of Scheme/ State/ Executing Agency	Installed Capacity (MW)	Estimated Cost (₹ in crores)	Date of concurrence/ appraisal by CEA
1.	Uri-I Stage-II HEP in J&K by M/s NHPC.	2x120= 240	2500.59 (cost at completion level)	07.03.2023
2.	Dugar HEP in Himachal Pradesh by M/s. NHPC	4x103 +2x44= 500	4250.20 (cost at completion level)	26.04.22
3.	Pinnapuram PSP in Andhra Pradesh by M/s. GEPL	4x240+2x120 = 1200	6465.22 (Price at February, 2021 level)	20.04.22
4.	Lower Arun HEP in Nepal by M/s SJVNL	4x167.25=669	5792.36 (cost at completion level)	31.10.2022
	TOTAL	**2609**		

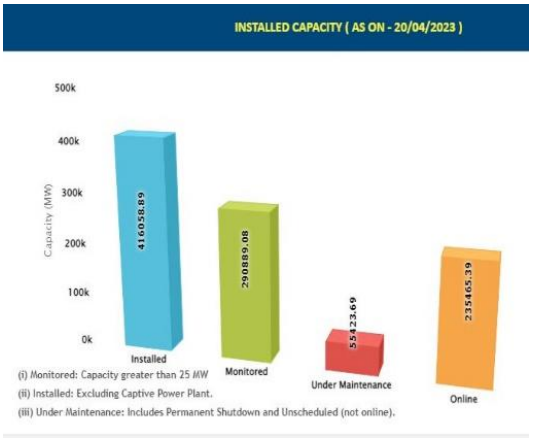
5.13 Computerization in CEA

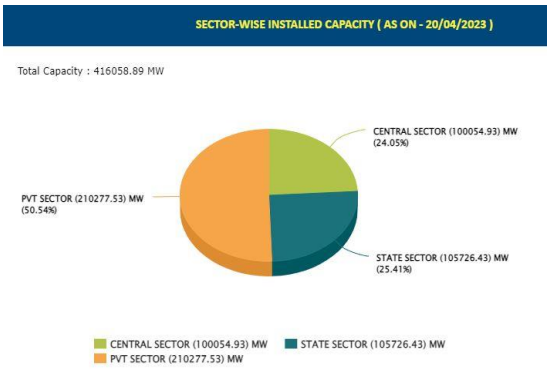
All Divisions and Sections of CEA have been equipped with the latest IT infrastructure. All computers of CEA office at Sewa Bhawan and West Block-II are interconnected through wired or wireless network. The important statistics/data/information of CEA is uploaded in bilingual (English & Hindi) website of Central Electricity Authority (www.cea.nic.in) for global access. The content of this website is updated on daily basis. A state of the art Data Center is running at Sewa Bhawan building for collecting and scrutinizing Load Forecasting data for economic scheduling.

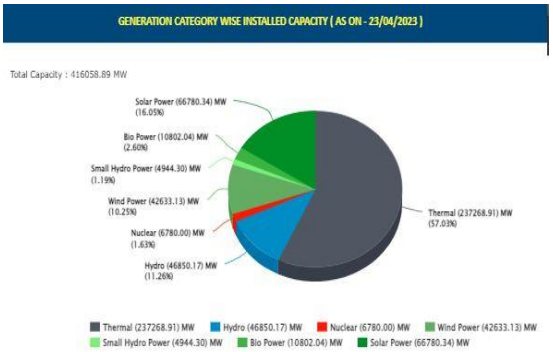
5.14 National Power Data Management System (NPDMS) / National Power Portal (NPP):

- Hon'ble Minister of State (IC) for Power and New & Renewable Energy launched the National Power Portal (NPP) on 14.11.2017 with the vision of creating a central hub for collection and dissemination of all Power Sector data.
- The NPP Dashboard has been designed and developed to disseminate the information of power sector through GIS enabled navigation and visualization chart windows on capacity, generation, transmission, and distribution at National, State, DISCOM, town, feeder level and scheme based funding to states.
- The NPP facilitates the online capture and input of information from entire power value chain; generation, transmission, and distribution utilities in the country on daily, Monthly and annually.
- NPP is integrated with associated systems of Central Electricity Authority (CEA), Power Finance Corporation (PFC), Rural Electrification Corporation (REC) and other major utilities and serve as single authentic source of power sector information to apex bodies, utilities for the purpose of analysis, planning, monitoring as well as for public users. The system is available 24x7 and ensures effective and timely collection of data. It standardized data parameters and formats for seamless exchange of data between NPP and respective systems at utilities.
- The stakeholders of NPP are Ministry of Power (MoP), CEA, PFC for Integrated Power Development Scheme (subsumed in Revamped Scheme), REC for Deen Dayal Upadhyaya Gram Jyoti Yojana (subsumed in Revamped Scheme), other power sector utilities in government as well as private sector, Apex Bodies, other government organizations and public users. Central Electricity Authority is the nodal agency for NPP.
- NPP captures data and display following information:

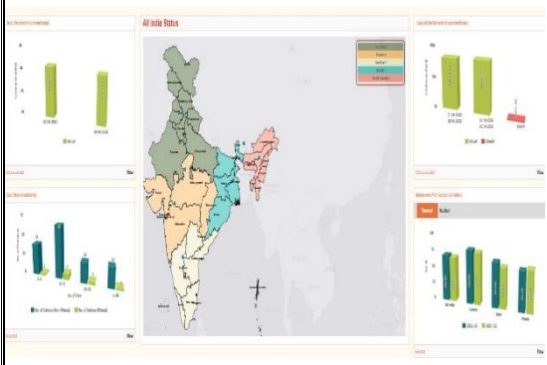
Installed Capacity: Information pertaining to total / sector-wise / category-wise Installed Capacity.



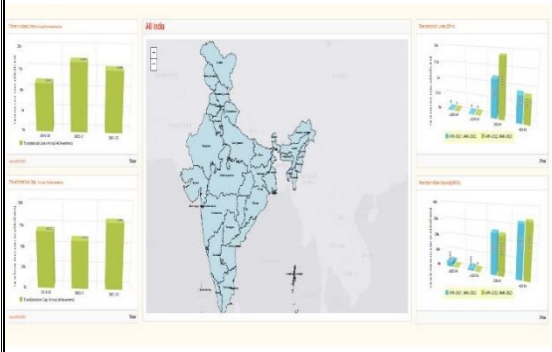




Daily Generation: Information pertaining to Daily Conventional generation, Cumulative Generation, Daily Coal Stock availability, Sector wise PLF.

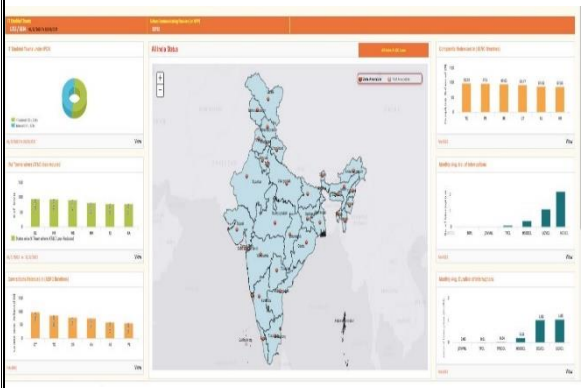


Transmission: Displays information on Transmission Capacity and circuit Km of Transmission line laid during the Financial Year and during the month.

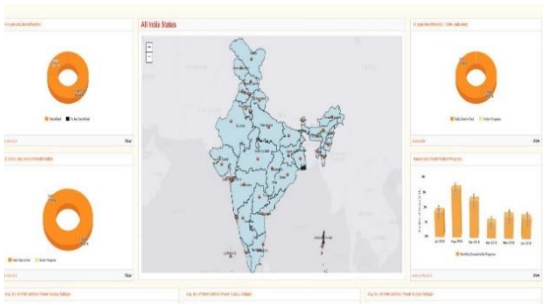


Urban Distribution: Captures and displays information IT Enabled Towns, Towns where AT&C loss reduced, Connections Released in (SERC timelines), Complaints Redressed in (SERC timelines), Monthly Avg. No. of Interruptions, Monthly Avg. Duration of

Interruptions.



Rural Distribution: Captures and displays information about rural power supply. Access to backend data inputs has been given to States/UTs for further granular analysis for adoption of promotion of data based policy making and decisions.

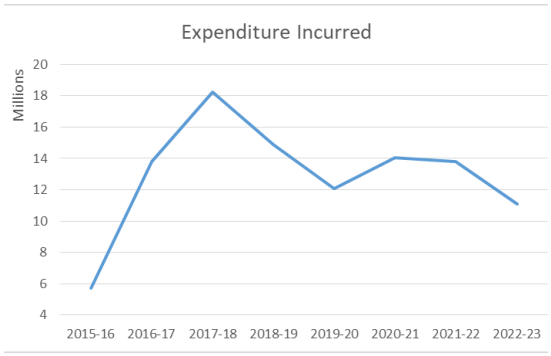


Reports: NPP facilitates various types of statutory reports i.e. Generation Reports, Coal Reports, Transmission Line reports and Installed Capacity reports required to be published regularly.

Applications:

The Links for all Power Sector Apps like TARANG, UJALA, VIDYUTPRAVAH, MERIT APP, UDAY, SAUBHAGYA, PRAAPTI, IPDS, RFMS, DDUGJY and India Renewables Dashboard are available at NPP.

Expenditure incurred in NPP project: Year-wise breakup of expenditure in NPP project is as under:



5.15 E-Office in CEA

For conducting file and letter handling processes in more efficient and transparent manner, e-office (https://cea.eoffice.gov.in) application has been working successfully. The E-Office application is hosted on the Cloud of National Informatics Centre (NIC) and provides features like digital signature facility for ascertaining authentication & non-repudiation, role based work flow, tracking and searching facility, etc. After the version up-gradation of e-File application in January 2022, movement of e-files is possible between CEA and Ministry of Power.

5.16 Cyber Security in Power Sector:

Government of India under the Information Technology Act 2000 (Amendment 2008) has constituted two bodies, National Critical Information Infrastructure Protection Centre (NCIIPC) and The Indian Computer Emergency Response Team (CERT-In) for protection against Cyber Attacks. In line with this, Ministry of Power, GoI has constituted six Sectoral CERTs (CERT-Thermal, CERT-Hydro, CERT-Transmission, CERT-Distribution, CERT-Grid Operation and CERT-Renewable Energy). Member (Hydro), CEA has been nominated as the Chief Information Security Officer, Ministry of Power (CISO-MoP). CISO-MoP looks after overall activities of Cyber Security in Power Sector in coordination with MoP, CERT-In, NCIIPC, other Govt. agencies and six Sectoral CERTs.

Sectoral CERTs work for their specific sector in coordination with MoP, CISO-MoP, and NCIIPC, CERT-In and nominated CISOs of their constituent organizations and look after implementation of Cyber security activities in their Subsectors. At bottom level, the nominated CISOs of Power Utilities work in co-ordination with respective CERTs and are responsible for implementation of Cyber Security Activity in their organization.

Guidelines / advisories issued by Ministry of Information and Technology, Ministry of Power, NCIIPC and CERT-In on Cyber Security from time to time are further being complied and implemented by Sectoral CERTs and CISOs at Power Utility level. All Utilities of Power sectors have been directed by Ministry of Power to on-board Cyber Swachhta Kendra (CSK - Botnet Cleaning and Malware Analysis Centre) of CERT-In. The daily advisories issued by CSK to the Utilities are being monitored for action taken and closure reports by CISO-MoP.

CERT-In conducts regular training programs for network / system administrators and CISOs of all utilities of Power Sector for securing the IT and OT infrastructure and mitigating cyber-attacks. Cyber security mock drills in co-ordination with CERT-In are being conducted regularly in utilities of Power Sector. A refresher course on cyber security has been worked out by CEA and the course is being conducted at NPTI for all load dispatchers of RLDCs and SLDCs.

5.17 CEA (Cyber Security in Power Sector) Guidelines, 2021

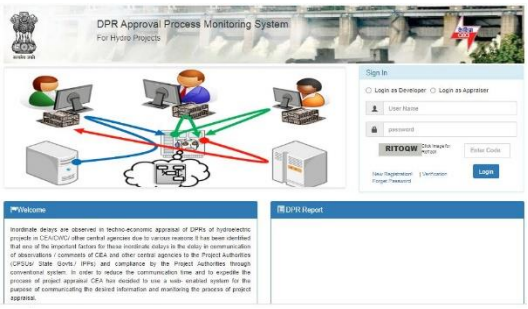
CEA (Cyber Security in Power Sector) Guidelines, 2021 under the provision of Regulation (10) of the Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019 has been issued by CEA on 7th October 2021. The Guidelines on Cyber Security are in the form of Articles incorporating the cardinal principles, requires mandatory Compliance by all Responsible Entities. The compliance of CEA (Cyber Security in Power Sector) Guidelines, 2021 by Power Utilities is being monitored by six Sectoral CERTs and CISO-MoP. Further, based on the feedbacks received from Power utilities, CEA (Cyber Security in Power Sector) Guidelines, was amended on **21.9.2022** to address the frequency of OT audit for compliance of Responsible Entities.

5.18 Digitization of Approvals/ Clearances given by CEA

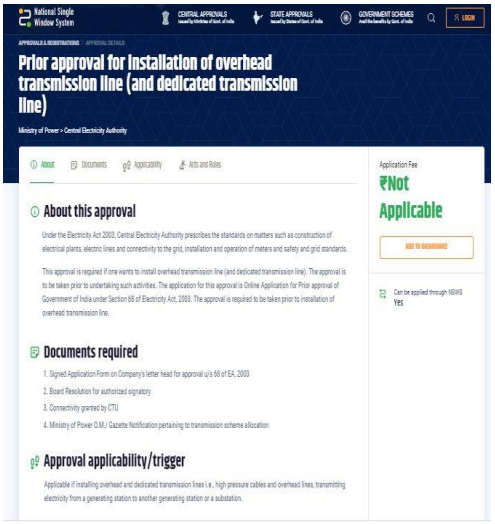
As per the direction of Project Monitoring Group of Cabinet Secretariat, online application for the following approvals/clearances, given by Central Electricity Authority, have been implemented:

- Online Application for Inspection of Electrical Installations

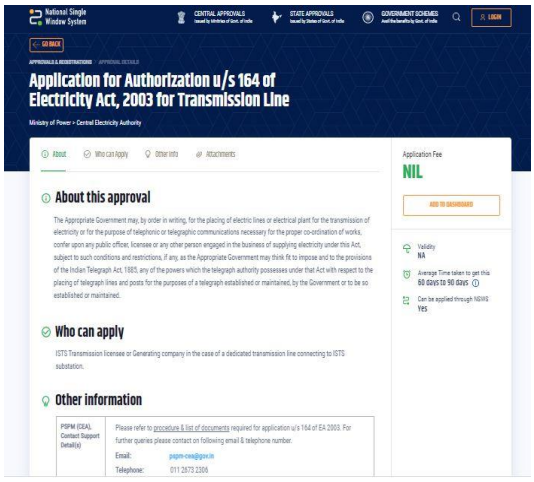
- DPR Approval Process Monitoring System for Hydro Projects



- Approval of GoI for installation of overhead lines as per Section 68 of the Electricity Act 2003



- Application for Authorization u/s 164 of Electricity Act, 2003 for Transmission Line



The digitization of approval/clearance processes is ensuring transparency and timely approval by CEA. This also facilitates developers to track the status of their application. Further, National Single Window System (NSWS) is a digital platform with aim to include all Govt. approval at one place for ease of doing business. In this regard, Central Electricity Authority has integrated its above mentioned clearances with NSWS.

5.19 Dedicated intranet portal of CEA

Intranet portal of CEA is hosted at https://intranet.cea.gov.in. This portal is accessible within as well as outside the NIC network. All officers / staffs have been provided login credentials. Internal information's of organization like presentations / forms / posting orders / leave orders/ internal circulars etc. are shared through the portal. In-house developed applications are also being integrated with the CEA Intranet.

- **Use of Kavach Application for login into NIC email**

All officers / staffs are currently using Kavach Authentication application for securely logging into NIC email.

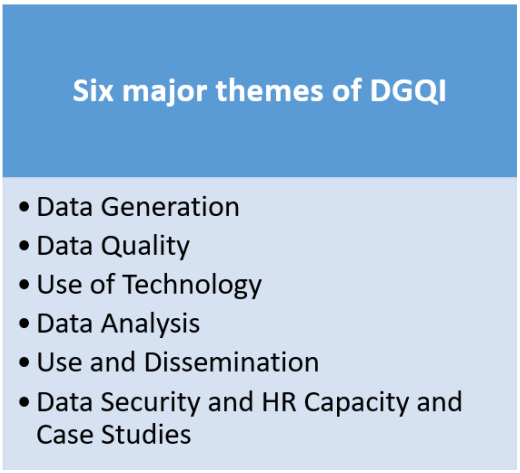
- **Other Information Communication Technology (ICT) enabled activities**

- Mostly IT related items are being procured through GeM portal and their payments are being made via PFMS. Total Procurement of IT related Goods and Services made from GeM portal during FY 2022-23 is as under:

Procurement of IT Goods (in Rs.)	Procurement of IT Services (in Rs.)
70,36,360/-	32,59,200/-

- All tenders are uploaded on Central Public Procurement (CPP) Portal.
- **DGQI assessment and MoP rating**

  Data Governance Quality Index 2.0 (DGQI 2.0) survey is an initiative of Niti Aayog to assess different Ministries/Departments' performance on the implementation of digitization of schemes.



  In DGQI 2.0, MoP has selected National Power Project as Non-Schematic Intervention (NSI).

  Central Electricity Authority (CEA) being the nodal organization for NPP has prepared the roadmap, action plan and questionnaire survey in respect of NPP. Under DGQI 2.0 survey assessment, score for NPP was 4.00 out of 5.00.

CHAPTER-6

THERMAL POWER DEVELOPMENT

6.1 New Thermal Power Projects accorded Environment Clearance:

6.1.1 Power Projects accorded Environment Clearance

During the year 2022-23, Environment clearance has not been granted to any new thermal power project.

6.1.2 Power Projects for which order placed

During the year 2022-23, order for 1320 MW thermal capacity have been placed as listed below:

Sl.	Project	Implementing Agency	Plant Configuration	Capacity (MW)	Main Plant (BTG)
1	Talcher TPP St-III (coal based)	NTPC	2x660	1320	EPC Package for awarded to M/s BHEL on 27.09.2022

6.1.3 Thermal Power Plants expected to be commissioned by the year 2026-30

A. Candidate Brown field Thermal Power Plants identified by CEA expected to be commissioned by 2026-30 have been identified by CEA. List of the same is furnished below:

Sl.	Name of Project	Sector	Developer	State	Pit Head/ Non Pithead	Capacity MW
1	Lara STPP St-II	Central	NTPC	Chhattisgarh	Pit Head	2x800=1600
2	Singrauli STPP-III			Uttar Pradesh	Pit Head	2x800=1600
3	Darlipalli-II			Odisha	Pit Head	1x800=800
4	Sipat-III			Chhattisgarh	Pit Head	1x800=800
5	TPS-II 2nd Expansion		NLC	Tamil Nadu	Pit Head	2x660=1320
6	NLC Talabira STPS			Odisha	Pit Head	3x800=2400
7	Raghunathpur TPS, PH-II		DVC	West Bengal	Non Pithead	2x660=1320
8	Durgapaur TPS			West Bengal	Non Pithead	1x800=800
9	Koderma TPS			Jharkhand	Non Pithead	2x800=1600
10	Meja-II		NTPC-JV	Uttar Pradesh	Non Pithead	3x800=2400
11	Buxar TPP-II		SJVN	Bihar	Non Pithead	1x660=660
12	Super Critical TPP, Korba(W)	State	CSPGCL	Chhattisgarh	Pit Head	2x660=1320
13	Yamuna Nagar TPP U#3	State	HPGCL	Haryana	Non Pithead	1x800=800
14	Amarkantak TPS	State	MPPGCL	Madhya Pradesh	Non Pithead	1x660=660
15	Satpura TPP (Sarni)	State	MPPGCL	Madhya Pradesh	Non Pithead	1x660=660
16	Koradi Replc TPP	State	MAHAGENCO	Maharashtra	Non Pithead	2x660=1320
17	Chandrapur TPP	State	MAHAGENCO	Maharashtra	Non Pithead	1x660=660
18	Ukai TPP	State	GSECL	Gujarat	Non Pithead	1x800=800
19	Singrani U#3	State	SCCL	Telangana	Non Pithead	1x800=800
20	IB Valley, #3 & 4	State	OPGC	Odisha	Pit Head	2x660=1320
21	Chhabra #7 & 8	State	RRVUNL	Rajasthan	Non Pithead	2x660=1320
22	Kalisindh	State	RRVUNL	Rajasthan	Non Pithead	1x800=800
TOTAL						**25,760 MW**

B. Additional Candidate Coal-based Thermal Power Plants identified for Development in future, if required:

Sl.	Name of Project	Sector	Developer	State	Pit Head/ Non-Pithead	Capacity MW
1	Nabi Nagar (NPCG) -II	Centre	NTPC	Bihar	Non-Pithead	3x660=1980
2	Talabira STPS	Centre	NLC	Odisha	Pit-Head	1x800=800
3	MBPP Sundergarh	State	MBPPL	Odisha	Pit-Head	2x800=1600
4	Obra 'D'	State	UPRVUNL	Uttar Pradesh	Pit Head	2x800=1600
5	Godna TPS	State	KPCL	Chhattisgarh	Pit Head	2x800=1600
TOTAL						**7,580 MW**

C. Stressed Thermal Power Projects expected to be commissioned by 2026-30:

Name of Project	Sector	Developer	State	Capacity MW
Athena	IPP	Jindal Power	Chhattisgarh	2x600
Monnet	IPP	JSW	Odisha	2x525
S K S Power	IPP	NCLT	Chhattisgarh	2x300
TOTAL				**2,850 MW**

6.2 Captive Coal Blocks Allocated to Power Sector

Presently, 48 nos. of Coal Blocks are allocated to the Power Sector. 33 nos. of coal blocks are producing coal. 15 nos. of coal blocks are in development. The total nos. of coal blocks allotted to the Central Sector is 12 nos., State Sector is 32 nos., Private sector is 02 nos. and UMPP is 02 nos.

Captive mines allocated to Power Sector produced 82.17 MT of coal against a target of 79.85 MT for FY 2021-22. For FY 2022-23, the captive coal production was 101.96 MT against the target of 106.71 MT. For H1 (Apr'23-Sep'23) of FY 2023-24, the estimated target of captive coal production is 61.7 MT.

6.3 Linkage under SHAKTI Policy, 2017

Ministry of Coal in May 2017 formulated a new policy for the allocation of coal to the power sector named SHAKTI (Scheme for Harnessing and Allocating Koyala transparently in India), 2017. Since, the inception of the policy, coal linkage has been accorded to various Govt./Private power utilities under its various provisions/clauses. Status up to March-2023 is as under

6.3.1 Shakti Policy Para B (i):-

Policy:- CIL/SCCL may grant Coal linkages for Central Government, State Government Gencos and JVs formed between or within CPSUs and State Govt./PSUs at the notified price of CIL/SCCL.

Achievement: Till date, SLC (LT) has accorded coal Linkage to 36 nos. Thermal Power Projects totaling 41,480 MW to Central /State GENCOs. In FY 22-23, 10 nos. of Thermal Projects of capacity 11,520 have been allocated long term linkage.

6.3.2 Shakti Policy Para B (ii):

Policy:- CIL/SCCL may grant coat linkages on notified price on auction basis for power producers/IPPs having already concluded long term PPAs (both under section 62 and section 63 of The Electricity Act, 2003) based on domestic coal.

Achievement:- Five rounds of auctions for coal linkage under Shakti B (ii) have been held so far.

Round of auction under Para B(ii)	Coal Qty booked (in G13 Grade) (MTPA)	Number of successful bidders and maximum discount offered on tariff
1st Round (Sep'17)	32.68	10 plants, Max discount 4 Paisa
2nd Round (May'19)	3.335	8 plants, Max Discount 7 Paisa
3rd Round (May'20)	3.466	5 plants, Max Discount 10 Paisa
4th Round (Sept'21)	3.819	5 plants, Max discount 12 paisa
5th Round (Dec'22)	0.058	2 plants, Max Discount 12 Paisa

6.3.3 Shakti Policy Para B(iii): -

Policy:- CIL/SCCL may grant future coal linkages on auction basis for power producers /IPPs without PPAs that are either commissioned or to be commissioned. All such power producers/IPPs may participate in this auction and bid for premium above the notified price of the coal. Coal drawl will be permitted only against valid long term and medium-term PPAs, which the successful bidder shall be required to procure and submit within two years of completion of auction process.

Achievements:- Four rounds of auctions for coal linkage under Shakti B(iii) have been held so far.

Round of auction under Para B (iii)	Coal Qty booked (in G13 Grade) (MTPA)	Premium offered in the auction
1st Round, Feb'2020	7.15	Average premium is 8.5%.
2nd Round, May'2022	7.01	Average premium is 2%.
3rd Round, Sept'2022	5.57	Premium is Zero.
4th Round, Jan'2023	4.87	Average premium is 1.88%.

6.3.4 Shakti Policy Para B(iv): -

Policy:- In this clause coal linkage may be earmarked to the states for fresh PPAs, by pre-declaring the availability of coal linkage with description. States may indicate these linkages to Discoms/State Designated Agencies (SDA). The states/Discoms may, based on such linkage, undertake tariff based competitive bidding for long-term and medium-term procurement of Power.

Achievements:- Under this clause, coal linkages have been allotted by CIL to Gujarat state for 3915 MW, to UP state for 1600 MW and to MP state for 3000 MW. Presently tariff based competitive bidding is under process by Gujarat state for 3000 MW. For MP state, Competitive bidding is successfully done.

6.3.5 Shakti Policy Para B(v): -

Policy:- In this clause, Power requirement of group of States can be aggregated and procurement of such aggregated power can be made by an agency designated by Ministry of Power or authorized by such States on the basis of tariff based bidding. Coal linkages will be earmarked for such agencies by pre-declaring the availability of coal linkage with description, based on which such agency will undertake tariff based competitive bidding for long-term and medium-term procurement of power and recommend grant of these linkages to successful bidders.

Achievements:- Under this clause, during FY 22-23 CIL allocated 24 MTPA of coal linkage. PFCCL (designated agency by MoP) invited bids for 4500 MW. Bids were received for 1480 MW only. However, the bidding was cancelled.

6.3.6 Shakti Policy Para B(viii)(a):

Policy: -

All such power plants including private generators which do not have PPAs, shall be allowed Coal linkage under B (iii) and B (iv) of Shakti Policy for a period of minimum 3 months upto a maximum of 1 year, provided further that the power generated through that linkage is sold in Day Ahead Market (DAM) through power exchanges or in short term through a transparent bidding process through Discovery of Efficient Energy Price (DEEP) portal.

Achievements: -

Thirteen rounds of quarterly auctions for coal linkage under SHAKTI B(viii)(a) have been held so far upto March-2023:

Tranches no. of auction under Para B(viii)(a)	Coal Qty booked (in G13 Grade) (MTPA)	Number of successful bidders and premium offered/ton
Tranche-1 (Apr-Jun'20)	1.34	9 plants, Premium NIL
Tranche-2 (July-Sep'20)	0.63	8 plants, Premium NIL
Tranche-3 (Oct-Dec'20)	0.35	6 plants, Premium NIL
Tranche-4 (Jan-Mar'21)	0.64	7 plants, Max Prem. Rs. 50/ton
Tranche-5 (Apr-Jun'21)	1.07	8 plants, Max Prem. Rs. 25/ton
Tranche-6 (July-Sep'21)	0.82	8 plants, Premium NIL
Tranche-7 (Oct-Dec'21)	1.81	8 plants, Max Prem. Rs. 35/ton
Tranche-8 (Jan-Mar'22)	1.45	11 plants, Max Prem. Rs. 675/ton
Tranche-9 (Apr-Jun'22)	6.13	16 plants, Max prem. Rs. 2600/ton
Tranche-10 (Jul-Sep'22)	4.25	27 Plants, Max prem. Rs. 3250/ton
Tranche-11 (Oct-Dec'22)	6.01	22 Plants, Max prem. Rs. 2050/ton
Tranche-12 (Jan-Mar'23)	5.39	26 Plants, Max prem. Rs. 2500/ton
Tranche-13 (Mar-May'23)	3.67	21 Plants, Max prem. Rs. 1400/ton

6.4 Bridge Linkage:

Ministry of Coal vide Office Memorandum dated 08.02.2016, had issued policy guidelines for grant of bridge linkage to End Use Plants (EUPs) of Central and State public sector undertakings which have been allocated Coal Mines/Coal Blocks. Based on these guidelines, 35 nos. Thermal Projects totaling 40,700 MW were granted Bridge Linkage.

6.5 Use of Treated Sewage Water by TPS under Tariff Policy-2016:

As per Tariff Policy dated 28.01.2016, notified by Government of India, sewage treated water is to be used by Thermal Power Plants (Thermal Power Plants which are located within 50 Kms from Sewage Treatment Plants) for cooling purpose. Accordingly, MoP/ Central Electricity Authority (CEA) is exploring the feasibility for the usage of Sewage Treated Water by Thermal Power Plants for cooling purpose.

Presently, 07 nos. of Thermal Power Stations with a total capacity of 8999.2 MW are utilizing 585 MLD of STP water i.e. Koradi TPS, Khaperkheda TPS & Sinnar TPP Phase-I in Maharashtra, Pragati CCGP & Pragati-III in Delhi, Bhavnagar Lignite TPS in Gujrat and Yelahanka CCP in Karnataka are utilizing STP water. Also, 02 nos. of Thermal Plants (3580 MW) have successfully placed the order for construction of the projects (Tertiary Treatment Plant and Pipeline). Quantum of STP water associated with these projects amounts to 90 MLD.

6.6 Mega Power Project Certificate:

Recommendation to MoP for issuance of proportionate Mega Certificate to provisional Mega Power Projects for release of Proportionate Bank Guarantee/FDRs. So far, the following 4 projects have been granted proportional Mega Certificate:

i. MB (Madhya Pradesh) Power Ltd
ii. DB Power Ltd
iii. RKM Powergen Pvt. Ltd.
iv. IL&FS Tamil Nadu Energy Ltd.

6.7 Ultra Mega Power Projects (UMPPs):

Government of India through Ministry of Power launched the initiative of Ultra Mega Power Projects (UMPPs) i.e. 4,000 MW super thermal power projects (both pit head and imported coal based) in November 2005 with the objective to develop large capacity power projects in India. Central Electricity Authority (CEA) has been designated as Technical Partner and Power Finance Corporation Ltd (PFC) as the Nodal Agency to facilitate the development of these projects. Various inputs

for the UMPPs are tied up by the Special Purpose Vehicle (SPV) with the assistance of Ministry of Power & CEA. CEA is involved in selection of sites for these UMPPs. The power generation capacity of each of the existing and proposed UMPP is 4000MW approximately. The funds for UMPP are arranged by the developer of the project which is selected through International Competitive Bidding Route as per the Standard Bidding Document issued by Ministry of Power.

6.7.1 Status of UMPPs Awarded:

Initially, four UMPPs namely Sasan in Madhya Pradesh, Mundra in Gujarat, Krishnapattnam in Andhra Pradesh and Tilaiya in Jharkhand were awarded to the successful bidders. The details of these project are given as below:

6.7.2 Present Stance of MoP, GoI on development of new UMPP:

Presently, no UMPP is under construction. As the country is undergoing energy transition from fossil fuel to non-fossil fuel, Ministry of Power vide OM dated 12.11.2021, decided to defer any action on formulation of UMPP Bidding framework as of now. Therefore, no project activities related to development of UMPP are being taken up further.

6.8 Construction Monitoring Of Thermal Power Projects:

CEA closely monitors the progress of various construction activities of thermal power projects under construction in the country. Project monitoring related activities emerge from Section73 (f) Electricity Act, 2003 Regular visits are made by CEA officers to the project sites for assessing the progress of various construction activities and rendering necessary advice/assistance in resolving the problems being faced by the Project Authorities to meet the schedule of commissioning. Regular Review Meetings are also held in CEA with Project Authorities, Main Plant & Equipment Manufacturers and other equipment Suppliers to review the progress status of the Projects.

Sl. No	Name of UMPP	Type	Date of Transfer	Levellised Tariff (in Rs. Per kWh)	Successful developer	Present Status
1	Mundra, Gujarat	Coastal	23.04.2007	2.26	Tata	Operational
2	Sasan, Madhya Pradesh	Pithead	07.08.2007	1.19	Reliance Power Ltd.	Operational
3	Krishnapatnam, Andhra Pradesh	Coastal	29.01.2008	2.33	Reliance Power Ltd.	Terminated
4	Tilaiya, Jharkhand	Pithead	07.08.2009	1.77	Reliance Power Ltd.	Terminated

6.8.1 Key initiatives

Based on the past experience, there has been a significant shift in approach in the area of project monitoring. Some key initiatives taken during recent past in the role of a facilitator, includes the following:

- Drawing up of detailed schedules for project /milestones commitments from project authorities for on-going under construction projects.
- Participation in various review meetings held in the Ministry of Power, Ministry of Heavy Industries, Project Monitoring Group and NITI Aayog etc.
- Holding review Meetings with various implementing agencies including suppliers to review the progress of work and finalizing the completion schedule of under construction thermal power projects.
- Undertaking visits to thermal projects to assess the progress of various activities at site.

During the year 2022-23, the following under construction thermal projects have been visited by CEA officers to assess the actual progress of various construction activities and the anticipated date of trial run of unit of the project:

1. Ghatampur Thermal Power Project (3x660 MW) in the state of Uttar Pradesh being implemented by M/s NUPPL from 19.05.2022 to 20.05.2022
2. North Chennai Super Thermal Power Project, St-III (1x800 MW) in the state of Tamil Nadu being implemented by M/s TANGEDCO from 15.11.2022 to 16.11.2022.
3. Dr. Narla Tata Rao Thermal Power Project, St-V (1x800 MW) in the state of Andhra Pradesh being implemented by M/s APGENCO from 19.12.2022 to 20.12.2022
4. Sri Damodaram Sanjeevaiah Thermal Power Station, St-II (1x800 MW) in the state of Andhra Pradesh being implemented by M/s APPDCL from 23.01.2023 to 24.01.2023
5. North Chennai Super Thermal Power Project, St-III (1x800 MW) in the state of Tamil Nadu being implemented by M/s TANGEDCO from 24.01.2023 to 25.01.2023.

As per the directions given by Hon'ble Minister for Power & NRE in the meeting held on 6.9.2022, a Task force has been constituted to monitor the upcoming, identified/candidates, stressed and retiring thermal power projects on monthly basis for dissemination of information to MoP. Report on the progress of this projects is submitted to MoP every month.

6.8.2 Other Important activities of construction monitoring of thermal projects:

- Monitoring the progress of construction/erection activities of the Maitree (Indo-Bangladesh (2x660 MW) Super Thermal Power Projects on monthly basis. Unit-I of Maitree Super Thermal Power Projects have been commissioned on 23.12.2022.
- Monitoring of progress (financial progress/ CAPEX) of National Infrastructure Pipeline (NIP) projects which are State's projects in thermal sector on monthly basis. The status of bidding of upcoming projects of State's projects in thermal sector are also prepared on Quarterly basis.
- Preparation of monthly/fortnightly reports viz. report for PMO / MIS report /Thrust Area report/ report for D.O. letter from Secretary (Power) to Cabinet Secretary/report for updates regarding Min. of Power/ Report for Urja Darpan portal in respect of under construction thermal power projects in the country.
- Constitution of a committee to standardize the manpower norms to optimize the manpower in Thermal sector.

6.9 Report of the Committee on Standardization of manpower norms:

Manpower requirement varies in different phases of the project such as Survey & Investigation, Under Construction and Operation. Per MW manpower requirement decreases with increase in installed capacity (MW) of the project. Considering this, multiplication factors (Manpower/ MW) for various Installed Capacities (viz. 210 MW, 250 MW, 500 MW 660 MW, 800 MW and their multiples or combinations) have been worked out by the Committee in its report. To accommodate various complexities involved in a thermal power project including combined cycle gas power plants (viz. expanse, no. of units, no. of components, accessibility, socio-environmental

factors, inhabitability, geography etc.), different complexity factors varying from 1.0 to 1.2 for different stages of project i.e. Survey & Investigation, under construction and operation have been worked out in the report. Manpower requirement of a project is determined as product of size (installed capacity), Multiplication Factor and Complexity Factor for the project.

6.10. THERMAL CAPACITY ADDITION PROGRAM

6.10.1 Thermal capacity addition achievement during 2022-23

The thermal capacity addition target for the year 2022-23 was 6350 MW against which a capacity of 1460 MW has been achieved. Sector-wise details of target and achievement during the year 2022-23 are as follows:-

SECTOR	THERMAL	
	Target	Achieved
CENTRAL	3580	660
STATE	2770	800
PRIVATE	0	0
TOTAL	**6350**	**1460**

The details of target/ achievements for the year 2022-23 is enclosed at **Annexure 6A.**

6.10.2 Thermal capacity addition target during 2023-24

The target for thermal capacity addition during 2023-24 is as under:-

SECTOR	Target (MW)
CENTRAL	6880
STATE	7820
PRIVATE	0
TOTAL	**14700**

6.11 Thermal Engineering & Technology Development (TE&TD)

CEA has been actively associated in resolving the thermal engineering related issues and introduction of new technologies in thermal power generation. The important responsibilities entrusted to TE&TD division are:

Advice to Electricity Regulatory Commissions/Power Generating Utilities on Technical Matters, Preparation of Standard Technical Specifications for Thermal Power Stations, Issues related to the Indian Boiler Regulation, Preparations/Amendment of following CEA Regulations

i) CEA (Technical Standards for Construction of Electrical Plants & Electric Lines) Regulations,2022

ii) CEA (Safety Requirements for Construction, Operation and Maintenance of ElectricalPlants & Electric Lines) Regulations, 2011 as amended

iii) CEA (Flexible Operationof Coal based Thermal Power Generating Units) Regulations, 2023,

Investigation of Accidents/Failures at Thermal Power Stations, Examining Proposal for R&D in IndianPower Sector, Technical Advice to various Expert/Technical Committees set up by CEA/Others organizations, Reference for expert advice

on Technological matter, New and Emerging clean energy technologies in the Thermal Power Sector such as Hydrogen co-firing in Gas Turbines, Ammonia in coal based TPS, CCUS etc., Matters related to Operating Parameters of Coal/Lignite and CCGT based Thermal Power Stations, Matters related to Excellence Enhancement Center and Bureau of Energy Efficiency, Matters related to Make in India for Thermal Power Sector, Co-firing of Biomass and Exemptions to TPPs under National Mission on use of Biomass in Thermal Power Plants (SAMARTH), Safety related matters under CEA (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants & Electric Lines) Regulations, 2011 as amended.

6.11.1 Important Activities

The following important activities have been completed/ undertaken during the financial year 2022- 23:

A. Mandatory co-firing of biomass in thermal power plants:

The Executive committee headed by Member (Thermal), CEA with representatives from MNRE, BHEL NTPC, BEE, CPRI, NPTI, Samarth Mission etc. has been constituted by MoP to supervise the acitivities of Samarth Mission and evaluate the progress of mission directorate. With the active support of the Executive Committee more than one lakh biomass pellets were cofired in various thermal power plants in the country.

Committee under the Chairmanship of Chief engineer (TE&TD) with representatives from Ministry of Agriculture, Mission Directorate under National Mission on use of biomass in thermal power plants, CPRI, NTPC and BHEL has been constituted by MoP to examine the request of power plants for their exemption / relaxation from mandatory co-firing of biomass. The Committee prepared and circulated the guidelines / procedure for examining the request of the power plants for seeking exemption / relaxation from co- firing, to all the coal based thermal power plants in the country. As on 31.03.2023, total 32 no. of applications for exemption/relaxation from mandatory co-firing of biomass had been assessed. It is to mention that till date, based on the information provided by above power plants, none of them were found suitable for recommending the exemption from mandatory co- firing of biomass has been given to any thermal power plant.

B. Comprehensive Review of "Central Electricity Authority (Technical Standard for construction of Electrical plants and Electrical lines) Regulations, 2010":

Comprehensive review of CEA "Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010" wascarried out and as a result, this regulation was replaced by CEA "Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 and published in the Gazette of India on date 27th December, 2022

C. Amendment to CEA Regulations "Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011":

Amendment of CEA Safety regulation, 2011 was carried out in consultation with all stakeholders. As a major achievement, CEA "Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) (Amendment), Regulations, 2022 were notified in Gazette on 16th November, 2022. The amendments have added a clause for enhanced safety provisions and deleted certain provisions for ease of doing business.

D. CEA (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023 for supporting the RE integration into the grid:

In light of the increasing RE Generation thermal power plants are required to operate in flexible manner and to facilitate the scheduling of thermal power plants for above purpose Central Electricity Authority (Flexible Operation of Coal based Thermal Power Generating Units) Regulations, 2023 were notified on 30th January, 2023.

E. Safety related matters under CEA:

In compliance to the Hon'ble National Green Tribunal (NGT) order in Original Application No. 919/2022 in respect of the fire accident happened at Neyveli New Thermal Power Station (NNTPS) of NLCIL on date 22.12.2022, an officer of CEA visited the Neyveli New Thermal Power Station (NNTPS) from 01.03.2023 to 02.03.2023 to inspect the NNTPS from Safety point of view and suggest the suitable safety measures to prevent such incidents in future. The report was issued on 23.03.2023 for compliance by NNTPS.

F. Advice to Electricity Regulatory Commissions/Power Generating Utilities on Technical Matters:

Expert opinion were provided to CERC in respect of Petition filed by M/s ONGC Tripura Power Company Limited (726.6 MW i.e. 2 x 363.3 MW Modules rating) before CERC, requesting for an upward revision of Technical Minimum from 55% to 65% of the installed capacity for the Palatana CCGT Power Station.

G. National Energy Conservation Awards 2022:

Ministry of Power has undertaken a scheme to encourage, motivate as well as give recognition through National Energy Conservation Awards to industrial units and other establishments, who take extra efforts to reduce energy intensities while maintaining the production levels. The scheme is aimed to create an environment that would spur industries and other establishment in achieving excellence in efficient use of energy and its conservation. The awards were given away for the first time in December, 14, 1991 which is now celebratedas National Energy Conservation Day throughout the country. Member (Thermal), CEA is head of the Technical Sub-Committee to assist the Award Committee, headed by Secretary, Power, in the finalization of awards. During the year 2021-22, proposals received from two industrial sectors viz. Integrated Steel and Textile sector were evaluated by CEA. The awards to the best performing industrial units in all the sectors covered during 2021-22 were given on 14th December, 2022 in New Delhi.

H. Model Quality Assurance Plan:

CEA published 'Guidelines for Model Quality Assurance Plan (MQAP) for major equipment of Power sector' in March 2022 covering MAQP for all the segments of power sector i.e. Generation (Thermal, Hydro), Transmission and Distribution. TETD Division prepared the thermal chapter of the above MQAP.

I. Technical Committee on Thermal Research:

The Technical Committee on Thermal Research is chaired by Central Power Research Institute (CPRI) and has members from CEA, IIT Bombay, NTPC, BHEL & Tata Power for evaluation of various research proposals/projects under the schemes of CPRI.The 11th, 12th and 13th meeting of the Committee were held in various phases during the year 2022-23 and various thermal research projects were evaluated.

6.12 Chairman/Members of various committees:

a. Chief Engineer, TE&TD is a member of the Task Force created by Bureau of Water Use Efficiency (BWUE) under the Ministry of Jal Shakti. Chief Engineer, TE&TD is also the chair of Subgroup-2B on Power and Energy under BWUE.

b. Chief Engineer, TE&TD is a member of the Working Committee constituted by NITI Aayog for the development of a policy framework for the effective implementation of the Carbon Capture, Utilization and Storage (CCUS) initiatives in India.

c. Chief Engineer, TE&TD is a member of the Standing Site Selection Committee for selection of sites for future nuclear power stations constituted by Department of Atomic Energy (Power Section).

d. Chief Engineer, TE&TD is a member of the Technical Committee on Thermal Research for review, recommendation and monitoring of R&D proposals under IHRD, RSOP, NPP schemes of MoP, Govt. of India

e. Chief Engineer, TE&TD has been member secretary of Sub- Committee-7 constituted under the chairmanship of CMD, NTPC to provide/update report on "Key Inputs for Power Sector" for National Electricity Plan (2022-27).

f. Chief Engineer, TE&TD has been member secretary of Sub- Committee-1 and Sub Committee -7 constituted for National Electricity Plan (2022-27).

g. Chief Engineer, TE&TD is member of Technical Committee constituted to finalize the baseline and target parameters for existing DCs under Thermal Power sector under PAT scheme.

h. Chief Engineer, TE&TD is member of Central Boilers Board and undertakes works related to technical matters related to boilers, issues related to repeal or reenactment of boilers act 1923, technical advice, comments on renewal or recognition of applications under IBR, 1950 etc.

i. Director (TE&TD) is a Member on Board of Directors of Puducherry Power Corporation Limited, Puducherry.

j. Deputy Directors of TE&TD are the members of Subgroup-1 (R&D on properties/characteristics of Biomass) and Subgroup-2(R&D on boiler design on biomass co - firing and safety aspects) created under National Mission on use of biomass in coal based thermal power plants.

6.12.2 R&M/ LE Programme during (2017 - 22)

71 thermal generating units with aggregate capacity of 14929 MW have been identified for implementation of R&M/LE works during 2017-22 period. Out of this a total of 35 nos. thermal generating units with aggregate capacity of 7570 MW for LE works and 37 nos. thermal generating units with aggregate capacity of 7359 MW for R&M works have been identified for the period 2017-22. Break-up summary of LE and R&M works of 14929 MW to be taken up during 2017-22 in terms of Central/ State sector-wise is furnished below at Table A:

6.13 Achievements of R&M & LE Projects upto 31-03-2023:

Life Extension works on 5 thermal generating units with aggregate capacity of 1020 MW and R&M works on 3 thermal generating units with aggregate capacity of 177 MW were completed upto 31-03-2023. Details of achievements is furnished below at Table B:

	Name of the TPS	Unit No.	Date of S/D	Capacity (MW)	Utility	Sector	Date of Achievement
1. 2017-18							
LE	Ukai TPS	4	07-12-2016	200	GSECL	State	17.05.2017
	Wanakbori TPS	3	25-07-2017	210	GSECL	State	27-11-2017
R&M	Kathalguri CCGT	3	19-06-2017	33.5	NEEPCO	Central	20-07-2018
	Kathalguri CCGT	6	19-03-2018	33.5	NEEPCO	Central	31-03-2018
Sub Total		**4 (Units)**		**477.00**			
2. 2018-19							
LE	Koradi TPS	6	25-08-2015	210	MAHAGENCO	State	16-07-2018(oil firing) 20-08-2018(coal firing)
	Obra TPS	12	01-10-2016	200	UPRVUNL	State	24-09-2018
R&M	--	--		--	---	--	--
Sub Total		**02(unit)**		**410**			
3. 2021-22							
LE	---	--	--	--	--	--	--
R&M	Barauni TPS	6	15-11-2009	**110**	NTPC	Central	31-05-2022
4. 2022-23							
LE	Obra TPS	13	16-05-2018	**200**	UPRVUNL	State	27-09-2022
R&M	--						

Total LE	**05 (1020)**	**State**	**05(unit)**	**1020**
		Centre	--	--
Total R&M	**03 (177)**	**State**	--	--
		Centre	**03(unit)**	**177**
Grand Total			**08(units)**	**1197.0**

6.14 Monitoring of R&M Projects:

The progress of R&M and LE works being implemented at Thermal Power units are monitored by holding the review meetings and information compiled on monthly/quarterly basis. Based on data / information collected & compiled, Quarterly Review Report on status of R&M projects were prepared.

Category	**LE/R&M works identified during 2017-22 No. of units & capacity (MW)**		**Total (State Sector + Central Sector)**
	State Sector	**Central Sector**	
LE	34 (7570)	--	34 (7570)
R&M	30 (7135)	07 (224)	37 (7359)
Total	64 (14705)	07 (224)	71 (14929)

6.15 Implementation of Phasing Plan for FGD installation/ ESP upgradation in respect of new Environmental Norms:

It is to be mentioned that the timeline for meeting the new emission norms (Dec 2015) has been revised by MOEF&CC vide gazette notification dated 31.03.2021 which has categorized thermal power plants in three categories having different timelines along with the environment compensation for non-compliance as follows:

Category A - Within 10 km radius of NCR or cities having million plus population as per 2011 census of India. Completion timeline 31.12.2022

Category B - Within 10 km radius of critically polluted areas or Non-Attainment cities as defined by CPCB. Completion timeline 31.12.2023.

Category C - Other than those included in category A and B. Completion timeline 31.12.2024.

Based on the MOEF&CC notification dated 31st March 2021, a task force was constituted comprising of representatives from MOEF&CC, MOP, CEA and CPCB to categorize the thermal power plants in above mentioned three categories. CPCB vide its MoM dated 13.12.2021 categorized the 596 TPP units in category A, B & C of which 79 units (22949 MW) are under Category A, 68 units (23020 MW) are under Category B and 449 units (163561 MW) are under Category C.

CEA, prepared and submitted a report "Review of new SO2 norms". The implementation of FGD system was proposed where ambient SO2 level is higher than permissible limit. Further it was informed that annual FGD system implementation target shall be decided considering the available vendor's capacity with existing market condition which is estimated to be about 15-17 GW (32 to 36 units) per annum at present. Therefore, it will take almost 14 years to complete FGD installation of 211 GW capacity.

It is, therefore, proposed for extension of timeline up to 2035 for smooth implementation of FGD system in all thermal generating units. However, the timelines for implementation of FGD was extended by 2 years in every categories. Timelines for Categories A, B and C are Dec-24, Dec-25 and Dec-26 respectively.

6.16 Summary of Current Status of Implementation of phasing plan for FGD Installation General Summary (MW)

S.No.	Sector	Total (MW)	CFBC	Claims SO2 compliance	Retired	Feasibility study not started	Feasibility Study started	Feasibility Study Completed	Tender specification made	NIT issued	Bid opened	Bid Awarded	FGD installed
1	Central	67250	750	0	430	0	210	0	0	1110	2390	60030	2330
2	State	68266.5	1075	0	584	0	4722.5	9090	5050	19545	13340	14860	0
3	Private	76003	4101	1430	0	1370	5905	6395	5730	7240	11342	25540	6950
	Total	211519.5	5926	1430	1014	1370	10837.5	15485	10780	27895	27072	100430	9280

General Summary (No. of Units)

S. No.	Sector	Total (No. of units)	CFBC	Claims SO2 compliance	Retired	Feasibility study not started	Feasibility Study started	Feasibility Study Completed	Tender specification made	NIT issued	Bid opened	Bid Awarded	FGD installed
1	Central	168	4	0	3	0	2	0	0	6	11	135	7
2	State	222	7	0	5	0	19	33	16	70	34	38	0
3	Private	210	42	6	0	2	23	16	13	18	29	46	15
	Total	600	53	6	8	2	44	49	29	94	74	219	22

6.17 Flexible Operation of Thermal Power Stations

India's Intended Nationally Determined Contributions (INDCs) include a reduction in the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level, and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent. Generating power from renewable sources of energy is of cardinal importance if India is to meet its INDC targets. With the aim to ensure future security & reliability of power supply and stability of electricity grids while maximizing generation from renewables flexibilization of existing coal-fired power plants is an important measure.

A committee has been constituted in CEA to find out the level of flexibilization required from thermal power stations and future roadmap for integration of 175 MW RES generation into Indian grid by 2022. The committee has come up with the findings of the quantum of flexibilization, minimum thermal load, and ramp rate required in its interim report in June 2018. The final report of the committee was released by Secretary (Power) on 18th March 2019. The report has been shared with the stakeholders of power sector. A pilot test of 40% minimum load operation and 3% ramp up/ ramp down (i.e. 15 MW/ Min) has been successfully conducted in Dadri TPS of NTPC. Study at Anpara-B TPS of UPRVUNL and Vindhyachal TPS of NTPC is being conducted by JCOAL to improve the flexibility of the plants.

Another flexible operation study has been organized by CEA and carried out by BHEL at Ukai Thermal Power Station Unit # 6 (500MW), GSECL on 04.03.2020. Minimum load of 40% with ramp rate of 3% was successfully achieved. Recently, Flexible operation (up to 40% load) test has been conducted at Unit#2, 500MW MPL, Maithon (Unit-2) of JV DVC & TATA Power from 22-23 July, 2021 and another test conducted between 28.03.2022 to 01.04.2022 at DSTPS, Andal of DVC under IGEF . In FY 2022-23, Flexible operation (up to 40% load) test has been conducted at Ramagundum, TPS, NTPC and Raichur TPS, KPCL with brief details given below:

Test Results of Ramagundum, TPS, NTPC

Test Date	**27/02/2023 – 02/03/2023**
Unit No	**7**
Unit Capacity	**500MW**

Test	Target	Achieved
Minimum Load Test (40%)	**200MW**	**174MW (34%) (1.5Hrs)**
Ramp Upward Direction (70-100%)	3%/min	2.6 %/min
Ramp Downward Direction (70-55%)	2 %/min	1.6%/min
(55-40%)	1%/min	.8%/min

Test Results of Raichur TPS, KPCL

Test Date	**04/03/2023 – 07/03/2023**
Unit No	**3**
Unit Capacity	**210MW**

Test	Target	Achieved
Minimum Load Test (40%)	**84 MW**	**84MW**
Ramp Upward Direction (70-100%)	3%/min	3.57 %/min
Ramp Downward Direction (70-55%)	2 %/min	0.88%/min
(55-40%)	1%/min	.8%/min

With the anticipated 175 GW of RE Capacity, it has been targeted to adapt 60% of the installed fleet of Thermal power plants to operate at 55% Minimum Technical Load (MTL). The MoP (Ministry of Power) has set the targets for achieving the flexibility (55% MTL) of thermal power plants (Coal/Lignite) in a time bound manner.

The targets set by MoP are 20%, 30%, 45%, 50% and 60% of the total fleet compliant of 55% MTL from year 2020 to 2024. Further CERC vide IEGC regulations 2016 has lowered and made mandatory the technical minimum limit to 55% and provided compensation to the Coal/Lignite based generating stations on account of partial loading of the units.

Under this key initiative the minimum load and ramp rates of thermal generating units are required to be improved. A committee has been constituted in CEA under chairmanship of Chief Engineer (TPRM) for flexible operation test of thermal power plant for smooth integration of intermittent RES generation. Based on the finding of CEA's flexibilisation report, the committee shall identify the thermal units in consultation with State/Central utilities for the flexibilisation. The identified units shall have to undergo the pilot tests to ascertain their capability, do gap analysis and carry modifications, if required.

A Compensation methodology for operating a coal based power plant below 55% load and the same was forwarded to CERC by MOP.

A comprehensive report titled "Flexibilisation of Coal Fired Power Plant - A Roadmap for Achieving 40% TML" was prepared to help utilities and understand the low load operation. The report was published in March, 2023.

S. N.	Initiative	Scheme /Program	Parameters	Requires change in law (yes/no)	Unit of measurement	Key Performance Indicators (KPI)					
						2020	**2021**	**2022**	**2023**	**2024**	
1	**Flexible Generation:** Reduction in Technical minimum limits and improvement in Ramp rates	Flexibilisation of Thermal Power Plants by CEA	Modifications in Thermal Power Plants to achieve Technical minimum up to 55% and Ramp rates	Yes, the CERC regulation need changes to reimburse the additional costs to generators for flexible operations	% fleet of installed capacity	20%	30%	45%	50%	60%	Target
						20%	30.4 %	45.12 %	**50.29 %**		Achieve-ment

Another report titled "OPERATING PROCEDURE AND TRAINING CURRICULUM AT 55% MINIMUM TECHNICAL LOAD OF THERMAL GENERATING UNITS "was prepared and published to provide Standard operating procedures for thermal generating utilities for 55% technical minimum load at low load operation.

KPI Targets vis-à-vis Achievement as on 31.03.2023

6.18 Japan-India Co-operation for Study on Efficiency and Environmental Improvement of Coal Fired Stations

Under Indo- Japan Co- operation for Efficiency and Environmental Improvement of Coal Fired Power Stations. Three MoUs have already been implemented between Central Electricity Authority (CEA) and Japan Coal Energy Centre (JCOAL) in the field of efficiency improvement and environmental improvement of coal fired power stations. The 4th MoU between CEA and JCOAL has been signed on 16th December, 2019 for Efficiency & Environment Improvement for Sustainable, Stable and Low Carbon Supply of Electricity. The purpose of this MoU is to address issues and barriers in expediting sustainable, stable and low carbon thermal power development by means of studies, training program and knowledge- sharing activities, outcomes of which are to be conducive to overall power development in India as well as to expedite relevant policy implementation by the Government of India. Following activities to be carried out under 4th MoU:

i) 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.

ii) Identification of issues to be addressed regarding both existing and upcoming facilities, and also operation and maintenance.

iii) Implementation of studies with priorities, but not limited to environmental technologies for coal fired power generation Flexibilization measures and biomass utilization are also of high priority.

iv)

- Biomass study on Co firing of biomass pellets and Waste to Energy technologies and Coal GCV loss in power plant and its remedies Implementation of an annual workshop in India and CCT Training Programme in Japan.
- Holding a joint meeting to discuss issues that have arisen or may arise in the course of implementation of the Cooperation.

Under Clean Coal Technology (CCT) Training Programme study tours to Japan have been organized in which representatives from MoP, CEA and different power utilities have participated. The participants visited the latest USC power stations and updated about various applicable technologies and equipment as well as O&M technique. During the FY22, 50 participants have undergone the Virtual CCT Training Programme from 31st Oct. 2022 to 2nd Nov., 2022.

Under Indo-Japan Cooperation, a one-day Workshop on "Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" was organized jointly by CEA and JCOAL on 13th Jan, 2022.

CEA-JCOAL Workshop FY22

6.19 Fuel Management and Analysis

Central Electricity Authority (CEA) plays a pivotal role in optimal utilization of coal for the power sector. It monitors coal supply to the power plants so that plants have sufficient coal stock as per norms. CEA in association with MoP, MoC, Railways and other stakeholders closely monitors the coal supply to power plants and take necessary steps to improve supply of coal to power plants. With the concerted efforts of all stakeholders, the coal supply to power utilities is maintained to meet their coal requirement. At the beginning of the year (as on 01.04.2022), the coal stock available with the thermal power plants was 25.63 Million Tonnes (MT) (38% of the normative coal stock required), which was sufficient

for an average of 9 days at a requirement of 85% PLF. However, as on 31st March 2023, the total coal stock available with the plants increased to 36.95 MT (55% of the normative coal stock required), which was sufficient to run these plants for an average of about 13 days at a requirement of 85% PLF.

6.19.1 Monitoring Mechanism

The coal stock position of all the power plants in the country are being monitored by CEA on a daily basis and daily report is published on National Power Portal (NPP) (www.npp.gov.in). Moreover, on monthly basis all coal based power plants are also monitored and monthly report is published which is uploaded on CEA website.

CEA has revised the coal stocking norms w.e.f. 6th December 2021. As per the revised norms, daily coal requirement for both Pithead and Non-Pithead plants would be estimated @85% PLF and number of days for which stock needs to be maintained would vary from 12 to 17 days for Pithead plants and 20 to 26 days for Non-Pithead plants with month-wise variation based on coal despatch/ coal consumption pattern during the year.

Quarter	Month	Pithead	Non-pithead
Q1	Apr	17	26
	May	17	26
	Jun	17	26
Q2	Jul	14	22
	Aug	13	21
	Sep	12	20
Q3	Oct	13	21
	Nov	14	22
	Dec	15	23
Q4	Jan	16	24
	Feb	17	26
	Mar	17	26

The Gencos would be graded in three zones. Grading of a Genco/Independent Power Producers (IPP) into Red, Yellow and Green zone will be done on monthly basis based on the average coal stock maintained by the plant during previous month and its outstanding dues with coal companies. Gencos/IPPs in Green Zone will be given highest priority followed by Yellow and the least priority to Red Zone- in terms of rakes loading and supply of coal.

Monitoring by Inter-Ministerial Committee

A Secretary level Inter Ministerial committee has been set up to ensure that the medium and long term requirements of coal are met. The IMC comprises of Chairman Railway Board, Secretary, Ministry of Coal, Secretary Ministry of Environment Forests and Climate Change as members and Secretary Ministry of Power as convener.

Monitoring by Subgroup:

CEA is a member of an Inter-ministerial subgroup constituted by the Infrastructure Constraints Review Committee under the Chairmanship of Joint Secretary, Ministry of Coal comprising of representatives from Ministry of Railways, Ministry of Power, Shipping, NITI Aayog, CEA, CIL and NTPC Limited. The subgroup reviews and monitors coal supply and related infrastructural constraints on day-to-day basis for adequate supply of coal to power plants.

6.19.2 Coal Scenario for the Power Sector during 2022-23

6.19.2.1 Estimation of coal requirement for the year 2022-23

During 2022-23, based on generation target, the coal requirement was estimated to be about 789 MT. The break-up of coal requirement during2022-23 is given as under:

(Figs. in MT)

Coal Requirement	2022-23
Domestic Coal based (DCB) Plants	759.9
Imported Coal based (ICB) Plants	28.6
Total Requirement	**788.5**

6.19.2.2 Coal Supply Position for the year 2022-23

For the year **2022-23**, the receipt of coal was 787.3 MT against the consumption of 776.8 MT. The details of coal receipt and consumption for year **2022-23** are given as under:

(Figures in MT)

A. Estimated Requirement (Domestic + Imported)	**788.5 (759.9+ 28.6)**
B**. Receipt**	
a. Domestic coal	731.7
b. Imported coal for blending	35.1
c. Imported coal for ICB plants	20.5
d. Total Import	55.6
Total Receipt (a+d)	**787.3**
C. Consumption	
a. DCB Plants	756.5
b. ICB Plants	20.3
c. Total	**776.8**

During the year **2022-23**, the receipt of domestic coal by the power plants was 731.7 MT as against 667.6 MT during 2021-22 resulting in increase of about 64.1 MT (9.6%). The total coal consumption during **2022-23** was 776.8 MT as against 697.3 MT during last year, thus increasing 79.5 MT (11.4%). Plant-wise details of coal receipt and coal consumption during **2022-23** is enclosed at **Annexure-6B.**

6.19.2.3 Source-wise Receipt of coal during 2021-22

During the year 2022-23, source-wise break-up of coal receipt at the power stations is given below:

Source	**Actual Receipt (MT)**
CIL	587.8
SCCL	57.5
Captive Mines	86.3
E-Auction	29.9
Total Domestic Receipt	**731.7**
Total Import	**55.6**
Total Receipt	**787.3**

6.19.2.4 Import of coal during the year 2022-23.

1. Power plants designed on domestic coal import coal in view of their cost economics and power plants designed on imported coal import coal to meet its fuel requirement. During 2022-23, the total coal imported by the power plants was about 55.6 MT as against 27.0 MT during 2021-22, thus increasing by about 28.6 MT (106%).

During 2022-23, the coal imported by domestic coal based plants was 35.1 MT and that by imported coal based plants was 20.5 MT.

3. During the second quarter of the FY 2021-22, with increased demand, less generation from imported coal based plants and some interruption in supply of coal by coal companies, the coal stock available with the TPPs depleted by about 21 MT.

3. Considering less coal stock in TPPs during second quarter of FY 2021-22 and supply pattern from domestic sources, Ministry of Power vide letter No. FU-21/2020-FSC CN: 253974 dated 28.04.2022 has issued an advisory regarding import of coal for blending purpose for the period 2022-23. As per the advisory, about 61 MT coal to be imported for blending purpose during 2022-23 by TPPs. The coal imported for blending during 2022-23 was about 35.1 MT.

6.19.2.5 Generation Loss

1. During the year, 2022-23, there was no loss of generation due to shortage of coal.

6.19.2.6 Specific Coal Consumption

During the year 2022-23, the Specific Coal Consumption (kg/kWh) of the Domestic Coal Based Plants was 0.684 kg/kWh as compared to 0.678 kg/kWh in 2021-22. However, for imported coal based plants, it was 0.497 kg/kWh as against 0.466 kg/kWh in 2021-22.

6.19.3 Coal Quality Issues

In order to address quality concerns of the coal supplied to power plants, it was decided in the meeting dated 28.10.2015 that coal samples shall be collected and prepared by a Single Third Party Agency appointed by power utilities and coal companies. Accordingly, it was decided by the Ministry of Power and the Ministry of Coal that the power utilities would appoint a Third Party Sampler (CIMFR) for Third Party Sampling and Analysis of coal at loading-end as well as at unloading-end. Based on the Third Party Sampling analysis results furnished by CIMFR, credit/debit note are being issued by coal companies to the power plants in case

of difference between declared grade of coal and analysed grade of coal.

Third party sampling has been started by CIMFR at loading as well as unloading ends, which has resulted into lowering of ECR, thus benefiting the end consumers of electricity.

Subsequently, Ministry of Power vide letter dated 30.03.2021 conveyed the decision that Power Finance Corporation (PFC) shall empanel Third Party Sampling (TPS) Agencies for Power Sector, in addition to CIMFR, and consumers shall be free to take services of any of the empanelled agencies. The Terms of Reference for empanelment for the agency was to be formulated with the following broad guidelines:

a. Multiple Agencies should be available.

b. Sampling only at loading end with appellate/referee provision.

c. Choice of taking services fromempanelled agencies shall be of the buyer of coal.

d. Review mechanism to review the working of the system.

MoP, after consultation with the stakeholders including CEA, finalized the Terms of Reference for empanelment of TPS which was forwarded to PFC on 17.08.2021 for taking further necessary action.

PFC has empanelled one firm (M/s Mitra SK Private Limited) as a 'Third Party sampling Agency (TPSA) for collection, preparation and analysis of coal samples at loading end with appellate/referee provision for power sector.

6.19.4 New initiatives for addressing issues related to coal supply to Power Plants

A. Flexibility in Utilization of Domestic Coal

- The Government, on 04.05.2016, approved the proposal for allowing flexibility in utilization of domestic coal amongst power generating stations to reduce the cost of power generation. Under the scheme, the Annual Contracted Quantity (ACQ) of each individual coal linkage as per Fuel Supply Agreement is to be aggregated as consolidated ACQ for each State and Company owning Central Generating Stations instead of individual generating station. The State/Central Gencos have flexibility to utilize their coal in most efficient and cost effective manner in their own power plants as well as by transferring coal to other State/Central Gencos Power plants for generation of cheaper power. The methodology provides for utilizing coal amongst State/Central Generating Stations having 4 cases- i) within state ii) one state to another state iii) one state to CGSs & vice versa and iv) within CGSs & other CGSs. The methodology in this regard has been issued by CEA on 08.06.2016.
- Further, the methodology for use of coal transferred by a State to Independent Power Producer (IPP) generating stations has been issued by Ministry of Power, Govt. of India on 20.02.2017. As per the methodology, the State can divert their coal and take equivalent power from IPP generating station, which is selected through an e-bidding process. The guiding principle of the methodology is that the landed cost of power from IPP generating station at the State's periphery should be lower than the variable cost of generation of the State generating station whose power is to be replaced by generation from IPP. The landed cost of power is inclusive of the transmission charges and transmission losses.
- Based on the experience gained, Ministry of power vide letter dated 15.06.2018 has amended clauses related to bid security, performance security coal transportation mode in the methodology for Case-4. Subsequently, Ministry of Power vide letter dated 25.10.2018 has issued 2nd amendment in the methodology allowing moisture correction while reconciliation of coal.

Status/ Current Development of the Scheme:

- All State/Central gencos have signed supplementary agreement with Coal Companies for aggregation of their ACQ. CIL, on quarterly basis, allocates coal to the plants of State /Central Gencos as per their requirement within their AACQ.
- Based on the methodology issued by MoP on 20.02.2017 for Case-4, Gujarat Urja Vikas Nigam Limited (GUVNL) and Maharashtra State Power Generation Company Limited (MSPGCL) invited bids for supply of power

from willing IPPs.

- GMR Chhattisgarh Energy Limited (GCEL) emerged as successful bidder in case of bid invited by GUVNL and was awarded contract to take equivalent power of 500 MW at a tariff of Rs 2.81 per unit for a period of 8 months starting from November 2017 to June 2018. However, power supply started from January 2018. The contract was later extended by GUVNL till November, 2018.Gujarat again invited bids and awarded contract to GCEL for supply of 1000 MW at a tariff of Rs. 3.16 per unit. The Power purchase agreement (PPA) was signed on 21.12.2018 and the contract period was upto June, 2019. However, the supply of power started from January, 2019 and the contract was extended till December, 2019.
- Maharashtra tied up 400 MW (185 MW) with Dhariwal Infrastructure Ltd. and 215 MW with Ideal Energy Projects Ltd. for a period of 8 months at a tariff of Rs. 2.76 per unit. The supply of power started by Dhariwal Infrastructure Ltd. from April 2018 and by Bela TPS from May 2018. Maharashtra again tied up 185 MW with Dhariwal Infrastructure Ltd. from November 2019 to October 2020.

B. National Power Portal

National Power Portal (NPP) has been developed in CEA for collection of various power sector related data and various reports are generated with the help of these data. Through this portal, the power plants are furnishing their coal related data. Daily Coal Report, Monthly Coal Report and Monthly Gas Report are being generated through this portal.

6.19.5 Gas Supply Position

CEA monitors 62 Nos. of gas based power stations with a total installed capacity of about 23845 MW (As on 31st March 2023) using gas as primary fuel. The production and supply of gas have not been keeping pace with the growing demand of gas in the country including in power sector. Even gas allocations committed for power stations are not fulfilled due to shortage of gas in the country. The domestic gas supply during 2022-23 was 13.11 MMSMMD only against allocation of 84.79 MMSCMD. The PLF achieved during 2022-23 was 11.5% only against PLF of 17.2% during previous year mainly due to higher price of gas in international markets. Plant-wise details of gas allocated and supplied/consumed during 2022-23 is enclosed at **Annexure-6C**.

The gas supply position in gas based power plants during 2022-23 is as under

(Figures in MMSCMD)							
Category	**Domestic Gas**			**RLNG (Imported)**		**Total**	**PLF (%)**
	APM / Non -APM/ PMT	**KGD-6**	**Total**	**Long Term Contract**	**Spot**		
Gas Allotted (Domestic)	52.41	32.37	84.79	7.48	-	92.27	11.5%
Gas Supplied	12.99	0.13	13.11	1.46	1.31	15.88	
% Gas Supplied w.r.t Gas Allotted	25%	0%	15%	19%	-	17%	

(MMSCMD: Million Metric Standard Cubic Meter per Day.)

CHAPTER-7

DISTRIBUTION SCHEMES AND INITIATIVES

7.1 Revamped Distribution Sector Scheme (RDSS)

Central Government launched "Revamped Distribution Sector Scheme (RDSS) in July 2021 with the objective of improving the quality and reliability of power supply to consumers through a financially sustainable and operationally efficient distribution Sector. The Scheme aims to reduce the AT&C losses to pan-India levels of 12-15% and Average Cost of Supply (ACS) - Average Revenue Realized (ARR) gap to zero by 2024-25. The Scheme has an outlay of Rs.3,03,758 crore and an estimated Gross Budgetary support of Rs 97,631 Crores from Govt of India. The duration of the scheme is 5 Years (2021-22 to 2025-26).

The Scheme has two parts: Part 'A' - Financial support for upgradation of the Distribution Infrastructure and Prepaid Smart Metering & System Metering and Part 'B' -Training & Capacity Building and other Enabling & Supporting Activities.

Under the scheme, eligible DISCOMs (all State-owned Distribution companies and State /UT Power Departments excluding private Sector power companies) are being provided financial support for upgradation of the Distribution Infrastructure, Distribution Automation, IT intervention, implementation of SCADA/DMS & installation of 25 Crore Pre paid smart meters for consumers and Smart Metering at Feeder and Distribution Transformers etc.

The scheme envisages installation of 25 crore prepaid smart meters for all consumers along with associated AMI & communicable meters for DTs & Feeders. Prepaid Smart Meters including System metering with communication features are important interventions in reducing Distribution losses in the Utilities and in facilitating automatic measurement of energy flows and energy accounting as well as auditing without any human Intervention. This intervention will also facilitate switch over to digital pre-paid system, with recharging facility through mobile phones and enabling of Time-of-Day tariff.

Advanced ICT like Artificial Intelligence & Machine Learning Technologies would be leveraged to analyses data generated through IT/OT devices including System Meters, prepaid Smart meters to prepare actionable MIS from system generated energy accounting reports every month so as to enable the DISCOMs to take informed decisions on loss reduction, demand forecasting, asset management, Time of Day(ToD) tariff, Renewable Energy (RE) Integration and for other predictive analysis. This would contribute a great deal towards enhancing operational efficiency and financial sustainability of the DISCOMs.

Funding Pattern:

For rolling out prepaid Smart metering in a mission mode under Part A – in "Other than Special Category States", a fixed amount of 15% (22.5% in case of Special Category States) of the cost per meter worked out over the whole project period, subject to a maximum of Rs. 900/- (Rs. 1350/- in case of special category States) per meter in case of consumer meters, will be funded.

States/UTs would be incentivized for deployment of prepaid Smart meters by December, 2023. An incentive@ 7.5% of the cost per consumer meter worked out for the whole project or Rs. 450 per consumer meter, whichever is lower, would be provided for "Other than Special Category States" for prepaid Smart meters installed within the targeted timeline of first phase mission i.e. by December, 2023. The incentive for Special Category States would be @ 11.25% of the cost per Consumer meter worked out for the whole project or Rs. 675 per consumer meter, whichever is lower. The funds for prepaid Smart Metering will be made available to the DISCOMs only after installation, commissioning and demonstration of at least one

prepaid billing period in the area specified by the DISCOM in the DPR approved by the Monitoring Committee.

Development of applications related to the use of advanced ICT like Artificial Intelligence, machine Learning and Blockchain Technology in the Distribution Sector and the unified billing and collection system will be funded 100% through the GBS.

For Distribution System upgradation works, maximum financial assistance given to DISCOMs of "Other than Special Category States" will be 60% of the approved cost, while for the DISCOMs in "Special Category States", the maximum financial assistance will be 90% of the approved cost.

Part B of the Scheme will be fully funded by grant through Central/State Governments.

Monitoring Committee:

An inter-ministerial Monitoring Committee for the Scheme has been constituted under the chairmanship of Secretary, Ministry of Power. Chairperson, CEA is the member of the Monitoring Committee. The Monitoring Committee frames and approves all operational guidelines, sanction all Action Plans & DPRs of DISCOMs / States and proposals/DPRs under Part B, and review and monitor implementation of Scheme including review of Third-Party Mid-Term Evaluation of the Scheme carried out by the Nodal Agency.

The Monitoring Committee also approves scope of works and take necessary decisions for operationalization of various components of the Scheme and amendments thereof, within the framework approved by Cabinet Committee on Economic Affairs (CCEA). The Monitoring Committee may also modify the scope of works under various parts of the Scheme in line with the objectives of the Scheme.

The funds for a particular year in respect of Infrastructure Works would be released in respect of a DISCOM for a particular year only after it has been found to have fulfilled the pre- qualifying criteria and its total weighted score is at least 60 Marks on the result evaluation matrix after having been evaluated by the Nodal Agency and approved as such by the Monitoring Committee. Evaluation of parameters relating to financial accounts shall be based on audited quarterly/ annual accounts.

Nodal Agency:-

REC Limited and Power Finance Corporation Limited (PFC) has been designated the Nodal Agencies for the Scheme and are responsible for operationalization of Scheme in the entire country. CEA has been associated with the Nodal Agencies for framing of RFPs (Request for Proposal) and SBDs (Standard Bidding Document) for Smart Metering infrastructure and SCADA projects etc.

Rural Electrification under RDSS:

Under Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya), all States declared electrification of all willing Households on 31st March, 2022 in the country. However, addition of households is a continuous process. The Central Government in line with its commitment, is supporting States under the ongoing Scheme of Revamped Distribution Sector Scheme(RDSS) for electrification of any left-out households, which existed before 31.03.2019 (period of execution of SAUBHAGYA) but were somehow missed out by the DISCOMs.

State-wise status of sanctioned works as on 31.03.2023 under RDSS, is as given below:

Sr. No.	State	Smart Meters Sanctioned (in nos.)	Smart Metering works - Sanction details		Loss reduction works - Sanction details		Approved Cost (Inc. PMA Cost)	GoI Grant(Inc. Addl. Grant + PMA Grant)
			Project Cost incl PMA	GBS for Project (incl. incentives)	Project cost including PMA	GBS for Project cost incl. PMA		
1	Assam	5,825,027	3677.48	907.67	2609.1	2348.19	6286.58	3255.86
2	Bihar	2,607,153	2021.22	407.8	7081.05	4248.63	9102.27	4656.43
3	Chhattisgarh	6,179,479	4105.31	795.23	3597.55	2158.53	7702.86	2953.76
4	Goa	750,356	469.17	93.46	247.08	148.248	716.25	241.708
5	Jammu & Kashmir	1,497,690	1052.6	264.19	4635.56	4197.72	5688.16	4461.907
6	Manipur	166,208	119.65	37.19	400.98	360.882	520.63	398.072
7	Meghalaya	472,743	309.55	84.79	796.5	716.85	1106.05	801.64
8	Mizoram	292,081	179.93	59.79	237.33	213.597	417.26	273.387
9	Rajasthan	14,736,692	9714.81	1665	8912.32	5347.39	18627.13	7012.392
10	Sikkim	148,542	97.44	29.93	263.61	237.249	361.05	267.179
11	Tamil Nadu	30,490,774	19235.4	3355.34	9066.27	5493.35	28301.63	8848.69
12	Tripura	562,870	316.55	78.37	484.56	436.104	801.11	514.474
13	Uttar Pradesh	28,526,731	18956.3	3458.07	16746.09	10047.7	35702.39	13505.72
14	Arunachal Pradesh	298,250	183.56	54.4	799.99	720	983.55	774.4
15	Laddakh	0	0	0	697.36	627.63	697.36	627.63
16	Andhra Pradesh	5,919,344	4127.85	815.4	9276.66	5566	13404.51	6381.4
17	Gujarat	16,787,587	10642	1884.6	6021.48	3612.89	16663.44	5497.49
18	Haryana	7,614,141	4966.62	909.36	3158.43	1895.06	8125.05	2804.42
19	Himachal pradesh	2,841,908	1788.49	466.23	1913.08	1721.77	3701.57	2188
20	Jharkhand	1,362,044	858.02	190.5	3262.27	1957.36	4120.29	2147.86
21	kerala	13,383,001	8231.21	1413.34	2346.81	1408.09	10578.02	2821.43
22	Madhya Pradesh	13,395,016	8768.98	1482.1	9403.43	5642.06	18172.41	7124.16
23	Uttarakhand	1,623,907	1050.92	297.47	1447.39	1302.65	2498.31	1600.12
24	Maharashtra	24,004,866	15214.9	2791.8	14157.91	8494.76	29372.9	11286.6
25	Puducherry	407,052	251.1	38.08	84.39	50.63	335.49	88.71
26	Punjab	8,981,414	5768.5	874.97	3873.37	2324.02	9641.87	3198.99
27	West Bengal	21,035,262	12670.5	1921.87	7222.57	4333.54	19893.03	6255.41
28	Nagaland	323,878	207.57	47.48	391.18	352.06	598.75	399.54
29	Delhi	3521	13.38	2.03	323.63	194.18	337.01	196.21
Total		**210,237,537**	**134986**	**24424.4**	**119134.32**	**75962.9**	**254120**	**100387**

7.2 Development of Smart Grid in the Country

(i) National Smart Grid Mission:

Govt. of India launched 'National Smart Grid Mission (NSGM)' in March 2015 for planning, monitoring and implementing policies & programs related to Smart Grid in India. MoP vide letter no. 27/3/2017-APDRP, dated 7th May, 2018 sanctioned continuation of NSGM up to 2020 with a total outlay of Rs 990 Cr including budgetary support of Rs 312 Cr from Govt. of India. Further, MoP vide letter no. 27/3/2017- IPDS(E-236958) dated, 23rd September, 2022 sanctioned continuation of NSGM up to 31st March, 2024 with an estimated outlay of Rs.136.95 Cr including budgetary support of Rs 45.42 Cr from Govt. of India for 1st April, 2021 to 31st March, 2024.

NSGM has a three-tier structure i.e. Governing Council, headed by the Hon'ble Minister of Power, Empowered Committee, headed by the Secretary (Power) and Technical Committee headed by the Chairperson, CEA. NSGM Project Monitoring Unit (NPMU) is the nodal agency of NSGM for speeding up the development of Smart Grid projects andhand holding of States/UT in the implementation of smart grid in the country.

As per NSGM extension OM dated 23rd September, 2022, the following are the scopeof works envisaged under NSGM:

1. Completing ongoing sanctioned projects,
2. Training and capacity building,
3. Technical assistance to utilities through SGR-SAT (Smart Grid Readiness- Self Assessment Tool) and CBA (Investment analysis Tool) etc. and handholding of DISCOMs on their Smart Grid preparedness, developing smart grid roadmaps, establishing new processes for distribution system efficiency & effective improvement, reliability improvement and data analysis etc.
4. NSGM shall be a part of an expert committee and shall act as a secretariat of the said committee to recommend a complete framework of smart grid/smart distribution, the outcome of which shall be used to develop 10 Cities across country with Smart distribution grid under the Revamped Distribution Sector Scheme (RDSS).

5. CEA is dealing with development of smart distribution in the country and assisting NSGM in various technical matters related to development of smart distribution including Expert Group constituted by MoP etc.

ii) **Expert Group to Recommend Complete Framework of Smart Grid:**

Ministry of Power vide OM dated 20th September 2022 constituted an Expert Group to recommend complete framework of Smart Grid in Distribution sector under Chairmanship of Chairperson, CEA. The members of the Expert Group were from NSGM, POSOCO, PFC, REC, CDAC, IIT Kanpur and IIT Bombay. After various meetings and due deliberations amongst the Committee members, the final Report was submitted to MoP in December, 2022.

The Report of the Expert Group was also reviewed by Hon'ble Minister of Power & NRE in February, 2023 and one of the major decision of the meeting was to formulate a new Scheme, wherein around 10 smart cities shall be selected for implementation of Model Smart Distribution Attributes with suitable funding support from the Center and these 10 model smart cities with Model Smart Distribution Attributes shall be developed by the year 2026.

7.3 Examination/ Technical Clearances of DPRs/PPRs

I. UT of Dadra and Nagar Haveli and Daman & Diu:

- Technical clearance accorded to Scheme for replacement and enhancement of capacity of 4 Nos. of 66/11 kV Power transformers from 10 MVA to 20 MVA at 66/11kV Dabhel, Ringanwada, Varkund and Bhimpore sub-stations in Daman.
- Technical clearance accorded to Schemes for
    - Enhancement of additional 2.56 MWp SPV capacity at 6 MWp Solar PV plantat Diu.
    - Enhancement of additional 4.91 MWp SPV capacity at 3 MWp Solar PV Plantat Diu.
- The Scheme for Supply, Erection, Testing and Commissioning of Sub-station Control room equipment's and associated works in New Control room at 66/11 kV Dabhel Sub-station, Daman was examined and comments furnished.

II. UT of Andaman & Nicobar Islands:

A Preliminary Engineering Design Report (PEDR) for power Generation and Distribution in Great Nicobar Island (GNI) received from Niti Aayog was examined and the final project report as modified based on the recommendations given by CEA, submitted to MoP.

III. Ministry of DONER/NEC for North Eastern States

- Technical clearance accorded to DPR submitted by Government of Mizoram for Development of Power Sector in Mizoram under State Specific Grant of the 15th Finance Commission.

IV. DPRs/PPRs under External Assistance from ADB/World Bank/ MDB etc.

- Technical clearance accorded to DPR of Sikkim for Power Sector Development Project to be funded by ADB.
- Preliminary Project Report (PPR ID-11452) of Tamil Nadu Power Distribution Network Improvement Program to be funded by ADB was examined and comments furnished.
- PPR (PPR ID 11945) for ADB Loan for part /gap funding of Government of India's Revamped Distribution Sector Scheme (RDSS) for WBSEDCL Distribution System Strengthening Projects, was examined and comments furnished.
- PPR (PPR ID 12032) for Technical Assistance from ADB for Uttar Pradesh Energy Sector Improvement was examined and comments furnished.
- PPR on the Policy Based Loan (PBL) to support Power Sector Reforms under the RDSS Scheme regarding Part Financing of the Counterpart Loan Component of the Scheme through REC and PFC was examined and comments furnished.

V. DPR received from Ministry of External Affairs for providing Line of Credit to Foreign Countries

Technical clearance accorded for the project of 'Improving the quality of power supply in Mozambique' under the GoI Line of Credit of USD 250 million extended to the Government of Mozambique.

VI. DPR for Renovation and Augmentation of T&D system (phase-I) for DVC.

Technical Clearance accorded for the part DPR for augmentation and reconductoring of old 33kV lines with HTLS/AAAC conductors.

7.4 Distribution Perspective Plan (DPP-2030)

Preparation of 2nd Distribution Perspective Plan for the period 2022-2030 is taken up to project the requirement of distribution infrastructure during 2022-2030 period to meet the projected demand and to provide 24x7 quality and reliable power to all consumers with automations and smart metering plan etc. The DPP-2030 would include projected requirement of Discoms regarding Power Sub-stations (66 KV, 33KV, 22KV), Feeders (66 kV, 33 kV, 22 kV and 11 kV), DTs (33/0.4 kV, 22/0.4 kV, 11/0.4 kV), LT Lines (230V & 400V), Capacitors, SCADA/RT-DAS, Consumers and Consumer metering, AT&C losses and total investment required by Discoms vis-à-vis total investment available with the Discoms etc. for the period 2022-2030. Presently, DPP is under preliminary stage.

7.5 Guidelines for Type Tests and Model Quality Assurance Plan (MQAP) for major equipment of Power sector

Central Electricity Authority (CEA) issued Guidelines for Type Tests and Model Quality Assurance Plan (MQAP) for major equipment of Power sector, including distribution sector, in March, 2022. However, as advised by MOP, the MQAP and type test validity for distribution sector are under review to delete the Factory Acceptance Test (FAT) from the scope of Discoms.

7.6 CERT-Distribution

With the rapid implementation of IT enabled support and services in electricity distribution sector, the power sector is becoming more & more prone to various types of cyber-attacks and information security issues. In view of this, Ministry of Power constituted CERT-Distribution (CERT-D) in CEA. CERT-D is working to improve the cyber security posture of power distribution Sector by coordinating with the DISCOMs, NCIIPC, MoP, CISO-MoP and CERT-In. The following actions were taken by CERT-D during 2022-23: -

1) CERT-D disseminated information and advisories to all the DISCOMs on cyber security issues received from NCIIPC, CERT-In & CISO-MoP and action taken report was sought from the Discoms.
2) Due to continuous efforts of CERT-D, all Major Discoms have nominated their Chief Information Security Officer (CISOs) and updating their details regularly, in case of any change.
3) All Major Discoms (except one) have on boarded Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre) being operated by CERT-In. Vulnerability of DISCOMs reported in every fortnightly Power Sector Situational Report of CSK, is taken up by CERT-D with the concerned DISCOMs for closer/necessary action and closer reports are submitted to MoP/CERT-In.
4) Discoms were advised regularly to prepare their Cyber Crisis Management Plan (CCMP). 44 Discoms have prepared their CCMP, out of which, CCMP of 17 Discoms have been approved by CERT-In. CCMPs of other Discoms are under various stages of preparation and approval.
5) Template & guidelines issued by NCIIPC for identifying the Critical Information Infrastructure (CII) in Distribution sector was circulated to all DISCOMs. Further, documents from NCIIPC regarding identification of CII of various Discoms were examined and comments were furnished. CII of major cities like Delhi, Mumbai, Kolkata, and Bangalore have been declared and CII of other major cities are under examination of NCIIPC.
6) Discoms were advised regularly to take necessary actions as per CCMP like quarterly review of their Cyber Security Measures and to conduct regular security audits of their IT Infrastructure through CERT-IN empaneled agencies, implementation of ISO 27001, conduction of mock drill etc. in their respective organizations.
7) An Empowered Committee under Secretary, MoP and Standing Committee under Additional

Secretary, MoP have been constituted to monitor the cyber security measures taken by Power Utilities. CERT-D is regularly participating and providing necessary inputs in the meeting of Empowered Committee & Standing Committee.

7.7 Task Force for Phased Manufacturing Program for Smart Meters and to examine the various issues raised by IEEMA regarding Indian Content in Smart Meters.

A Task Force was constituted by MOP under the chairmanship of Member (GO&D) for Phased Manufacturing Program for Smart Meters and to examine the various issues raised by IEEMA regarding Indian Content in Smart meters etc. Other members of the Task Force were from MoP, Meity, CPRI, and NSGM. After deliberation with IEEMA & meter manufacturers, a Report of the Task Force was prepared and submitted to MoP.

As per the Report, installed capacity of Indian smart meters manufacturers to manufacture meters is about 10 Crores meters / Year, which is sufficient to meet the expected demand of smart meters in the country as per the requirement of RDSS.

7.8 Task Force for installation of 5G Small Cells on electric poles

A Task Force was constituted by Telecommunication Engineering Centre, Department of Telecommunications to look at the regulations and stability of electric poles to be used as street furniture for 5G Small Cells. A draft report on "Stability and Regulations of electric poles to be used as street furniture for 5G Small Cells" has been prepared. Further, testing of the stability and load bearing capacity of the electric pole by placing the 5G Small Cell Antenna and Radio Unit/BBU along with the Battery Bank/UPS on the Electric Pole is being taken up by CPRI.

7.9 Guidelines and Best Practices for Operation & Maintenance (O&M) of DTs:

A "Guidelines and Best Practices for Operation & Maintenance (O&M) of DTs" was prepared covering the best practices for operation and maintenance of Distribution Transformers, which will be useful for the distribution utilities for O&M of DTs. A brief description of working of Transformers, Design consideration, Best Practices and I.T. interventions have also been included in the Guidelines. The Guidelines will serve a good practicing and reference tool in the hands of field engineers for reducing the DT failure rates, reducing the downtime of the system, revenue saving and achieving 24x7 power for all. Guidelines were released by Hon'ble Minister of Power & NRE in the month of March, 2023.

7.10 Report on Benchmarking of Operation & Maintenance (O&M) Norms for Distribution Utilities:

As desired by MoP, a report on the benchmarking of O&M norms for Discoms was prepared covering both the financial as well as technical benchmarking of O&M. The Report covered the analysis of the present practices being followed by SERCs for calculation of O&M cost of Discoms and recommended a suitable model, which may be adopted by SERCs for calculation of O&M cost of Discoms. Technical benchmarking for various distribution infrastructure like sub-stations, DTs, lines etc. were also covered in the document. Based on the comments received from MoP, the document is under revision.

7.11 Power Supply interruption issues in Port Blair, A&N

As per request of A&N administration, to resolve the frequent power supply failure issues in Port Blair, CEA team visited Port Blair to examine the issues. The team found various reasons such as lack of protection coordination/relay settings, non-availability of suitable BESS capacity etc. for

frequent failure of power supply in Port Blair. A Report on the various issues is under preparation. Further, SRPC team also visited A&N Islands and furnished a detailed report and recommendations.

7.12 Manual on Distribution Planning Criteria

A Manual on Distribution Planning Criteria (DPC) was taken up for helping the Discoms to plan their distribution system uniformly. Draft DPC was circulated to various stakeholders and the manual is under finalization.

7.13 Report of the Status of Feeder, Distribution Transformer and consumer metering

The report on the status of Feeders, DTs and Consumers metering in the country is regularly being updated and submitted to MoP.

7.14 Development of DAMS Portal:

An online system called Distribution Assets Monitoring System (DAMS) was developed to capture all the distribution infrastructure data from sub-station till consumer level. The Portal is live and Discoms are filling the data in the Portal. Training was also provided to the Discoms Officers to familiarize them regarding the Portal.

7.15 Conduction of Mock Test Exercise at Parliament House

To ensure reliability of power supply to Parliament house before onset of each Parliament session, a Mock test exercises at CPWD 11 KV Parliament House S/S were organized by CPWD in presence of officers of CEA, CPWD & NDMC before the Monsoon, Winter and Budget Sessions of Parliament and the reports of the Mock Test Exercise were sent to MOP, CPWD & NDMC.

7.16 Enquiry Report of DDUGJY Works in Bihar

As per the direction of Ministry of Power, a team of CEA Officers visited Bhagalpur and Muzaffarpur District in Bihar to make a enquiry into the issues raised in a representation to MOP regarding site verification for actual assessment of works executed under DDUGJY in Bihar. Based on the findings/observation and information gathered during the site inspection on the issues raised, the detailed Enquiry Report was prepared and sent to Ministry of Power.

7.17 Consultancy work

Noida Power Company Limited (NPCL)- NPCL requested CEA for consultancy work regarding network planning study for its distribution system including improvements in distribution system such as ensuring N-1 in 11 kV and LT level, effects of EV and grid connected DERs, cost – benefit analysis of CAPEX plan etc. CEA is assisting NPCL in formulation of reports & recommendations, after appointment of consultant.

New Delhi Municipal Council (NDMC)- NDMC requested CEA for technical audit of 66 kV and below distribution system. CEA prepared the Scope of works including GIS mapping, automation including SCADA, RMUs, master plan, trainings etc. and suggested NDMC for appointment of consultant.

BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL)- Consultancy work for Feasibility Study for conversion of existing Overhead Electrical Network to Underground Electrical Network in BRPL and BYPL was carried out.

7.18 Development of TechDome under Nav Bharat Udyan

As per the instructions received from the Office of the Principal Scientific Advisor (PSA) to Government of India (GoI), proposals were invited from various Ministries/ Science & Technology (S&T) for showcasing the selected scientific and technological achievements in the TechDome / Nav Bharat Udyan at Central Vista, New Delhi. In this regard, four proposals from Distribution Sector were submitted before CDAC

on behalf of Ministry of Power.

7.19 VIP/MoP/Other References

- Inputs/ comments were provided for various references related to Standing Committee and Consultative Committee on Energy.
- Comments were furnished to Power Sector Skill Council (PSSC) on Revalidation of National Occupational Standards (NOS) and Qualification Packs (QPs) in respect of job roles in Distribution Sector/Downstream Distribution Sector.
- Inputs provided on the Note on the Reliability Indices.
- Inputs furnished regarding amendment in Electricity (Rights of Consumers) Rules
- Inputs provided on Draft National Electricity Policy.
- Inputs furnished regarding Expansion of Telecom Networks by utilizing Energy infrastructure and Enhancing Ease of Doing Business for the Telecom Sector.
- Inputs provided to the Committee constituted by the Ministry of Power to discuss TRAI's consultation paper on Data Center.
- Comments furnished to MoP on Draft EFC Memo on appraisal for continuation of Border Area Development Programme (BADP) for the XVth finance commission period.
- Comments furnished to MoP regarding proposals of Power infrastructure along the Border Roads Organisation road proposals in Border States as part of PM GatiShakti.
- Inputs provided to the Committee on determining (on yearly basis) the ceiling of the service fee to be charged from EV consumers.
- Inputs provided on various references related to make in India, Minimum Local Content (MLC), Phased Manufacturing Programme, IEEMA representation etc.
- A Note was prepared on the improvements in border infrastructure wrt power sector and submitted to MoP.
- Inputs provided on the issues raised by The Associated Chambers of Commerce & Industry of India during a meeting under the Chairmanship of Hon'ble Minister of Power & NRE.
- Pilot project of installation of underground submersible substation in Mumbai was studied and technical clearance accorded.
- Inputs provided for ATN on 46th Report (7th Lok Sabha) of the PAC on "Generation and Distribution of Power in Lakshadweep Islands" (MHA).
- Furnished inputs to R&D regarding identification of new areas for Research and Development relevant to Power Sector.
- Inputs provided on the Cabinet Note for the new Scheme “Prime Minister’s Development Initiative for North-East Region (PM-DevINE)” for the remaining 4 years of the 15th Finance Commission period (2022-23 to 2025-26)-Inter-Ministerial Consultation.
- Inputs furnished to the Committee constituted by TEC/ DoT to prepare “Design and Standards for Common Ducts and Posts Infrastructure to be established along highways and public pathways”.
- Issuance of Quality Control Orders (QCOs) for Insulating Oil/Liquids and Smart meter was taken up with DPIIT and BIS and process was initiated.
- Comments furnished on VIP reference received from Shri Ajit Kumar Bhuyan, Member of Parliament, Rajya Sabha Assam regarding procurement of distribution transformer.
- Inputs furnished to MoP on “BRICS Smart Grid Report 2022: BRICS Reports by Chinese Presidency”.
- Inputs furnished on the Draft EFC Memo for Appraisal of Central Sector Scheme (s) of M/o DoNER for their continuation in the 15th Finance Commission (2022-23 to 2025-26).
- Inputs furnished on various references related to issue of shortage of Cold Rolled Grain Oriented (CRGO) and related issues for transformer manufacturing.
- Inputs provided to MoP on the issue raised by DPIIT in connection with 'Power issues persist at Tuticorin Port in Tamilnadu'.

7.20 National Feeder monitoring system

National Feeder Monitoring System (NFMS), is an automated Web-based System for Monitoring the 11 kV Distribution Feeders by integrating

data from various DISCOM's and status of all outgoing 11 kV Feeders from 33/11kV substations to make theinformation available on near Real-Time basis through Machine-to-Machine (M2M) communication mode.

NFMS aims to set up a Centralized Unified system which will be further linked to NPP. NFMS is envisaged with the following key objectives:

a) Automatic monitoring for Reliability of Power parameter such as SAIFI (System Average Interruption Frequency Index), SAIDI (System Average Interruption Duration Index) and Hours of Supply etc.

b) Automatic monitoring for Quality of Power such as Voltage level, Frequency, Powerfactor etc.

c) Enabling Inputs for DISCOM Consumer Service Rating, Demand forecasting, Network Planning, Load Management & Energy Accounting and other operational &strategic initiatives

d) Advanced reporting and generation of multi layered MIS for all stakeholders along with enablement for Advanced Data based Analytics (AI/ML based)

e) Enabling seamless Machine to Machine data transfer from field equipment to the servers and data processing Unit without any manual interventions.

A Steering Committee under Chairmanship of Member (GO&D), CEA with members from PGCIL, MoP, PFC & REC is constituted by MOP for reviewing and finalizing the scope of works, corresponding cost estimates with timelines for achieving immediate milestones, release of funds, regular review and monitoring of NFMS Project implementation.

7.21 Monitoring of Prime Minister Development Package (PMDP) 2015 Distribution Projects in UT of J&K and Ladakh:

CEA is monitoring the progress of works in Distribution Sector in the UTs of J&K and Ladakh under PMDP-2015**.**

Projects under Ongoing Works for PMDP 2015

Ministry of Power on 9th Nov, 2016 has sanctioned an amount of Rs 2570.14 Crores for Strengthening of Distribution system and new technologies in the UT of J&K and Ladakh as below:

Rural Area: Projects in 21 districts amounting to Rs 1157.75 Crores including PMA charges, for strengthening the Rural distribution area also includes electrification in shrines, Underground cable laying in Tourist Place, and electrical infrastructure in Industrial Area were sanctioned. JPDCL, KPDCL& PGCIL are nominated as Project Implementing Agency (PIA) by JKPDD. Region and PIA wise Financial progress vis-à- vis surveyed and approved projects as provided by respective PIAs under the PMDP- Rural is as below:-

Region	PIA	Progress
Jammu	JPDCL	93%
	PGCIL	100%
Kashmir	KPDCL	81%
	PGCIL	100%
Ladakh	PGCIL	85%

Urban Area: Project in 12 circles amounting to Rs. 1144.59 Crores including PMA charges for strengthening the urban distribution area which includes establishment of meter testing labs were sanctioned. JPDCL, KPDCL& RECPDCL are the PIAs. Regionand PIA wise Financial progress vis-à-vis surveyed and approved projects as provided by respective PIAs under the PMDP-Urban is as below:-

Region	PIA	Progress
Jammu	JPDCL	97%
	RECPDCL	92%
Kashmir	KPDCL	100%
	RECPDCL	96%
Ladakh	RECPDCL	94%

Smart metering projects: Projects for providing smart meters to 2 lakh consumers at the cost of 126.54 Crores including PMA charges were sanctioned, for which RECPDCL is the PIA. The work is almost completed as on 31.03.2023.All the ongoing works are on the verge of completion.

Projects under Additional fund for PMDP 2015:

Ministry of Power vide sanction order dated 01-June-21 approved additional funds of Rs 1068.43 crs for completion of balance works sanctioned under PMDP2015.These work have awarded by the respective PIAs during November-December 2021.

Rural Area: Additional Funds for projects in 21 districts amounting to Rs 565.87 Crores including PMA charges, for strengthening the Rural distribution area also includes electrification in shrines, Underground cable laying in Tourist Place, and electrical infrastructure in Industrial Area has been sanctioned. JPDCL, KPDCL& PGCIL are nominated as Project implementing Agency (PIA) by JKPDD. Region and PIA wise Financial progress vis-à-vis surveyed and approved projects as provided by respective PIAs under the PMDP-Rural is as below:-

Region	PIA	Progress
Jammu	JPDCL	24%
	PGCIL	36%
Kashmir	KPDCL	29%
	PGCIL	43%
Ladakh	PGCIL	14%

Urban Area: Additional funds for Project in 12 circles amounting to Rs 486.61 Crores including PMA charges for strengthening the Urban distribution area has been sanctioned. JPDCL, KPDCL& RECPDCL are the PIAs. Region and PIA wise Financial progress vis-à-vis surveyed and approved projects as provided by respective PIAs under the PMDP-Urban is as below:-

Region	PIA	Progress
Jammu	JPDCL	17%
	RECPDCL	57%
Kashmir	KPDCL	33%
	RECPDCL	37%
Ladakh	RECPDCL	0%

The expected Date of completion of Projects under Additional fund is July, 2023.

7.22 Monitoring of Urban & Rural Power Supply on National Power Portal (NPP):

NPP, launched on 14th Nov, 2017, is a centralized system which facilitates online data capture/ input (daily, monthly, and annually) and to disseminate related information (operational, capacity, demand, supply, consumption etc.) through various analysed reports, graphs, statistics etc. for Indian Power Sector. The Nodal Agency for implementation of NPP and its operational control is CEA. The system has been conceptualized, designed and developed by National Informatics Centre (NIC).

In Distribution Sector, NPP captures the feeder-level Power Supply Data for rural & urban areas. CEA monitoring the rural and urban Power Supply in the country based on the feeder linked on NPP.

By end of March, 2023, approx. 55447 urban feeders of 61 Discoms/UTs and approx. 1, 28938 rural feeders of 43 Discoms are integrated in NPP.

Average Hour of Power Supply

As reported by the States on National Power Portal (NPP), the Average hours of Power Supply in a Day in 11 kV feeder for Rural areas and Urban areas during the FY 2022-23 is 20.56 (HH.hh) and 23.72 (HH.hh) respectively.

CHAPTER – 8

DESIGN & ENGINEERING SERVICES

8.1Design & Engineering of Hydro ElectricProjects

Central Electricity Authority (CEA) renders design & engineering services for Hydro Electric Projects under execution in the Country in Central/ State Sectors and neighboring countries. CEA provides consultancy for conventional type hydro generating units, bulb/ tubular type units, pumped storage schemes with an underground/ surface power stations. Design & Engineering includes complete design, techno-economic analysis and preparation of Technical Specifications, tender evaluation, selection and sizing of equipment, detailed layout and schematic drawings for hydro turbine, generator, transformer, GIS, switchyard equipment and other auxiliaries.

8.2 Programme and Achievement during 2022-23

During 2022-23, CEA continued consultancy services for design and engineering of electrical and mechanical works of nine (9) nos. hydroelectric projects. Out of these, seven (7) projects are in India and two (2) projects are in Bhutan. The Projects for which design & engineering services were rendered by CEA are as given below:-

Sl. No.	Name of the H.E. Project	Executing Agency/ State	Capacity
Main Consultancy (Neighboring Countries)			
1.	Punatsangchhu–I HEP	PHPA-I/Bhutan	6x200 MW
2.	Punatsangchhu–II HEP	PHPA-II/Bhutan	6x170 MW
Main Consultancy (India)			
1.	Lakhwar MPP	UJVNL, Uttarakhand	3x100 MW
2.	Ganol SHEP	MePGCL*/ Meghalaya	3x7.5 MW
Overview Consultancy (India)			
1.	THDC Projects		
	a) Under Construction:	i) Tehri PSP	4x250 MW
		ii) Vishnugad Pipalkoti HEP	4x111 MW
	b) Under Operation:	i) Tehri HEP	4x250 MW
		ii) Koteshwar HEP	4x100 MW
		iii) Dhukwan Small HEP	3x8 MW

8.3 Scrutiny/Examination/Preparation of DPRs of HE Projects

a) Chapters on General Layout Aspect, Electro-Mechanical equipment, related drawings, bill of quantities, Memorandum of Changes, etc. of 15 nos. (13 nos. in India and 02 nos. in Nepal) of DPR of HEPs aggregating to 7518MW including clarifications/ drawings/ documents etc. as received from time to time were examined and commented upon.

b) Chapters on General Layout Aspect, Electro-Mechanical equipment, related drawings, bill of quantities, Memorandum of Changes, etc. of 16 nos. of DPR of PSPs aggregating to 19710 MW including clarifications/ drawings/ documents etc. as received from time to time were examined and commented upon.

c) Chapters on E&M aspects along with related drawings & BOQ pertaining to 01 no. of Lift Irrigation Scheme which was referred to CEA by CWC were examined and commented upon.

d) Memorandum of Changes pertaining to Electro-mechanical aspect received for 03 nos. HEP of 1002 MW were examined and commented upon.

e) Revised Cost Estimates of 02 nos. HEPs aggregating to 2800 MW, for which the concurrence was already accorded by CEA, were also examined/commented upon.

f) Electro-mechanical chapter along with related drawings & BOQ for 01 no. DPR are prepared for Ujh Multipurpose Project (3x29MW+1x2.5MW), J&K and are under preparation for Barinium HEP (5x80 +1x20 MW), J&K.

g) Electro-mechanical chapter along with related drawings & BoQ of DPR for 3 stage Damanganga (Ekdare) - Godavari (Waghad) Link Project, Maharashtra is under preparation.

The list of above projects is as given below:

A. List of DPRs of HEPs examined for E&M aspects during the year:

S. No.	Name of the Project	State	Installed Capacity (MW)
1	Oju Subansiri HEP	Andhra Pradesh	1878
2	Reoli-Dugli HEP	Himachal Pradesh	456
3	Bardang HEP	Himachal Pradesh	166
4	Tandi Rashil HEP	Himachal Pradesh	268
5	Anjaw HEP	Arunachal Pradesh	270
6	Demwe Upper Stage – I HEP	Arunachal Pradesh	270
7	Niare HEP	Arunachal Pradesh	860
8	Sirkaribhyol Rupsiabagar HEP	Uttarakhand	120
9	Teesta intermediate HEP	West Bengal	90
10	Idukki Extension Scheme	Kerala	800
11	Myntdu Leshka Stage II HEP	Meghalaya	210
12	Uri-I(Stg-II) HEP	Jammu & Kashmir	240
13	Teesta-VI HEP	Sikkim	600
Project abroad			
14	Arun-4 HEP	Nepal	490
15	West Seti HEP	Nepal	800

B. List of HEPs under S&I stage which were examined for E&M aspects during the year:

S. No.	Name of the Project	State	Installed Capacity (MW)
1	OWK PSP	Andhra Pradesh	800
2	Kurukutti PSP	Andhra Pradesh	1200
3	Karrivalasa PSP	Andhra Pradesh	1000
4	Sukhpura PSP	Rajasthan	2560
5	Gandikota PSP	Andhra Pradesh	1000
6	Upper Sileru PSP	Andhra Pradesh	1350
7	Sillahalla PSP	Tamil Nadu	1000
8	Shahpura PSP	Rajasthan	1800
9	Paidipalem East PSP	Andhra Pradesh	1200
10	Paidipalem North PSP	Andhra Pradesh	1000

11	Bhavali PSP	Maharashtra	1500
12	Sirohi PSP	Rajasthan	1200
13	Narihalla PSP	Karnataka	300
14	Veeraballi PSP	Andhra Pradesh	1800
15	Pane PSP	Maharashtra	1500
16	Chitravathi PSP	Andhra Pradesh	500

C. List of Lift Irrigation Schemes, referred by CWC, which were examined for E&M aspects during the year:

S. No.	Name of the Project	State
1	Palamuru Rangareddy Lift Irrigation	Telangana

D. List of HEPs Memorandum of Changes which were examined for E&M aspects during the year:

S. No.	Name of the Project	State	Installed Capacity (MW)
1	Lower Kopili	Assam	120
2	Teesta-VI HEP	Sikkim	500
3	Sunni Dam HEP	Himachal Pradesh	382

E. List of HEPs which were examined for Revised Cost Estimates for E&M aspects during the year:

S. No.	Name of the Project	State	Installed Capacity (MW)
1	Parbati-II HEP	Himachal Pradesh	800
2	Subansiri Lower HEP	Arunachal Pradesh	2000

8.4 Proposals for Foreign Assistance/Bilateral Co-operation

Relevant material/ inputs were provided for the proposal of bilateral co-operation with various countries in the field of hydro power development (including Energy Storage) as and when received from various ministries, such as Norway, Canada, USA, Burundi, SAARC, Slovenia, Crotia, US, China, Germany, Italy, Tajikistan, Azerbaijan, SASEC, Kazakistan, Sri Lanka, Japan, Finland, UNESCAP, New Zeeland, Maldives, Algeria etc.

8.5 Review of Technical Standards/ Regulations:

i. Notification of CEA regulations entitled Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations issued on 23.12.2022 after completion of revision/ modification.

ii.CEA Guidelines for Type Test(s) validity period and Model Quality Assurance Plan (MQAPs) of major Electro-Mechanical Equipment in Hydro Power Sector became legally enforceable in the country after notification of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022.

iii. Participated in panel meetings of BIS for preparation of /amendments in draft Indian Standards, namely IS: 12800 Part-I, as and when required.

8.6R&D Activities:

i. Providing inputs on R&D references received from various ministries and organizations as and when received.

ii. Participation in various workshops, conferences and trainings conducted by CBIP, CWC, etc. pertaining to developments in Hydro Power Sector.

iii. Member of Technical Committee on Hydro Research for the examination of R&D proposals for Hydropower sector received from entities for funding by Government of India.

8.7Examination of Innovative Proposals:

Examination/scrutiny of Innovative Proposals on generation of electricity from renewable and other sources of energy. However, no innovative proposals were received in the given period.

8.8 Miscellaneous Works:

i. A Committee was constituted under the chairmanship of Member (Hydro), CEA in the matter of requirement of Variable Speed Machine (VSM) vis-à-vis Fixed Speed Machine (FSM) in PSPs vide OM no. 10/3/HE&TD/2023/ dated 15.02.2023 and its report is under finalization.

ii. On the directives of Ministry of Power, a Committee is constituted under the chairmanship of Member (Hydro), CEA to formulate Guidelines for Field Efficiency Testing of Units in Hydro Power Plants (including PSPs), and which are under preparation.

iii. Providing inputs and participation in Technical Coordination Committee (TCC) & Authority Meetings of Punatsangchhu- I (6x200 MW) and Punatsangchhu-II (6x170 MW) HEP, Bhutan. Participation in other project related meetings like Project Level Tender Evaluation Committee (PLTEC), Pre-Bid Meetings, Tender-Evaluation Committee (TEC), etc. of Punatsangchhu-I (6x200 MW) and Punatsangchhu-II (6x170 MW) HEP, Bhutan.

iv. Conducting inspections at manufacturer works and preparation of reports thereof for various Electro-Mechanical equipment of Punatsangchhu-I (6x200 MW), Punatsangchhu-II (6x170 MW) and Ganol (3x7.5 MW) HEP.

v. Inputs in respect of Hydro Power Sector pertaining to Public Procurement (Preference to Make in India) [PPP-MII] Order were provided as & when required. Examination of representations from various associations/ manufacturers in light of latest PPP-MII Order & other relevant MoP & DPIIT Orders.

vi. Examination of tender documents of value more than Rs. 500cr. floated by CPSUs of Hydro Power Sector under Ministry of Power to ascertain the compliance of PPP-MII Order issued by DPIIT & MoP. The examination were completed for eleven (11) projects.

vii. Inputs for preparation of National Electricity Plan in respect of Hydro Power Sector were provided.

viii. Reply of various Parliament Questions, VIP references, RTI applications etc. as and when received.

8.9 Design and Consultancy Assignments (Civil Aspects) for Thermal/Hydro/ Power Transmission Projects during 2022-23

Civil Design Division of CEA carried out the following specific works in respect of thermal/hydro/power transmission projects during 2022-23:

8.9.1 Thermal Power Projects

Civil Design Division of CEA is providing consultancy services to power utilities for thermal power projects as and when referred by Competent Authority.

Presently, Civil Design Division is Preparing "Guidelines on design, construction and O&M & Annual certification of coal ash ponds" as per MoEF&CC notification for Ash utilization.

8.9.2 Hydro Power Projects

(a) Punatsangchhu-I HEP (6 X 200 MW), Bhutan

- Assembly structure of IPBD support structure were examined and necessary advice was communicated to Project Authorities.

(b) Ganol HEP (3 X 7.5 MW), Meghalaya

- 132 KV Switchyard foundation plan & structural details drawings were examined and necessary advice was communicated to Project Authorities. Further, 132 KV Equipment Support structure drawing was examined and necessary advice was communicated to Project Authorities.

CHAPTER -9

ECONOMIC AND COMMERCIAL ASPECTS OF POWER INDUSTRY

As per the Electricity Act, 2003, CEA has, inter-alia, been entrusted with duties and functions relating to collection/recording of data/information relating to generation, transmission, distribution, trading and utilization of electricity and to carry out studies relating to cost, efficiency, competitiveness etc. to evaluate the financial performance of the power sector.

9.1 Trend in Outstanding Dues Payable to CPSUs

CEA has been monitoring the status of the outstanding dues payable by the DISCOMs to CPSUs. Based on the information / data received in CEA from the CPSUs, the total outstanding dues (more than 45 days) payable by various power utilities to CPSUs, is Rs.17258.95 Crore as on 31st March 2023. The details of outstanding dues payable by power utilities to CPSUs is given as **Annexure- 9A**.

9.2 Electricity Tariff & Duty and Average Rates of Electricity Supply in India

In-fulfillment of its obligation under section 73(i) & (j) of the Electricity Act, 2003, CEA brings out a publication titled "Electricity Tariff & Duty and Average Rates of Electricity Supply in India". The latest edition (March 2022) contains information on retail electricity tariff applicable in various States / Utilities effective during the year 2021-22.

The publication provides assimilation of regulatory data on notified tariffs of various States/UTs, the estimated data on average rates of electricity supply & electricity duty for different categories of consumers, along with the summarized data on power supply schemes for special categories of consumers. It also provides the details of subsidy support given by the government to various categories of consumers. The estimated average rates of electricity published herein have been computed on the basis of tariff orders received from various State Electricity Regulatory Commissions.

The effective rates for different consumer categories have been worked out assuming different energy consumption for various sanctioned load keeping in view the urbanization, increase in usage of electricity appliances and improvement in the standard of living. In the March 2022 edition, tariff revisions subsequent to the last edition of the publication have been incorporated and tariff applicable in 45 Distribution Utilities have been indicated.

The sanctioned load and monthly energy consumption have been assumed for each category of consumer and considering the tariff notified by the respective Regulatory Commissions, the total amount payable by a particular category of consumer is worked out for the assumed load and monthly energy consumption. The Taxes and Duties are then added to arrive at the average estimated rate of electricity supply in terms of Paise / kWh.

A statement indicating category-wise estimated average rates of electricity for

various Distribution Utilities in the country is given as **Annexure-9B.**

9.3 Commercial appraisal of Power Sector Projects

9.3.1 During the year 2022-23, CEA carried out commercial appraisal of following projects/proposals in India

- Financial Concurrence for 6 Hydro Projects with installed capacity of 4485 MW at estimated cost of Rs. 15102 crore as under:
  - ✓ Apportionment of Power and Irrigation component of Shahpurkandi Project, 206 MW of PSPCL.
  - ✓ 669 MW Lower Arun Project in Nepal,
  - ✓ 1856 MW Sawalkote HEP in Jammu & Kashmir by NHPC
  - ✓ 300 MW Bowala Nand Prayag in Uttarakhand by M/s UJVN Ltd.
  - ✓ 2 x 120 MW Uri-I Stage-II Hydro Power Station, NHPC, J&K
  - ✓ Parbati Stage-II (800 MW), NHPC, H.P.
- CCE of 2880 MW Dibang HEP in Arunachal Pradesh by NHPC.
- Preliminary observations on Upper Sileru Pumped Storage Plant (9 x 150 MW), Andhra Pradesh.
- R&M of Unit #1, #3 of 2 x 20 MW Maithon Hydel Station, DVC.
- RCE of 8 x 125 MW Indira Sagar Project, NHDC, Madhya Pradesh.
- Renovation and Modernization (R&M) of Kopili Power Station (4x50 MW), NEEPCO, Meghalaya

9.3.2 CEA also carried out financial and commercial appraisal of following hydro projects in Bhutan

- Repayment schedule, estimation of cost of infirm power was carried out for Mangdechhu (720 MW).
- Tariff estimation was done for Punatsangchhu HEP (1020 MW).

9.3.3 Recommendation of tariff for Nuclear Power Stations

As per Atomic Energy Act 1962, fixation of tariff can be done by atomic power stations or through any authority or corporation established by atomic power stations or Government Company in consultation with Central Electricity Authority.

During the year 2022-23, tariff for Kakrapara Unit # 1 & 2 of Nuclear Power Plant (440 MW) recommended to Department of Atomic Energy for the period 2017-22. Besides, report on financial re-engineering of Kakrapara U#3 and U#4 (2x700 MW) was prepared to reduce tariff implication on consumers.

9.3.4 Computation of Energy Charge Rate for Imported Coal Based Plant during Section 11 period

In the light of emergent circumstances in May, 2022, MoP had issued directions vide order dated 05.05.2022 to imported coal based power plants under section 11 of the Act with further clarifications from time to time. MoP had also constituted a committee under the Chairperson, CEA via the aforesaid directions to suggest prudent tariff for imported coal based generating stations by assessing the implication of rise in imported coal price and to suggest modalities for generation and supply from such generating stations. The validity period of the above said committee was till 31.12.2022. The committee had recommended the benchmark ECR for 8 ICB plants for the period from

May, 2022 to December, 2022 on fortnightly basis.

9.3.5 Ceiling Limit for Service Charges to be charged from EV consumers

Ministry of Power had issued Guidelines and Standards of charging infrastructure for Electric Vehicles. Amendment to Guidelines and Standards for Charging Infrastructure for Electric Vehicles (EV) dated 7th November, 2022 provides that a committee under Central Electricity Authority (CEA) will periodically recommend to the State Government the ceiling limit of service charges to be charged from EV consumers. This Committee shall also recommend "time of the day rate" for service charges as well as the discount to be given for charging during solar hours. Accordingly, a committee in CEA after discussion with utilities like Tata Power, NVVN and EESL, assessed different parameters affecting charges being levied by Public Charging Station from EV consumers and worked out ceiling limit of charges to be charged from EV consumers. The report of the committee has been shared with Ministry of Power.

9.4 Preparation of Bidding Documents and Guidelines

9.4.1 Guidelines for procurement of power from ICB Plants on competitive bidding basis during crunch period has been prepared by CEA and the same was issued by Ministry of Power on 12.01.2023

9.4.2 Guidelines under Shakti B(v) Policy to facilitate aggregate procurement of power on long term and medium term basis has been prepared by CEA and the same were issued by Ministry of Power vide gazette notification dated 20.10.2022

9.4.3 Bidding guideline, RFP and TSA for bidding of ISTS Transmission projects:

A Committee under Member (E&C), CEA was constituted to revise Standard Bidding Documents and "Tariff Based Competitive Bidding (TBCB) Guidelines for Transmission Service" and "Guidelines for Encouraging Competition in Development of Transmission Projects". Based on recommendation of the Committee, the revised Standard Bidding Documents and "Tariff Based Competitive Bidding (TBCB) Guidelines for Transmission Service" and "Guidelines for Encouraging Competition in Development of Transmission Projects" have been revised by Ministry of Power and issued on 06.08.2021. The major changes in the revised SBD include reduction in Equity Lock in period (from earlier 51% for a period of 2 years from Date of Commissioning (COD) and 26 % for period of 3 years thereafter to 51% for a period of 1 year from COD), signing of Transmission Service Agreement by CTU, provision for quoting of single tariff in the bid, changing from Build Own Operate Maintain (BOOM) model to Build Own Operate Transfer (BOOT) model, provision of Independent Engineer during construction phase for monitoring, quality assurance and quantification of cost/time related issues, etc.

9.4.4 Model PPA for procurement of power on FOO basis:

Due to changed power procurement scenarios in the recent past, the generating companies are facing difficulties in signing PPAs for longer duration. At present all the guidelines for power procumbent for long term has a tenure of 25 years or more. Further, a need was felt to move towards market based economic dispatch for deriving the cost benefits of competitive purchase. In this regard, a model PPA for Medium term (1 to 7 years) was prepared and the same was issued by MoP vide order dated 19th Dec, 2022.

9.4.5 Guidelines for asset monetization:

In order to boost the quality infrastructure creation, the Government of lndia have identified asset monetization as an important financing option for creation of infrastructure. It was envisaged that the States have significant potential for Asset Monetization by leveraging brownfield transmission assets for new infrastructure Investment which will have multiplier effects on the respective state economies. A Committee was constituted by Ministry of Power under Member (Power System), CEA to prepare draft asset monetization guidelines to help the states to monetize their transmission assets. The committee had prepared the draft guiding principles for Monetization of Transmission Assets in the Public Sector through Acquire, Operate, Maintain and Transfer (AOMT) based PPP model after consultation with NITI Aayog. The same was issued by MoP vide order dated 03.10.2022. This model comprised of a limited period transfer of ownership of a transmission service provider SPV along with a mandatory buy back at the end of the transaction period.

9.5 Compilation of Information on Power Purchase Agreement

The information on Power Purchase Agreement (PPA) of Independent Power Producers (IPPs) with their tied and untied capacity, has been compiled based on the information supplied by IPPs. The compiled information is being updated regularly. During the year 2022-23 (up to 31.12.2022), the information for 131 IPPs with an installed capacity of 89911.15 MW , having tied and untied capacity of 65763.95 MW & 18880.055 MW respectively has been compiled.

9.6 Monthly report on Indices

A summary analysis from electricity point of view of major indices like WPI, Index of 8 core industries, CPI and IIP released by DPIIT and MOSPI is prepared on a monthly basis.

9.7 The Electricity Act, 2003

9.7.1 Framing and Amendments of the CEA Regulations framed and notified under the Electricity Act, 2003

The Central Electricity Authority has been vested with the powers to make Regulations under Section 177 of the Electricity Act, 2003. The status of the notification of principal regulations and their subsequent amendments since the enactment of the Electricity Act, 2003, is as under:

A. Notified Principal Regulations:

During 2022-23 following principal regulations have been notified:

1	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022	27.12.2022
2	Central Electricity Authority (Flexible Operation of Coal Based Thermal Power Generating Units) Regulations, 2023	30.01.2023

B. Notified amendments in the Principal Regulations:

The regulations are regularly reviewed and amended by the Authority as per the requirements of various stakeholders in the power sector including general public at large.
During 2022-23 following regulation has been amendment:

1	Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) (Amendment) Regulations, 2022	16.11.2022

C. Repealed Regulations:

During 2022-23 following 02 regulations have been repealed:

S.No.	Regulation	Repealed with effect from
1	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010	27.12.2022
2	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Amendment Regulations, 2015	27.12.2022

9.7.2 Court Cases

CEA is dealing with the Court Cases filed in the Hon'ble Supreme Court, High Courts, National Green Tribunal and District Courts/ Lower Courts across the Country on behalf of Government of India, Ministry of Power and Central Electricity Authority.

More than 175 court cases which are ongoing/ pending at various courts in which Ministry of Power or Central Electricity Authority have been impleaded as respondent(s) during the year 2022-2023.

9.8 Assistance to Ministry of Power

The important issues in which assistance provided to MoP are as under: -

- Report of "Eligibility of subsidiary companies to qualify as Captive users of generation plants set up by parent company".
- Examination of the reference initiated by Tata Power, wherein it was requested for intervention in the development of a mechanism for verifying the Captive Status, since there is no mechanism available to

verify the captive status of a Plant, if the Captive Users are located in more than one state.

- Standing Committee on Energy: Issues raised by Shri KRN Rajesh Kumar on Electricity Amendment Bill 2022.
- Consultative Committee meeting of the Ministry of Power held on 03.03.2021 on the Proposed Reforms.
- Preparation of Concept paper on introduction of High Price Day Ahead Market.
- Norms for Establishment cost for DISCOMs.
- Financing of FGD for projects having PPA under Section 63 of the Electricity Act, 2003.
- Report of Technical Committee for facilitating power supply to Data Centers.
- Report of Committee constituted to look into provision of new DSM regulations w.r.t. concerns raised by industry/state.
- Market Coupling in Day Ahead Market and Real Time Market Transactions.
- Furnished CEA's comments on the Renewable Energy Issues in Andhra Pradesh & Telangana (Post bifurcation).
- Applications on National Single Window System (NSWS).
- Swedish Chamber of Commerce India (SCCI) representation regarding disparities in different state level regulations or lack of coordinated enforcement make it challenging for companies to meet their emissions reductions targets and increasing their Renewable Energy (RE) ratio.

9.9 Legal Assistance/Advice to Utilities

The important issues on which legal assistance was provided to various departments/organizations/ Stakeholders/utilities are as under:

- Advice/Comments on the Gujarat Electricity Industry (Reorganization and Regulation) (Amendment) Bill, 2022.
- Advice/Comments on Grant of Deemed Licensee Status to NCRTC.
- Advice/Comments on the Standing Committee on Energy - List of Points on the subject 'Evaluation of Wind Energy in India received from MNRE.
- Advice/Comments on Grant of authorization under section 164 of Electricity Act, 2003 for an overhead line post commissioning of the overhead line.
- Advice/Comments on clarification on Prior Approval under Section 68(1) of the Electricity Act, 2003.
- Advice/Comments on "Amendment in Indian Telegraph Act, 1985 for grant of Section 164 approval under Electricity Act, 2003" referred by EPTA.

- Gujarat Industries Power Company Limited (GPICL) -- Surat Lignite Power Plant (SLPP) -- letter regarding issues being faced with New DSM Regulation, 2022.
- Analysis of cost of generation from ICB plants viz. MCP, whether to allow the HP-DAM for ICBs plants or not.
- Grievance Received from AIPEF dated 05.05.2022, regarding Adani Gujarat violating PPA with Haryana and not supplying 1424 MW of contracted power.
- Standing Committee on Energy: Issues raised by Shri KRN Rajesh Kumar on Electricity Amendment Bill 2022.
- Standing Committee on Energy (2021-22) – 32nd report on action taken by the Government on the observations/ recommendations contained in the 26th report on the subject "Review of Tariff Policy - need for uniformity in tariff structure across the country".

9.10 References on Policy and Regulatory aspects in the Power Sector

Following references on policy and regulatory aspects in the Power Sector have been dealt:

1. PMO reference- Biomass power project -Viability Gap funding- Letter from Hon'ble CM Punjab
2. Cabinet Note on setting up of Joint Venture Company between NLCIL and Assam Power Development Company Limited (APDCL) for developing Renewable Energy Projects in Assam
3. Draft PIB note for setting up of 1x800 MW capacity Technology Demonstration plant (TDP) to establish Advanced Ultra Supercritical (AUSC) technology for coal fired thermal power plants
4. Draft CERC (Indian Electricity Grid Code) Regulations, 2022- Applicability of Minimum Turndown Level and Compensation mechanism for loading below normative level
5. Open access policy for telecom networks
6. Draft operational guidelines of VGF for Storage
7. Uniform tariff across the country
8. Action taken reports on references received from Standing Committee on Energy
9. Cost Escalation & Extension of sunset date w.r.t various Transmission projects under PMDP-15 in the UT of Ladakh.
10. Energy cost optimization specific to Mhaisal Lift Irrigation Scheme by Integrating Solar Power Supply with Efficient Water Management.
11. Challenges being faced by Transmission sector
12. Indian Electricity Grid Code
13. Regulatory certainty as regards the Change in Law and Force Majeure issues faced by Transmission Service Providers executing projects under Sec-63 of the EA, 2003
14. Representation on Aggregate multiple small-sized packages into

single large value packages for TBCB bidding
15. Insurance Surety Bonds as security instruments in Transmission project development
16. Sub-committee for 500 GW-avenues for utilization
17. Banking at ISTS level for Green Hydrogen projects
18. Amendment to Mega Power Policy 2009 for Provisional Mega Power Projects
19. Proposal to support hydro power projects through VGF.
20. Expansion of Telecom Networks by utilizing Energy Infrastructure and Enhancing Ease of Doing Business for the Telecom Sector
21. Review of New Domestic Gas Pricing Guideline, 2014 and HP HT ceiling guidelines for gas produced from Deepwater, Ultra Deepwater and High Pressure High Temperature areas,2016
22. Impact on Tariff of Thermal Power Plants for Flexible Operation
23. Sharing of transmission charges under Force Majeure condition
24. Comments/justification on points raised by Hon'ble Ministers and Standing committee on Energy on Electricity Amendment Bill 2022
25. Escalation of Reserve Price for mines allocated to power sector under the Coal Mines (Special Provisions) Act, 2015
26. Concept note on Pooling of Tariff of 25 years Plus Thermal/ Gas Generating Stations
27. Allocation of Power to Himachal Pradesh from Koldam.
28. Proposal for rationalization in GST rates on components of Energy Storage System
29. Draft bidding guidelines on Long term and Short term Energy storage Systems
30. Representation from Baba Kalyani, CMD of Kalyani Group on 'Electricity (Promoting Renewable Energy Through Green Energy Open Access) Rules, 2022
31. Optimum utilization of surplus coal from PSPCL's captive coal mine i.e. Pachwara Central coal mine
32. Lowering the tariff for sale of power from 60 MW Natwar Mori Project of SJVNL
33. Draft Electricity (Amendment) Rules, 2022
34. References received on the provisions related to Captive Power Plants in Electricity Rules, 2005
35. Power Sector related responses received on TRAI's ' Consultation Paper on "Data Centre, Content Delivery Network and interconnection Exchange Points"
36. Representation on Implementation of Electricity (Late Payment Surcharge and Related Matters) Rules 2022
37. Representation on Electricity (Promoting Renewable Energy through Green Energy Open Access) Rules, 2022
38. Directions under Section 107 of the Electricity Act, 2003 – Regarding deemed CoD.

39. Financial impact due to reduced availability for Transmission line shutdown for NH/Railway works
40. Guidelines for usage of multi circuit towers for transmission lines traversing through wild life/ protected areas of India.
41. India Green Cell Electric Bus Financing Project
42. Extension of validity of concurrence of Dikhu HE Project being developed by M/s NMPPL
43. Development of 1000 MW grid connected Solar PV Power Project(s) under Central Public Sector Undertaking (CPSU) Scheme Phase-II (Tranche-III) anywhere in India by NHPC Ltd
44. Development of 1000 MWh of Pilot BESS Project: Requirement of Grant /support
45. Proposal from the Government of Myanmar for undertaking the "Mawlamyine-Ye Dawei 230 kV Transmission Line Project" under the GoI Line of Credit (LOC)
46. Loan Guarantee for Dam Rehabilitation and Improvement Project (DRIP) Phase-II & III
47. Draft Central Electricity Regulatory Commission (Terms and Conditions for Renewable Energy Certificates for Renewable Energy Generation) Regulations, 2022
48. Karnataka Electricity Regulatory Commission (Procurement of Energy from Renewable Sources) (Eighth Amendment) Regulations, 2022.
49. Representation on Implementation of Electricity (Late Payment Surcharge and Related Matters) Rules, 2022.
50. Representation on Electricity (Promoting Renewable Energy through Green Energy Open Access) Rules, 2022-Certain anomalies and difficulties in the enforcement of the Rules.
51. CERC's draft Indian Electricity Grid Code (IEGC) Regulations, 2022.
52. CERC's draft Sharing of Inter-State Transmission Charges and Losses (First Amendment), Regulations, 2022.
53. Comments on the CERC's draft (Indian Electricity Grid Code) Regulations, 2022- Applicability of Minimum Turndown Level and Compensation mechanism for loading below normative level.

9.11 Implementation issues related to Regulations/Standards of CEA/ CERC/SERCs

Following Writ petitions filed by the utilities /persons before Hon'ble High Courts/ Supreme Courts etc. regarding implementation/regulatory issues have been dealt:

1. Writ Petition No. 269 of 2019, Captive Power Producer Association & Anr. Vs Maharashtra Electricity Regulatory Commission & Anr
2. Civil Appeal No. 8507 of 2022 in the matter of Jaipur Vidyut Vitran Nigam Ltd. & Ors. Vs CERC & Ors before the Hon'ble Supreme Court of India.

3. Writ Petition No. 3750 of 2023 in the matter of Tamil Nadu Generation and Distribution Corporation Ltd. (TANGEDCO) & Anr. Vs Ministry of Power & Ors before the Hon'ble High Court of Judicature at Madras
4. Civil Appeal No. 8175 of 2022 in the matter of Punjab State Power Corporation Ltd. & Ors. Vs CERC & Ors before the Hon'ble Supreme Court of India
5. WP No 3446 of 2021, filed by Shri Nagarajan V/s The Union of India & Ors before Madras Court Madhurai Bench
6. WR Petition No. 40307 of 2022 filed by Sprng Agnitra Private Limited & others Vs CTUIL & Others in the Hon'ble High Court of Andhra Pradesh at Amrawati
7. MB Power (Madhya Pradesh) Limited v. UoI and Others
8. Writ Petition No. 17964/2022 filed by Wind independent power producer association and ors Vs Ministry of Power and others
9. M/s Bajaj Energy Ltd. Vs. Union of India & Ors.
10. WP (PIL) No. 237 of 2021 in the matter of K. Rama Krishna Vs UOI & Ors. in the High Court of Andhra Pradesh at Amravati
11. Writ Petition No. 4619 of 2022 filed by Shri Mytrah Energy (India) Pvt. Ltd. And Ors Vs. NPDC, SPDC, Union of India (MNRE), CEA & Ors
12. WP (C) No. Nil of 2022 filed by Shri Deepak Kansal & Ors Vs New Delhi Municipal Council & Ors before the Hon'ble High Court of Judicature at Delhi.
13. Writ Petition No. 269 of 2019, Captive Power Producer Association & Anr. Vs Maharashtra Electricity Regulatory Commission & Anr. In the Hon'ble High Court of Bombay.
14. PIL No. 59 of 2022 in the matter of Mr. Satish Banwarilal Sharma Vs UOI & Ors in the Hon'ble High Court of Bombay.
15. Writ Petition No. 25000 of 2021 in the matter of Captive Power Producer Association & Anr. Vs Maharashtra Electricity Regulatory Commission & Anr in the Hon'ble High Court of Bombay.
16. W.P. No. 17964/2022 in the case of Wind Independent Power Producer Association and ors Vs Ministry of Power and others before the Hon'ble High Court of Madhya Pradesh.
17. W.P. No. 13839 of 2022 filed by M/s Organic World Pvt. Ltd. v/s UoI and Others in the High Court of Madhya Pradesh at Jabalpur.
18. Writ Petition No. 13781 of 2022 (F.R No. 12926 of 2022) filed by Shanay Renewables Private Limited Vs Union of India and others pending before the Hon'ble High Court of Karnataka.
19. WP No 3446 of 2021, filed by Shri Nagarajan V/s The Union of India & Ors before the Hon'ble High Court of Madras.
20. W.P (C) no. 825 of 2023 titled as Echanda Urja Power Limited v. Union of India & Ors before Hon'ble High Court of Delhi.
21. WP(C) No. 270 of 2023 in the matter of National Solar Energy Federation Vs UOI & Ors before Hon'ble High Court of Delhi.

22. WP (C) No. 16060 of 2022 in the matter of Wind Independent Power Producers Association v/s UoI before the Hon'ble High Court of Delhi.
23. Writ Petition No. 7519 of 2023, filed by Chief Financial Controller (TANGEDCO) Vs Ministry of Power and Ors. before the Hon'ble High Court of Judicature at Madras.
24. CERC Petition No. 278/MP/2019 by OTPC, OTPC sought relaxation of technical minimum of Palatana Project from 55% to 65% in IEGC.
25. Civil Appeal No. 8175 of 2022 in the matter of Punjab State Power Corporation Ltd. & Ors. Vs CERC & Ors before the Hon'ble Supreme Court of India.

9.12 Market Monitoring

1. Ministry of Power in March, 2019 had entrusted CEA with the task of monitoring the transaction in the electricity market in India. As such, CEA prepares Monthly Market Monitoring Reports (MMMR) and Annual Market Monitoring Reports (AMMR) with the objective of analysis of movement of prices discovered for the electricity transacted on the power exchanges in India in the Day Ahead Market (DAM), Green Day Ahead Market (GDAM), Term Ahead Market (TAM), Green Term Ahead Market (GTAM) and Real Time Market (RTM. In the year 2022-23, CEA has prepared Monthly Market Monitoring Reports (for March, 2022 to February, 2023) and Annual Market Monitoring Report (for year 2021-22). These reports are available on CEA's website (https://cea.nic.in/regulatory-affairs-division/?lang=en).

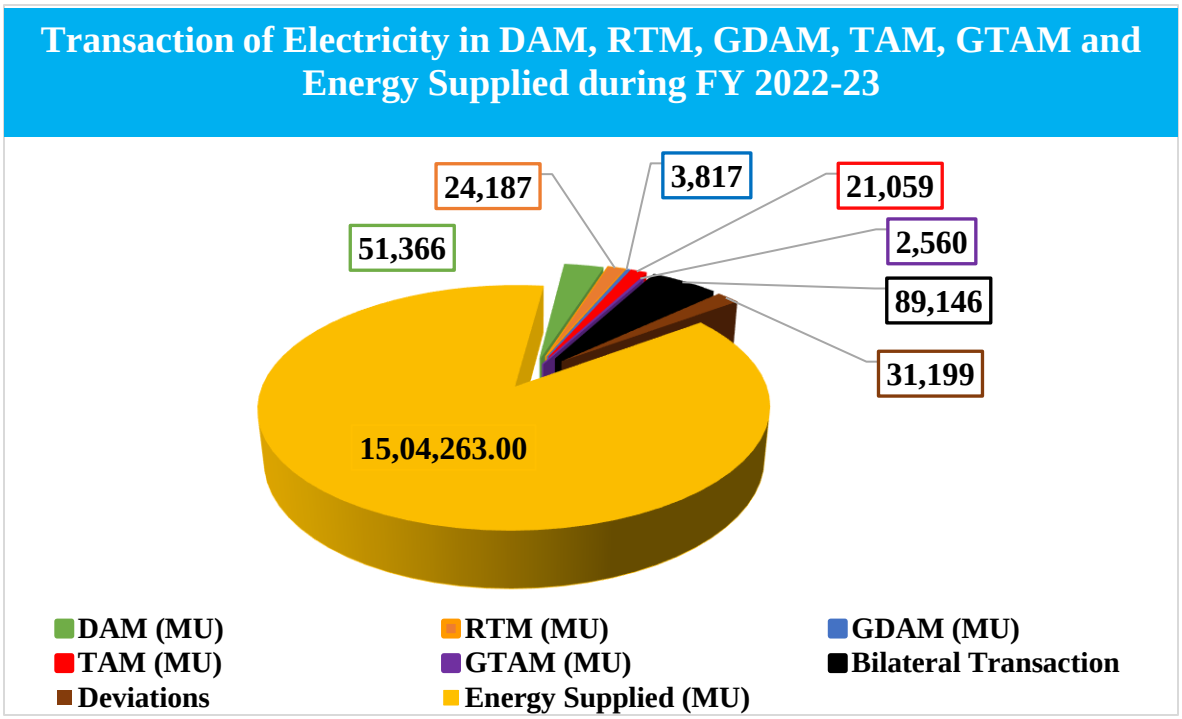
2. The salient points from these reports are as under:

(i) The total volume of electricity transacted during the period April, 2022 to March, 2023 in the power exchanges i.e. IEX, PXIL and HPX on delivery date basis was **102,977 MU**, which is 6.84 % of the total energy supplied i.e. **1,504,263 MU** in the country during FY 2022-23.

(ii) The total volume of electricity transacted in the power exchanges in DAM, TAM, RTM, GTAM and GDAM during the period April, 2022 to March, 2023 were **51366 MU, 21059 MU, 24187 MU, 2560 MU and 3817 MU** respectively. The volume of electricity transacted in Day Ahead Market constituted about 50 % of total transacted volume of electricity in the power exchanges during the months April, 2022 to March, 2023.

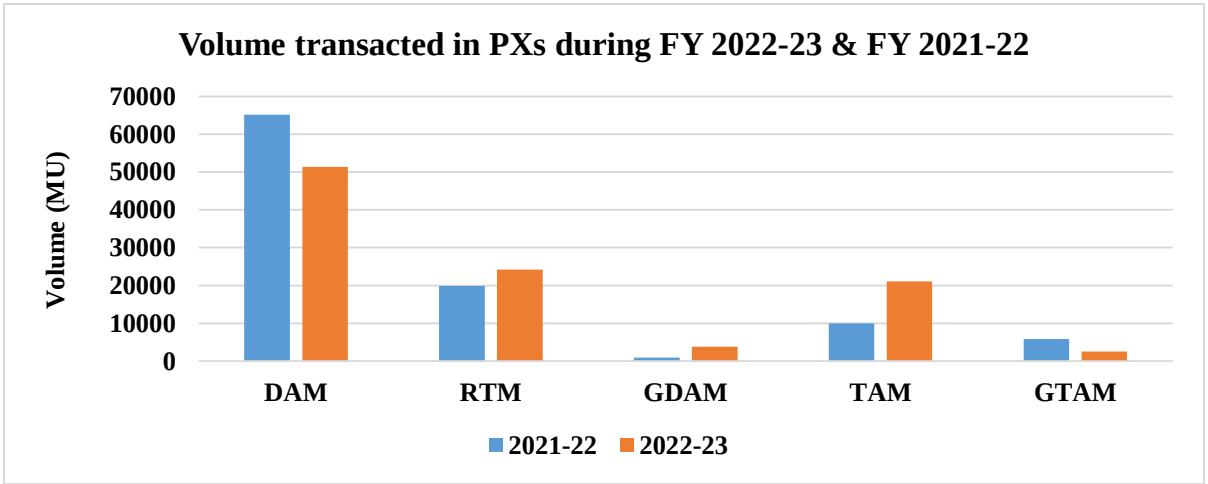
(iii) The monthly average Market Clearing Price in IEX in DAM varied from minimum of **Rs 3.96/kWh** in the month of October, 2022 to maximum of **Rs 10.06/ kWh** in the month of April, 2022. Similarly, the monthly average Market Clearing Price in PXIL in DAM varied from minimum of **Rs 4.30/ kWh** in May, 2022 to maximum of **Rs 11.33/ kWh** in the month of January, 2023, respectively.

(iv) The monthly average Market Clearing Price in IEX in RTM varied from minimum of **Rs 3.78/ kWh** in October, 2022 to maximum of **Rs 9.55/kWh** in April, 2022. Similarly, the monthly average Market Clearing Price in PXIL in RTM varied from minimum of **Rs 3.21/ kWh** in August, 2022 to maximum of **Rs 12.00/ kWh** in the month of September, 2022, respectively.



(v) The monthly average Market Clearing Price in IEX in GDAM varied from minimum of **Rs 4.03/kWh** in October, 2022 to maximum of **Rs 10.21/kWh** in April, 2022. Whereas, in PXIL transaction took place only in the month of July, 2022 (at monthly average MCP of **Rs 4.23/kWh**) and September, 2022 (at monthly average MCP of **Rs 5.87 /kWh**) for the period April, 2022 to March, 2023.

(vi) The regression analysis using double log function was carried out for Market Clearing Price w.r.t. purchase Bid and other independent variables in IEX for the months April, 2022 to March, 2023, which showed that the purchase bid is most significant variable which determined market clearing price in IEX.



CHAPTER – 10

POWER GENERATION

10.1 Power Generation

Generation of power from conventional sources (Thermal, Nuclear & Hydro) & import from Bhutan by the Central Sector, State Sector, Pvt. utilities & IPPs was about 1420912.93 million units during the year 2022-23. This represents a growth of about 7.57% over the same period during previous year 2021-22 as per details given below:

Power Generation during 2022-23

Category	Programme (MU)	Actual (MU)	Shortfall (-)/ Excess(+)	% of Programme	Growth (%) with respect to previous year Actual Gen.
THERMAL	1257388.00	1206210.67	51177.33	95.93	8.21
NUCLEAR	43324.00	45861.09	-2537.09	105.86	-2.66
HYDRO	150661.00	162098.77	-11437.77	107.59	6.91
BHUTAN IMP	8000.00	6742.40	1257.60	84.28	-10.02
TOTAL	**1459373.00**	**1420912.93**	**38460.07**	**97.36**	**7.57**

Note: Generation from stations having installed capacity less than 25 MW is not being monitored in CEA since 01.04.2010.

The highlights / achievements of operation performance of generating stations in the country during the year 2022-23 are as under:

- Gross annual generation of the country was 1420.91 BU.
- The annual growth in the energy generation during the year was 7.57 %.
- Thermal, Nuclear, Hydro and Import from Bhutan achieved a growth rate of 8.21%, -2.66%, 6.91% & -10.02% respectively. The electricity generation during the year 2022-23 from coal based thermal power stations was 1145.9 BU showing a growth rate of 10.03 % over same period last year.
- In Northern Region, the growth in thermal generation was 17.31% with respect to last year, which was highest amongst all the regions.
- The national average PLF for thermal stations was 64.15% and 105 Stations with an aggregate installed capacity of 125551.2 MW, achieved PLF above national average. 03 number of thermal power stations with an aggregate installed capacity of 4150 MW achieved above 90% PLF.

The Sector-Wise Generation and PLF during 2022-23 is given below:

Category / Sectors	Programme (MU)	Actual (MU)	PLF (%)
CENTRAL SECTOR			
THERMAL	425436	456133.13	74.67
NUCLEAR	43324	45861.09	77.22
HYDRO	61368	62961.33	
TOTAL	**530128**	**564955.55**	
STATE SECTOR			
THERMAL	429452	379313.87	61.86
HYDRO	74047	83209.08	
TOTAL	**503499**	**462522.95**	
PVT. SECTOR IPP			
THERMAL*	385823	353569.38	56.18
HYDRO	13776	14359.57	
TOTAL	**399599**	**367928.95**	
PVT. SECTOR UTL.			
THERMAL	16677	17194.29	68.45
HYDRO	1470	1568.79	
TOTAL	**18147**	**18763.08**	
TOTAL PVT	**402500**	**370763.67**	56.64
BHUTAN IMP	**8000**	**6742.4**	
ALL INDIA REGION			
THERMAL	1257388	1206210.67	64.15
NUCLEAR	43324	45861.09	77.22
HYDRO	150661	162098.77	
BHUTAN IMP	8000	6742.4	
TOTAL	**1459373**	**1420912.93**	

*****Includes import from some of the Captive Plants

10.2 Plant Load Factor of Thermal Power Stations

- During the year 2022-23 the average PLF of Thermal Power Stations was 64.15 % and for Nuclear Power Stations was 77.22%.
- 105 Thermal power plants (Coal and Lignite based) achieved PLF higher than the All India average PLF of 64.15 % as per details given in the table below:

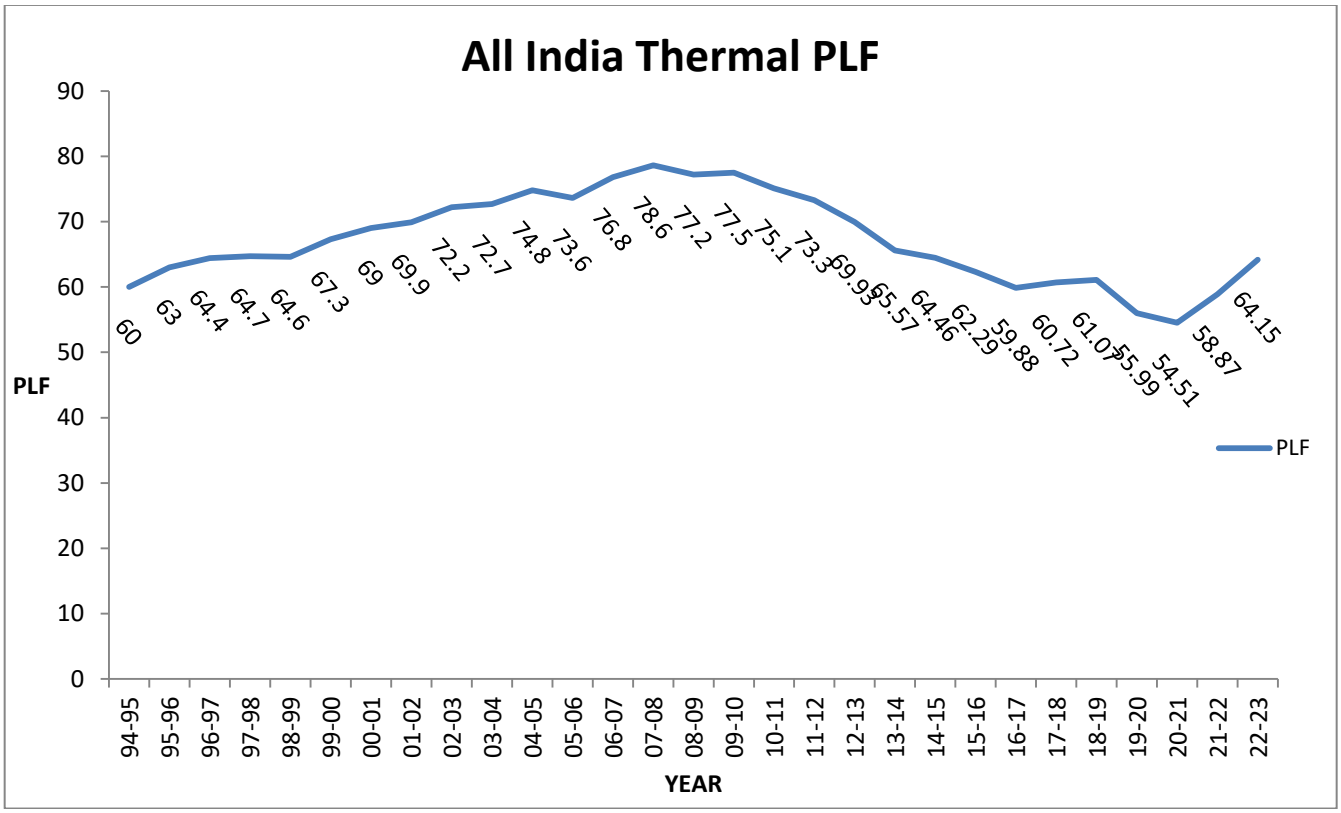
List of Thermal Power Stations (Coal and Lignite based) which have achieved PLF above National Average of 64.15 % during the year 2022-23

S. No.	STATION NAME	CAPACITY (in MW)	SECTOR	STATE	% PLF
1	BAKRESWAR TPS	1050	STATE SECTOR	West Bengal	92.38
2	SANTALDIH TPS	500	STATE SECTOR	West Bengal	91.37
3	KORBA STPS	2600	CENTRAL SECTOR	Chhatisgarh	91.15
4	VINDHYACHAL STPS	4760	CENTRAL SECTOR	Madhya Pradesh	89.54
5	SAGARDIGHI TPS	1600	STATE SECTOR	West Bengal	89.39
6	RIHAND STPS	3000	CENTRAL SECTOR	Uttar Pradesh	88.92
7	SINGARENI TPP	1200	STATE SECTOR	Telangana	88.52
8	TALCHER STPS	3000	CENTRAL SECTOR	Odisha	88.37
9	SABARMATI (D-F STATIONS)	362	PVT SECTOR	Gujarat	88.23
10	MUZAFFARPUR TPS	390	CENTRAL SECTOR	Bihar	87.58
11	SINGRAULI STPS	2000	CENTRAL SECTOR	Uttar Pradesh	87.52
12	BOKARO TPS `A` EXP	500	CENTRAL SECTOR	Jharkhand	86.67
13	BHILAI TPS	500	CENTRAL SECTOR	Chhatisgarh	86.57
14	SASAN UMTPP	3960	IPP SECTOR	Madhya Pradesh	85.8
15	JOJOBERA TPS	240	IPP SECTOR	Jharkhand	85.05
16	NEYVELI (EXT) TPS	420	CENTRAL SECTOR	Tamil Nadu	84.64
17	RAJPURA TPP	1400	IPP SECTOR	Punjab	84.63
18	MONARCHAK CCPP	101	CENTRAL SECTOR	Tripura	84.45
19	LARA TPP	1600	CENTRAL SECTOR	Chhatisgarh	83.37
20	DSPM TPS	500	STATE SECTOR	Chhatisgarh	83.29
21	KODARMA TPP	1000	CENTRAL SECTOR	Jharkhand	82.99
22	LAKWA REPLACEMENT POWER PROJECT	69.755	STATE SECTOR	Assam	82.58
23	KORBA-WEST TPS	1340	STATE SECTOR	Chhatisgarh	82.52
24	MAITHON RB TPP	1050	IPP SECTOR	Jharkhand	82.18
25	GMR WARORA TPS	600	IPP SECTOR	Maharashtra	82.17
26	KOTHAGUDEM TPS (NEW)	1000	STATE SECTOR	Telangana	82.02
27	BARAMURA GT	42	STATE SECTOR	Tripura	81.97
28	KARAIKAL CCPP	32.5	STATE SECTOR	Puducherry	81.87
29	NEYVELI NEW TPP	1000	CENTRAL SECTOR	Tamil Nadu	81.69
30	BUDGE BUDGE TPS	750	PVT SECTOR	West Bengal	81.14
31	SIPAT STPS	2980	CENTRAL SECTOR	Chhatisgarh	81.09
32	DURGAPUR STEEL TPS	1000	CENTRAL SECTOR	West Bengal	81.01
33	DARLIPALI STPS	1600	CENTRAL SECTOR	Odisha	80.75
34	TORANGALLU TPS(SBU-I)	260	IPP SECTOR	Karnataka	80.59
35	DHARIWAL TPP	600	IPP SECTOR	Maharashtra	80.47
36	YAMUNA NAGAR TPS	600	STATE SECTOR	Haryana	80.42
37	HALDIA TPP	600	IPP SECTOR	West Bengal	80.28
38	DAHANU TPS	500	PVT SECTOR	Maharashtra	79.88
39	ANPARA TPS	2630	STATE SECTOR	Uttar Pradesh	79.64
40	CHANDRAPURA(DVC) TPS	500	CENTRAL SECTOR	Jharkhand	79.41
41	NABINAGAR TPP	1000	CENTRAL SECTOR	Bihar	79.07
42	KAKATIYA TPS	1100	STATE SECTOR	Telangana	78.56

43	NABINAGAR STPP	1980	CENTRAL SECTOR	Bihar	78.51
44	BANDEL TPS	270	STATE SECTOR	West Bengal	78.44
45	BARSINGSAR LIGNITE	250	CENTRAL SECTOR	Rajasthan	78.36
46	TIRORA TPS	3300	IPP SECTOR	Maharashtra	78.18
47	PANIPAT TPS	710	STATE SECTOR	Haryana	78.13
48	AMARKANTAK EXT TPS	210	STATE SECTOR	Madhya Pradesh	77.95
49	TRIPURA CCPP	726.6	CENTRAL SECTOR	Tripura	77.55
50	ANPARA C TPS	1200	IPP SECTOR	Uttar Pradesh	77.33
51	AMRAVATI TPS	1350	IPP SECTOR	Maharashtra	77.18
52	KAWAI TPS	1320	IPP SECTOR	Rajasthan	77.14
53	JALIPA KAPURDI TPP	1080	IPP SECTOR	Rajasthan	77.01
54	KAMALANGA TPS	1050	IPP SECTOR	Odisha	76.98
55	PAINAMPURAM TPP	1320	IPP SECTOR	Andhra Pradesh	76.95
56	IB VALLEY TPS	1740	STATE SECTOR	Odisha	76.92
57	BONGAIGAON TPP	750	CENTRAL SECTOR	Assam	76.5
58	MEJIA TPS	2340	CENTRAL SECTOR	West Bengal	76.44
59	KAHALGAON TPS	2340	CENTRAL SECTOR	Bihar	76.08
60	BARH STPS	1980	CENTRAL SECTOR	Bihar	75.75
61	AVANTHA BHANDAR	600	IPP SECTOR	Chhatisgarh	75.5
62	SANJAY GANDHI TPS	1340	STATE SECTOR	Madhya Pradesh	74.82
63	DERANG TPP	1200	IPP SECTOR	Odisha	74.8
64	CHAKABURA TPP	30	IPP SECTOR	Chhatisgarh	74.26
65	MAHADEV PRASAD STPP	540	IPP SECTOR	Jharkhand	73.93
66	KOTA TPS	1240	STATE SECTOR	Rajasthan	73.46
67	METTUR TPS	840	STATE SECTOR	Tamil Nadu	73.33
68	CHHABRA-I PH-1 TPP	500	STATE SECTOR	Rajasthan	72.89
69	VALLUR TPP	1500	CENTRAL SECTOR	Tamil Nadu	72.81
70	BARADARHA TPS	1200	IPP SECTOR	Chhatisgarh	72.61
71	MAUDA TPS	2320	CENTRAL SECTOR	Maharashtra	72.4
72	SIMHADRI	2000	CENTRAL SECTOR	Andhra Pradesh	72.15
73	Dr. N.TATA RAO TPS	1760	STATE SECTOR	Andhra Pradesh	72.14
74	PRAYAGRAJ TPP	1980	IPP SECTOR	Uttar Pradesh	72.13
75	ANUPPUR TPP	1200	IPP SECTOR	Madhya Pradesh	71.52
76	AGARTALA GT	135	CENTRAL SECTOR	Tripura	71.5
77	HIRANMAYE TPP	300	IPP SECTOR	West Bengal	71.48
78	ROSA TPP Ph-I	1200	IPP SECTOR	Uttar Pradesh	71.45
79	SEIONI TPP	600	CENTRAL SECTOR	Madhya Pradesh	70.93
80	RAMAGUNDEM STPS	2600	CENTRAL SECTOR	Telangana	70.51
81	MAHATMA GANDHI TPS	1320	IPP SECTOR	Haryana	70.45
82	TENUGHAT TPS	420	STATE SECTOR	Jharkhand	70.27
83	PARAS TPS	500	STATE SECTOR	Maharashtra	70.08
84	SGPL TPP	1320	IPP SECTOR	Andhra Pradesh	70.06
85	NIGRI TPP	1320	IPP SECTOR	Madhya Pradesh	69.5
86	OP JINDAL TPS	1000	IPP SECTOR	Chhatisgarh	68.39
87	BINA TPS	500	IPP SECTOR	Madhya Pradesh	68.03
88	NTPL TUTICORIN TPP	1000	CENTRAL SECTOR	Tamil Nadu	67.69
89	KOLAGHAT TPS	840	STATE SECTOR	West Bengal	67.55
90	AKALTARA TPS	1800	IPP SECTOR	Chhatisgarh	67.42
91	FARAKKA STPS	2100	CENTRAL SECTOR	West Bengal	67.42
92	DADRI (NCTPP)	1820	CENTRAL SECTOR	Uttar Pradesh	67.14
93	GADARWARA TPP	1600	CENTRAL SECTOR	Madhya Pradesh	67

94	GANDHI NAGAR TPS	630	STATE SECTOR	Gujarat	66.94
95	TALWANDI SABO TPP	1980	IPP SECTOR	Punjab	66.51
96	SURAT LIG. TPS	500	IPP SECTOR	Gujarat	66.31
97	KATHALGURI CCPP	291	CENTRAL SECTOR	Assam	66.29
98	KHAPARKHEDA TPS	1340	STATE SECTOR	Maharashtra	66.24
99	AND. NICOBAR Pvt. DG	35.19	PVT SECTOR	Andaman & Nicobar Islands	65.49
100	LALITPUR TPS	1980	IPP SECTOR	Uttar Pradesh	65.35
101	BHADRADRI TPP	1080	STATE SECTOR	Telangana	64.87
102	VALUTHUR CCPP	186.2	STATE SECTOR	Tamil Nadu	64.75
103	KORADI TPS	2190	STATE SECTOR	Maharashtra	64.63
104	BHUSAWAL TPS	1210	STATE SECTOR	Maharashtra	64.48
105	RAYALASEEMA TPS	1650	STATE SECTOR	Andhra Pradesh	64.43

The trend in All India PLF of coal and Lignite based thermal power stations from 1994-95 onwards is shown below:



All India Sector-wise/Organization-wise target, actual generation and PLF (%) for the year 2022-23 is at the **Annexure-10A.**

Annexure-10A

Fuel, Sector/Organization	Target (MU)	Actual (MU)	PLF (%)
THERMAL			
CENTRAL SECTOR			
APCPL	5067	8268.17	62.92
BRBCL	5567	6926.8	79.07
DVC	41248	43084.76	73.43
JHAPL	4264	3727.99	70.93
K.B.U.N.L	2490	2991.96	87.58
MUNPL	7101	7366.82	63.71
NEEPCO.	2907	3282.66	**
NLC	20396	21959	68.87
NPGCL	9934	12924.67	78.51
NSPCL	4092	3791.95	86.57
NTECL	8143	9566.74	72.81
NTPC Ltd.	299025	321059.43	75.74
NTPL	6491	5930.01	67.69
NUPPL	1488	0	**
ONGC	4196	4936.23	**
RGPPL	3027	315.94	**
SJVNL	0	0	
THDC	0	0	
TOTAL CENTRAL SECTOR	**425436**	**456133.13**	**74.67**
STATE SECTOR			
HPGCL	12487.00	15722.58	71.51
IPGCL	453.00	331.88	**
JKSPDC	0.00	0.00	**
PPCL	5897.00	3452.42	**
PSPCL	6237.00	7449.42	48.32
RRVUNL	46180.00	39362.73	55.47
UPRVUNL	37119.00	34796.96	65.22
CSPGCL	18930.00	17709.62	71.18
GMDCL	904.00	821.94	37.53
GPPCL	1198.00	6.56	**
GSECL	25190.00	23543.35	52.07
GSEGL	689.00	0.97	**
MAHAGENCO	61090.00	53232.28	61.91
MPPGCL	30143.00	27352.08	57.82
APEPDCL	531.00	244.66	**
APGENCO	25612.00	20434.72	68.41

APPDCL	12569.00	5883.05	41.97
KPCL	22113.00	13679.32	45.66
KSEB	0.00	0.12	#
LAKSH		15.02	#
P&ED, Pudu.	226.00	233.07	#
RPCL	7097.00	4739.40	33.81
SCCL	9112.00	9304.71	88.52
TANGEDCO	32011.00	24426.98	59.96
TSGENCO	28935.00	25374.12	71.65
A&N ADM	151.00	97.31	#
DPL	2741.00	2707.16	56.19
OPGC	11474.00	11724.28	76.92
TVNL	2183.00	2585.54	70.27
WBPDC	26384.00	31854.19	85.36
APGCL	1244.00	1676.98	**
ED, Manipur	0.00	0.00	**
TSECL	552.00	550.45	**
Total STATE SECTOR	**429452**	**379313.87**	**61.86**
PVT. SEC. UTILITY			
AEML	3868.00	3498.90	79.88
A&N ADM		117.26	#
CESC	5870.00	5966.39	60.54
DPSCLTD		43.50	0.00
TATA PCL	4157.00	4770.23	63.13
TOR. POW. (UNOSUGEN)	2782.00	2798.01	88.23
TOTAL PVT SECTOR UTIL	**16677**	**17194.29**	**68.45**
PVT. SEC. IPP			
ABAN POWR	448.00	55.15	**
ACB	2226.00	1334.54	46.88
ACPL	0.00	0.00	0.00
ADHUNIK	3756.00	3497.06	73.93
AMNEPL	0.00	0.00	0.00
APGPCL	832.00	365.34	**
APL	55964.00	40995.77	50.65
BALCO	3346.00	2541.09	48.35
BELLARY	0.00	0.00	#
BEPL	1304.00	1446.63	36.70
BIPL	0.00	0.00	
BLAPPL	614.00	318.71	40.43
BSES AP	0.00	0.00	
BSES(C)	0.00	0.00	
CEPL	3164.00	2349.99	22.36
CGPL	11500.00	11730.07	33.48

CLPINDIA	0.00	0.00	
CPL	0.00	0.00	0.00
DBPCL	8176.00	7632.45	72.61
DIL	2233.00	4229.47	80.47
EPGL	4756.00	2056.52	19.56
ESSAR	0.00	0.00	
ESSARPMPL	6694.00	3782.92	35.99
GAUTAMI	0.00	0.00	
GCEL	8528.00	7084.49	59.03
GEPL	0.00	0.00	0.00
GIPCL	2748.00	2904.27	66.31
GIPL	353.00	0.00	
GMR ENERG	11634.00	11399.50	78.87
GPGSL (GVK)	3036.00	2141.36	45.27
GREL	0.00	0.00	
GVKP&IL	0.00	0.00	
HEL	4450.00	4219.33	80.28
HMEL	1008.00	1878.54	71.48
HNPC	2536.00	4838.14	53.11
IBPIL	0.00	0.00	0.00
IEPL	96.00	759.21	32.10
ITPCL	4738.00	2302.51	21.90
JhPL(HR)	7615.00	8145.93	70.45
JITPL	6619.00	7862.69	74.80
JPL	14448.00	18968.03	63.69
JPPVL	12071.00	11016.09	69.10
JSWBL	7176.00	7285.68	77.01
JSWEL	3724.00	4530.03	44.58
KONA	0.00	0.00	
KONDAPALI	646.00	0.00	
LANCO	4762.00	3235.81	61.56
LAPPL	8721.00	8129.22	77.33
LBPL	0.00	0.00	0.00
LPGCL	9649.00	11334.39	65.35
LVS POWER	0.00	0.00	
LVTPL	0.00	0.00	0.00
MADURAI P	0.00	0.00	
MBPMPL	7808.00	7518.22	71.52
MCCPL	2232.00	1513.15	57.58
MEL	232.00	0.00	0.00
MPL	7407.00	7558.98	82.18
NPL	9945.00	10379.53	84.63
PENNA	0.00	0.00	

PGPL	0.00	0.00	
PPGCL (Jaypee)	11777.00	12509.99	72.13
PPNPGCL	48.00	69.11	
RATTANINDIA	8361.00	9127.46	77.18
REGL	3802.00	3968.28	75.50
RELIANCE	0.00	0.00	
RKMPPL	6705.00	5997.92	47.55
RPSCL	6489.00	7511.05	71.45
SAMALPATI	0.00	0.00	
SCPL	712.00	537.07	61.31
SEIL	17835.00	16999.20	73.51
SEPCPPL	2029.00	922.46	0.00
SEPL	0.00	135.53	2.58
SKS	2649.00	1452.13	27.63
SPGL	439.00	0.00	
SPL	32531.00	29763.91	85.80
SPPL	0.00	0.00	0.00
SrEPL	702.00	0.00	
ST-CMSECP	1347.00	1217.31	55.58
STPL	0.00	0.00	0.00
SVPPL	0.00	0.00	0.00
TATA PCL	1698.00	1788.09	85.05
TOR. POW. (SUGEN)	4800.00	1547.25	
TOR. POW. (UNOSUGEN)	1890.00	65.15	
TPDDL	0.00	0.00	
TRNE	3042.00	2588.65	49.25
TSPL	12181.00	11535.85	66.51
UPCL	3968.00	1410.93	13.42
VEDANTA	2029.00	3323.09	63.22
VEMAGIRI	0.00	0.00	
VESPL	0.00	0.00	0.00
VIP	0.00	0.00	0.00
VVL	0.00	0.00	0.00
WPCL	13180.00	13415.48	65.45
TOTAL PVT SECTOR IPP	**385409**	**353226.72**	**56.18**
PVT. SEC. IMP			
GIPCL	120.00	0.00	
ICCL	198.00	310.58	
NALCO	96.00	32.08	
TOTAL PVT SECTOR IMP	**414**	**342.66**	**0.00**
TOTAL IPP & IMP	**385823**	**353569.38**	**56.18**
TOTAL PVT. SECTOR	**402500**	**370763.67**	**56.64**
THERMAL TOTAL	1257388.00	1206210.67	64.15

NUCLEAR			
CENTRAL SECTOR			
DAE	0	0	
NPCIL	43324	45861.09	77.22
TOTAL CENTRAL SECTOR	**43324**	**45861.09**	**77.22**
TOTAL NUCLEAR	**43324**	**45861.09**	**77.22**
HYDRO			
CENTRAL SECTOR			
BBMB	9644	10824.72	
DVC	290	236.61	
NEEPCO.	5151	5202.44	
NHDC	3265	5443.49	
NHPC	**11168**	**10320.35**	
NHPC	**1205**	**0**	
NHPC	14495	14130.46	
NTPC Ltd.	3100	3132.81	
SJVNL	8888	9130.48	
THDC	4162	4539.97	
TOTAL CENTRAL SECTOR	**61368**	**62961.33**	
STATE SECTOR			
HPPCL	772.00	904.16	
HPSEB	1628.00	1779.35	
JKSPDC	4866.00	5056.98	
PSPCL	3780.00	3702.06	
RRVUNL	480.00	967.43	
UJVNL	5035.00	5177.21	
UPJVNL	1519.00	974.04	
CSPGCL	274.00	237.37	
GSECL	965.00	1340.85	
MAHAGENCO	3963.00	3941.02	
MPPGCL	2389.00	2230.78	
SSNNL	3099.00	4792.29	
APGENCO	2995.00	3940.88	
KPCL	12337.00	12964.04	
KSEB	7414.00	7989.00	
TANGEDCO	3913.00	5965.77	
TSGENCO	3852.00	6010.07	
APGENCO	605.00	543.73	
JUUNL	110.00	168.99	
OHPC	5363.00	4919.08	
TUL	5652.00	6152.57	
WBSEDCL	1550.00	1989.56	

APGCL	380.00	481.60	
MeECL	1106.00	980.25	
TOTAL STATE SECTOR	**74047.00**	**83209.08**	
PVT SECTOR UTL			
BHIRA HPS	900.00	401.60	
BHIRA PSS HPS	0.00	537.91	
BHIVPURI HPS	285.00	329.74	
KHOPOLI HPS	285.00	299.54	
TOTAL PVT SEC. UTIL	**1470**	**1568.79**	
PVT SEC. IPP			
ALLAIN DUHANGAN	658.00	640.14	
BAJOLI HOLI HPS	500.00	421.51	
BASPA HPS	1300.00	1351.93	
BHANDARDHARA HPS	36.00	19.28	
BUDHIL HPS	293.00	274.22	
CHANJU-I HPS	158.00	140.03	
CHUZACHEN HPS	537.00	503.92	
DIKCHU HPS	460.00	535.90	
JORETHANG LOOP	412.00	433.47	
KARCHAM WANGTOO	4131.00	4284.87	
MAHESHWAR HPS	0.00	0.00	
MALANA HPS	336.00	320.86	
MALANA-II HPS	348.00	343.54	
RONGNICHU HPS	442.00	434.84	
SHRINAGAR HPS	1310.00	1514.06	
SINGOLI BHATWARI	402.00	465.95	
SORANG HPS	392.00	318.29	
TASHIDING HPS	421.00	445.94	
TIDONG HPS	50.00	0.00	
VISHNU PRAYAG HPS	1590.00	1910.82	
TOTAL PVT SEC. IPP	**13776**	**14359.57**	
TOTAL PVT. SEC.	**15246**	**15928.36**	
TOTAL HYDRO	**150661**	**162098.77**	

Note: PLF is calculated for Coal & Lignite based power station only.
** Gas Based Station
# diesel Based Station

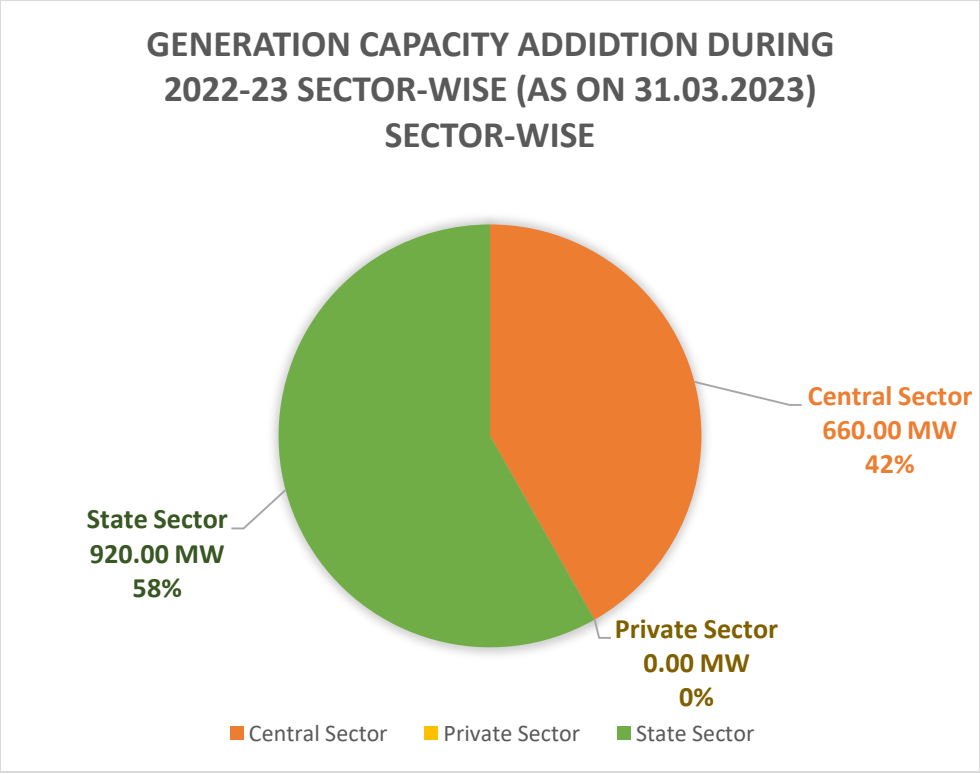
10.3 Generating Capacity Addition

During the year 2022-23, a total of 1580.00 MW generation capacity was added from conventional sources. The capacity addition during the last 10 years Sector-wise and mode-wise is given below:

Capacity addition during the last 10 years – Sector-wise

(Figures in MW)

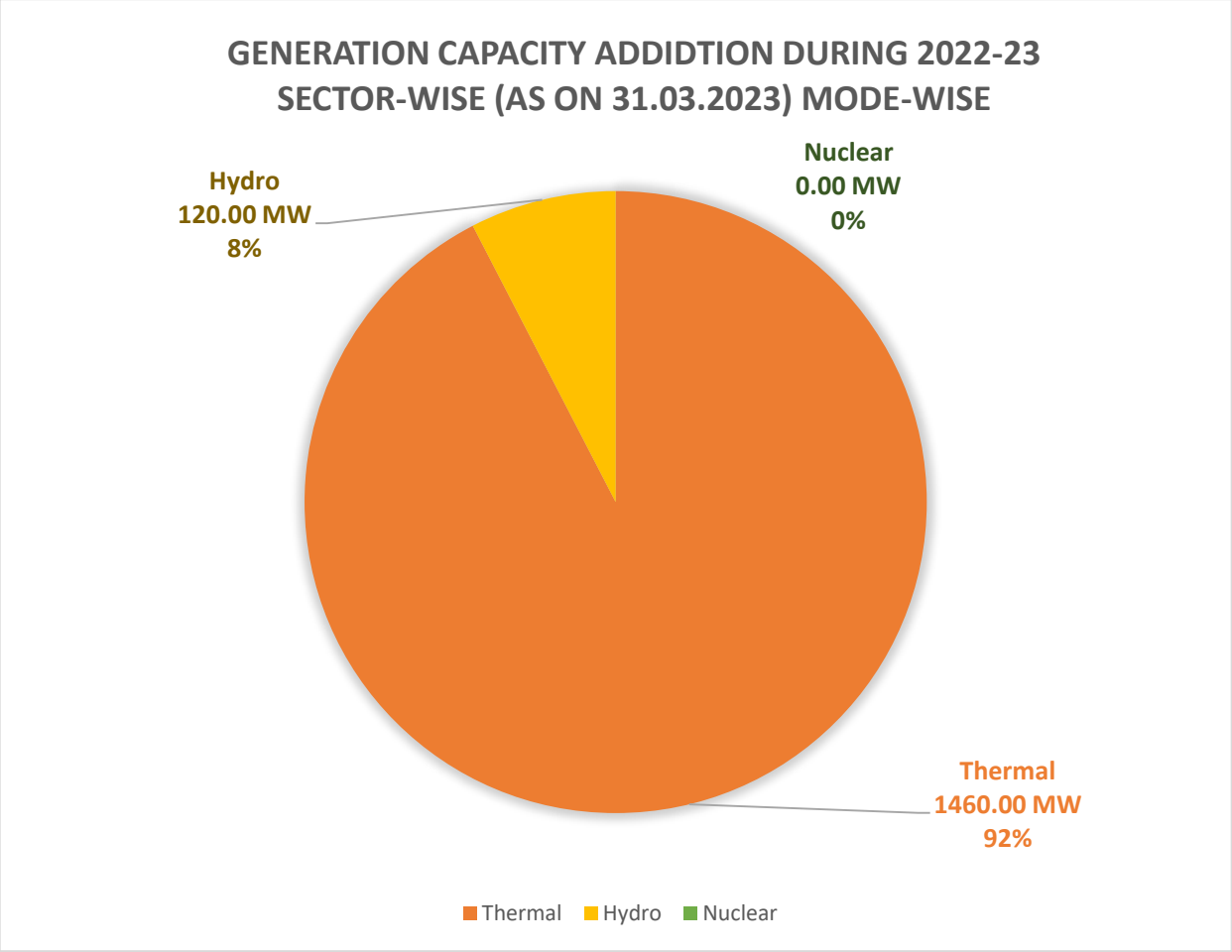
Year	Central Sector	State Sector	Private Sector	Total
2013-14	2574.01	3367.00	11884.00	17825.01
2014-15	4395.21	4886.10	13285.00	22566.31
2015-16	3775.60	7070.00	13131.00	23976.60
2016-17	4310.50	5177.30	4722.00	14209.80
2017-18	3560.00	1960.00	3985.00	9505.00
2018-19	2070.00	2879.755	972.00	5921.755
2019-20	4240.00	2780.00	45.00	7065.00
2020-21	4380.00	957.15	99.00	5436.15
2021-22	2370.00	1590.00	918.00	4878.00
2022-23	660.00	920.00	0.00	1580.00



Capacity addition during the last 10 years – Mode-wise

(Figures in MW)

Year	Thermal	Hydro	Nuclear	Total
2013-14	16767.00	1058.01	0.00	17825.01
2014-15	20830.30	736.00	1000.00	22566.31
2015-16	22460.60	1516.00	0.00	23976.60
2016-17	11550.80	1659.00	1000.00	14209.80
2017-18	8710.00	795.00	0.00	9505.00
2018-19	5781.755	140.00	0.00	5921.755
2019-20	6765.00	300.00	0.00	7065.00
2020-21	4926.15	510.00	0.00	5436.15
2021-22	4485.00	393.00	0.00	4878.00
2022-23	1460.00	120.00	0.00	1580.00



10.4 Installed Electricity Generating Capacity

Total All India Installed Electricity Generating Capacity, as on 31.03.2023 is 416058.89 MW comprising of Thermal 237268.91 MW, Hydro 46850.17 MW, Nuclear 6780.00 MW and 125159.81 MW from Renewable Energy Sources (RES). The details are shown in the Tables given below:

All India Installed Electricity Generating Capacity- Sector wise

Type	Central Sector (MW)	State Sector (MW)	Private Sector (MW)	Total (MW)
THERMAL	75977.91	75979.87	85311.14	237268.91
HYDRO	15664.72	27254.45	3931.00	46850.17
NUCLEAR	6780.00	0.00	0.00	6780.00
RES*	1632.30	2492.11	121035.39	125159.81
Total	**100054.93**	**105726.43**	**210277.53**	**416058.89**

*Sector wise breakup of RES capacity is provisional.

The growth of installed generating capacity in the country is shown in the table below:

Growth of Installed generating capacity in the country- Mode wise

Year	Thermal	Nuclear	Hydro	RES*	Total
Dec.1947	854	-	508	-	1362
Dec.,1955	1755	-	940	-	2695
March, 1961	2736	-	1917	-	4653
March, 1966	4903	-	4124	-	9027
March, 1974	9058	640	6966	-	16664
March, 1980	16424	640	11384	-	28448
March, 1985	27030	1095	14460	-	42585
March, 1990	43764	1565	18307	-	63636
March, 1991	45768	1565	18753	-	66086
March, 1992	48086	1785	19194	-	69065
March, 1996	60083	2225	20986	-	83294
March, 1997	61012	2225	21658	900	85795
March, 1998	64005	2225	21904	968	89102
March, 1999	67566	2225	22479	1024	93294
March, 2000	70193	2680	23857	1155	97885
March, 2001	72343	2860	25153	1270	101626

March, 2002	74429	2720	26269	1628	105046
March, 2003	76762	2720	26767	1628	107877
March, 2004	77969	2720	29507	2488	112684
March, 2005	80902	2770	30942	3812	118426
March, 2006	82410	3360	32326	6191	124287
March, 2007	86015	3900	34654	7760	132329
March, 2008	91907	4120	35909	11125	143061
March, 2009	93725	4120	36878	13242	147965
March, 2010	102454	4560	36863	15521	159398
March, 2011	112824	4780	37567	18455	173626
March, 2012	131603	4780	38990	24504	199877
March, 2013	151531	4780	39491	27542	223344
March, 2014	168255	4780	40531	34988	248554
March, 2015	188898	5780	41267	38959	274904
March, 2016	210675	5780	42783	45924	305163
March, 2017	218330	6780	44478	57244	326833
March, 2018	222907	6780	45293	69022	344002
March, 2019	226279	6780	45399	77642	356100
March, 2020	230600	6780	45699	87028	370106
March, 2021	234728	6780	46209	94434	382151
March, 2022	236109	6780	46723	109885	399497
March, 2023	237269	6780	46850	125160	416059

*Renewable Energy Sources (RES) includes Wind, Small Hydro Project, Biomass Gasifier, Biomass Power, and Urban & Industrial Waste Power & Solar Power.

All India Installed Capacity (in MW) of Power Stations located in the Regions of Main Land and Islands (as on 31.03.2023) are given at **Annexure-10B.**

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CHAPTER – 11

POWER DEVELOPMENT IN NORTH-EASTERN REGION

11.1 Hydro-electric Potential in N.E. Region

As per Re-assessment studies of 2017-23 carried out by CEA, hydro potential of the North Eastern Region in terms of installed capacity has been estimated as 55929.7 MW (above 25 MW capacity). Out of the above, 2027 MW (above 25 MW capacity) have been harnessed so far while projects amounting to 5000 MW (above 25 MW capacity) are under construction. State-wise identified hydro-electric potential (above 25 MW) of North-Eastern Region and its status of development is given below:

Region / State	Identified potential as per Re-assessment Study of 2017-23 (Above 25 MW)	H. E. Schemes Developed (Above 25 MW)	H.E. Schemes Under Construction (Above 25 MW)
Meghalaya	2026	322	0
Tripura	0	0	0
Manipur	615	105	0
Assam	643	350	120
Nagaland	325	75	0
Ar. Pradesh	50394	1115	4880
Mizoram	1926.7	60	0
Total(NER):	**55929.7**	**2027**	**5000**

Region / State	H. E. Schemes Concurred by CEA (MW)	H. E. Schemes Under Examination in CEA (MW)	H. E. Schemes Returned to Project authorities (MW)	H. E. Schemes under S&I (MW)	H. E. Schemes for which S&I is held up (MW)	Balance Capacity (MW)
Meghalaya	85	0	0	270	620	1156
Tripura	0	0	0	0	0	0
Manipur	0	0	0	0	0	510
Assam	0	0	60	0	0	143
Nagaland	186	0	0	0	0	64
Ar. Pradesh	13798	0	5323	12600	8276	6011
Mizoram	0	0	0	0	0	1866.70
Total(NER)	**14069**	**0**	**5383**	**12870**	**8896**	**9750.70**

11.2 Survey & Investigation of Hydro Projects

A Consultation Process has been evolved for Fast Tracking of S&I activities and preparation of Quality DPRs. DPRs of 2 nos. of HEPs in North Easter Region with aggregate installed capacity of **765** MW have so far been prepared in consultation with appraising agencies viz. CEA, CWC, CSMRS and GSI. As on 31.03.2023, 4 No. of schemes aggregating to 1659 MW are under Survey and Investigation in the North Eastern Region.

11.3 Status of development

Hydro Electric Projects being planned in the North Eastern Region are as under:

S. No.	Name of Project	Agency	State	Present Status
1	Demwe Lower (1750 MW)	Athena Energy Venture (P) Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 20.11.2009. MoP vide letter dated 22.12.2021 indicated that Demwe Lower HEP to be pursued by THDC.
2	Dibbin (120 MW)	KSK Dibbin Hydro Power Limited	Arunachal Pradesh	Concurrence accorded by CEA on 04.12.2009. MoP vide letter dated 22.12.2021 indicated that Dibbin HEP to be pursued by NEEPCO.
3	Lower Siang (2700 MW)	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 16.02.2010. MoP vide letter dated 22.12.2021 indicated that Lower Siang HEP to be pursued by NHPC.
4	Nafra (120 MW)	NEEPCO	Arunachal Pradesh	Concurrence accorded by CEA on 11.02.11. MoU between NEEPCO and Govt of Arunachal Pradesh signed on 14.08.2021.
5	Tawang-I (600 MW)	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.10.2011. MoP vide letter dated 22.12.2021 indicated that Tawang-I HEP to be pursued by NEEPCO.
6	Tawang-II (800 MW)	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 22.09.2011. MoP vide letter dated 22.12.2021 indicated that Tawang-II HEP to be pursued by NEEPCO.
7	Tato-II (186 MW)	Tato Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 22.05.12. MoP vide letter dated 22.12.2021 indicated that Tato-II HEP to be pursued by NEEPCO.
8	Hirong (500 MW)	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.04.2013. MoP vide letter dated 22.12.2021 indicated that Hirong HEP to be pursued by NEEPCO. Govt. of Arunachal Pradesh has approved the allotment of Hirong HEP to NEEPCO Ltd. on 13.01.2023
9	Etalin (3097 MW)	Etalin H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 12.07.2013. MoP vide letter dated 22.12.2021 indicated that Etalin HEP to be pursued by SJVNL.
10	Talong Londa (225 MW)	GMR	Arunachal Pradesh	Concurrence accorded by CEA on 16.08.2013. MoP vide letter dated 22.12.2021 indicated that Talong Londa HEP to be pursued by NEEPCO.

11	Naying (1000 MW)	D.S. Construction Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 11.09.2013. MoP vide letter dated 22.12.2021 indicated that Naying HEP to be pursued by NEEPCO. Govt. of Arunachal Pradesh has approved the allotment of Naying HEP to NEEPCO Ltd. on 13.01.2023.
12	Siyom (1000 MW)	Siyota Hydro power Pvt. Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 17.12.13.
13	Dikhu (186 MW)	Naga Manu Power Private Ltd.	Nagaland	Concurrence accorded by CEA on 31.03.14.
14	Kalai-II (1200 MW)	Kalai Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 27.03.2015. MoP vide letter dated 22.12.2021 indicated Kalai-II HEP to be pursued by THDC.
15	Kynshi – I (270 MW)	Athena Kynshi power Pvt.Ltd.	Meghalaya	Concurrence accorded by CEA on 31.3.2015.
16	Heo (240 MW)	Heo Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.07.15. MoP vide letter dated 22.12.2021 indicated that Heo HEP to be pursued by NEEPCO.
17	Tato-I (186 MW)	Siyota Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.10.15. MoP vide letter dated 22.12.2021 indicated that Tato-I HEP to be pursued by NEEPCO.
18	Dibang (2880MW)	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 18.09.2017.
19	Attunli (680 MW)	Attunli H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 15.03.2018. MoP vide letter dated 22.12.2021 indicated that Attunli HEP to be pursued by SJVNL
20	Wah-Umiam Stage-III (85 MW)	NEEPCO	Meghalaya	Concurrence accorded by CEA on 26.07.2021
21	Ranganadi St-II (130MW)	NEEPCO	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
22	Karbi Langpi (U. Borpani) (60 MW)	Assam State Electricity Board	Assam	DPR was returned to developer for re-submission after tying-up of requisite inputs.
23	Yamne St-II (84 MW)	SS Yamne Energy Ventures Private Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
24	Pemashelphu (90 MW)	Mechuka Hydro Power pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
25	Sissiri (100 MW)	Soma Sissiri Hydro Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
26	Gimliang (80 MW)	SKI Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
27	Raigam (141 MW)	SKI Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
28	Kangtang Shiri (80 MW)	Kangtang Shiri Hydro Project Pvt. Ltd	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
29	Nyukcharang Chu (96 MW)	Sew Energy Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.

30	Magochu (96 MW)	Sew MagoChu Power Corporation Limited	Arunachal Pradesh	DPR was returned and all the partial clearances issued till date were rescinded as no progress has been made by the Developer towards resolving the issues pending with various appraising groups.
31	Subansiri Middle (Kamala) (1800 MW)	Kamala HECL (Jindal Power Ltd.)	Arunachal Pradesh	DPR was returned and all the partial clearances issued till date were rescinded as no progress has been made by the Developer towards resolving the issues pending with various appraising groups.
32	Hutong- II (1200 MW)	Mountain Fall India Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
33	Kalai-I (1352 MW)	Mountain Fall India Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
34	Tagurshit (74 MW)	Larsen & Toubro Arunachal Hydro power Ltd.	Arunachal Pradesh	Developer vide letter dated 28.08.2018 informed that the company has decided not to go ahead with implementation of the project. In view of this, CEA returned the DPR vide its letter dated 20.06.2019 as the scheme is no more under consideration for CEA's concurrence.

11.4 Status of Various Hydro Power Projects in North-Eastern Region Appraised by CEA

11.4.1 Revised Cost Estimates

(i) Tuirial HEP (2x30=60 MW), Mizoram, NEEPCO

The project was cleared by CEA in July, 1998 at an estimated cost of ₹368.72 crores with likely completion by 2006-07. Project was to be financed substantially under Loan assistance of 11,695 Million Japanese Yen from Japan Bank of International Co-operation (JICA). This project was under execution and subsequently put on hold since June, 2004 due to poor law & order conditions and agitation by claimants of crop compensation.

Continuation or otherwise of the project was reviewed due to increase in the project cost and resumption of work was dependent upon viability of the project. CEA on 3.11.05 informed MOP that the present day cost of the project at October 2004 price level was likely to be ₹687.80 crores (including IDC of ₹ 40.05 crores and financing charges ₹ 0.16 crores). The first year tariff at this cost being ₹ 3.69/Kwh., project at this cost/tariff appeared unviable. In the meantime, JICA discontinued loan and requested for prepayment of entire outstanding amount.

Efforts were made to revive the project and the revised cost estimates were vetted by CEA a number of times and lastly vetted on 26.4.10 for the Hard cost of ₹ 877.06 crores at March, 10 P.L. PIB meeting was held on 4th June 2010 which recommended the project for CCEA approval.

CCEA approval was accorded to the project on 14.01.2011 for ₹913.63 crores including IDC of ₹36.57 crores at March, 2010 Price Level. The financial pattern of ₹913.63 crores comprises of (i) Equity of ₹ 137.04 Crs. (ii) Loan from financial institutions amounting to ₹ 184.63 crores (iii) Subordinate loan from Govt. of India amounting to ₹ 291.96 crores and (iv) Grant from DoNER amounting to ₹300 crores.

Cost estimates at completion level, submitted by NEEPCO, was vetted by CEA amounting to ₹1244.15 crores (Total project Cost) vide CEA letter dated 08.04.2019.

(ii) **Pare HEP (2x55=110 MW), Arunachal Pradesh, NEEPCO**

Pare HEP was accorded concurrence by CEA on 24th Sept. 2007 for an estimated cost of ₹553.25 crores including IDC & FC of ₹49.26 crores at June 2007 Price Level.

CCEA approval was accorded to the project on 04.12.2008 for ₹573.99 crores including IDC of ₹67.66 crores and FC of ₹0.40 crores at June, 2007 Price Level. The completion cost considering 44 months as construction period is estimated as ₹674.45 crores including IDC as ₹76.52 crores and FC as ₹0.47 crores.

Cost estimates at completion level, submitted by NEEPCO, was vetted by CEA amounting to ₹1640.31 crores (Total project Cost) vide CEA letter dated 25.02.2019.

(iii) **Subansiri Lower (8x250=2000 MW), Arunachal Pradesh, NHPC**

Subansiri Lower HE Project located in Lower Subansiri District of Arunachal Pradesh was accorded concurrence of CEA on 13.01.2003 for an estimated cost of ₹ 6608.68 Crores including IDC and FC of Rs705.58 Crores at December, 2002 price level.

CCEA approval was accorded to the project on 9.09.2003 for ₹6285.33 Crores including IDC and FC of ₹ 670.92 Crores at December, 2002 price level.

Memorandum of Changes (MoC) has been approved by CEA vide letter dated 15.03.2018. Revised cost estimates at April, 2017 price level, submitted by NHPC, was vetted by CEA amounting to ₹10601.16 crores (Total Hard Cost) vide CEA letter dated 18.07.2019.

11.4.2 CEA concurred Projects, yet to be taken under construction.

(A) Central Sector Projects:

(i) Tawang H.E Project St-I (3x200= 600 MW) in Ar. Pradesh by NHPC Ltd.

Project was accorded concurrence by CEA on 10.10.2011 at an estimated cost of ₹4824.01 Crores (including IDC & FC) at May, 2010 price level. MOP vide letter dated 22.12.2021 indicated that Tawang-I HEP to be pursued by NEEPCO.

Environment clearance was accorded on 10.06.2011. Forest clearance Stage-I & II yet to be obtained.

(ii) Tawang H.E Project St.-II (4x200=800 MW) in Ar. Pradesh by NHPC Ltd.

The project was concurred by CEA on 22.9.2011 at an estimated cost of ₹ 6112.3 crores (including IDC & FC) at May, 2010 price level. MOP vide letter dated 22.12.2021 indicated that Tawang-II HEP to be pursued by NEEPCO.

Project was accorded environment clearance on 10.06.2011. MoEF&CC vide letter dated 08.01.2014 has accorded Forest Clearance (Stage- I) for diversion of 116.62 ha forest land for the project. Forest clearance stage-II yet to be obtained.

(iii) Hirong HE Project (4x125 =500MW) in Arunachal Pradesh by NEEPCO.

Hirong H.E. Project was accorded concurrence by CEA on 10th April, 2013 at an estimated completed cost of ₹ 5532.63 Crores.

Environment clearance and Forest clearance are yet to be obtained. EIA/EMP report being revised as per Siang BSR. However, as per MoEF&CC, matter of FC is closed vide letter dated 02.12.2015**.**

Govt. of Arunachal Pradesh has approved the allotment of Hirong HEP to NEEPCO Ltd. on 13.01.2023. MoA is yet to be signed.

(iv) Wah-Umium Stage-III (Erstwhile Mawphu Stage-II) H.E. Project (2x42.5= 85 MW)-Meghalaya

The project was concurred by CEA on 26.07.2021 at an estimated cost of ₹ 965.40 crores at January, 2019 price level.

Environment clearance recommended by EAC on 26.02.2018. However, Environment clearance will be issued immediately on submission of Stage-I Forest Clearance. Forest Clearance yet to be obtained.

(v) **Naying HE Project (4x250 =1000MW) in Arunachal Pradesh by NEEPCO**

Naying H.E. Project was accorded concurrence by CEA on 11th Sept, 2013 at an estimated completed cost of ₹ 9301.11 Crores. Environment clearance and Forest clearance are yet to be obtained. Environment clearance is

linked with Siang Basin Study Report. MoEF&CC stated that developer needs to apply afresh for EC online as old proposal is not valid anymore.

Govt. of Arunachal Pradesh has approved the allotment of Naying HEP to NEEPCO Ltd. on 13.01.2023.

(vi) **Nafra HE Project (2x60= 120 MW) in Arunachal Pradesh by NEEPCO**

The project was concurred by CEA on 11.02.2011 at an estimated cost of ₹ 848.22 crores at completion cost. Project was accorded Environmental Clearance on 19.08.2013. Forest Clearance-I accorded on 12.07.2011 & Forest Clearance-II accorded on 26.06.2012.

MoU between NEEPCO and Govt of Arunachal Pradesh signed on 14.08.2021.

(B) State Sector Projects

NIL

(C) Private Sector Projects

i) Demwe Lower HE Project (5x342 + 1x40=1750 MW), Arunachal Pradesh by ADPL

Demwe Lower HE Project was accorded concurrence by CEA on 20.11.2009 for an estimated cost of ₹ 13144.91 Crores (Completion Cost). MOP vide letter dated 22.12.2021 indicated that Demwe lower HEP to be pursued by THDC.

MoEF&CC has accorded Environmental clearance to the project on 12.2.10. Forest clearances stage-II has been accorded on 03.05.2013. As per NGT order dated 24.10.2017, NBWL issue to be reconsidered by MoEF&CC.

ii) Lower Siang HE Project (9x300=2700 MW), Ar. Pradesh by JAPL

Lower Siang HE Project was accorded concurrence by CEA on 15.02.2010 for an estimated cost of ₹ 19990.74 Crores (Completion Cost).

Environment clearance & Forest clearance are yet to be obtained. MoP vide letter dated 22.12.2021 indicated that Lower Siang HEP to be pursued by NHPC.

iii) Etalin HE Project (10x307+1x9.6+1x7.4 = 3097MW) in Arunachal Pradesh by EHEPCL

Etalin H.E. Project was accorded concurrence by CEA on 12th July, 2013 at an Estimated completed cost of ₹ 25296.95 Crores. MOP vide letter dated 22.12.2021 indicated that Etalin HEP to be pursued by SJVNL.

Environment clearance recommended by EAC on 31.01.17. Letter will be issued after Forest clearance stage-I. Forest clearance stage-I & II are yet to be obtained.

iv) Talong Londa HE Project (3x75 = 225MW) in Arunachal Pradesh by GMR

Talong Londa H.E. Project was accorded concurrence by CEA on 16th Aug, 2013 at an estimated completed cost of ₹2172.88 Crores. MOP vide letter dated 22.12.2021 indicated that Talong Londa HEP to be pursued by NEEPCO.

Environment clearance accorded on 07.08.15. Forest clearance stage-I& II are yet to be obtained.

v) Kalai – II HE Project (6x200 = 1200MW) in Arunachal Pradesh by KPPL

Kalai – II H.E. Project was accorded concurrence by CEA on 27th March, 2015 at an estimated completed cost of ₹ 14199.64 Crores. MOP vide letter dated 22.12.2021 indicated Kalai-II HEP to be pursued by THDC.

Environment clearance has been accorded on 20.05.2015. Forest clearance Stage -I&II are yet to be obtained.

vi) Heo HE Project (3x80 = 240MW) in Ar. Pradesh by HHPPL

Heo H.E. Project was accorded concurrence by CEA on 28.07.2015 at an estimated completed cost of ₹ 1614.35 Crores. MOP vide letter dated 22.12.2021 indicated that Heo HEP to be pursued by NEEPCO.

Environmental Clearance accorded on 10.11.2015. Forest clearance stage-I accorded on 27.10.2015. Forest clearance stage-II yet to be obtained.

vii) Tato – I HE Project (3x62 = 186MW) in Ar. Pradesh by SHPPL

Tato – I H.E. Project was accorded concurrence by CEA on 28.10.2015 at an estimated completed cost of ₹1493.55 Crores. MOP vide letter dated 22.12.2021 indicated that Tato-I HEP to be pursued by NEEPCO.

Environmental Clearance accorded on 10.11.15. Forest clearance stage-I accorded on 27.10.15. Forest clearance stage-II yet to be obtained.

viii) Attunli HE Project (4x170 = 680MW) in Ar. Pradesh by AHPCL

Attunli H.E. Project was accorded concurrence by CEA on 15.03.2018 at an estimated completed cost of ₹ 6111.28 Crores. MOP vide letter dated 22.12.2021 indicated that Attunli HEP to be pursued by SJVNL. Environmental Clearance and Forest clearance are yet to be obtained.

ix) Dikhu HE Project (3x62= 186 MW) in Nagaland by NMPPL

Dikhu H.E. Project was accorded concurrence by CEA on 31.03.2014 at an estimated completed cost of ₹1994.74 Crores.

Environmental Clearance yet to be obtained. FC not applicable as forest land is not involved.

x) Tato – II HE Project (4x175 = 700 MW) in Ar. Pradesh by THPPL

Tato – II H.E. Project was accorded concurrence by CEA on 22.05.2012 at an estimated completed cost of ₹5616.20 Crores. MOP vide letter dated 22.12.2021 indicated that Tato-II HEP to be pursued by NEEPCO.

Environmental Clearance accorded on 27.06.11. FC is linked to Cumulative Impact Assessment Study of Siang Basin which has been carried out and accepted by MoEF&CC.

11.5 Status of Under Construction Hydro Power Projects in North Eastern Region including Sikkim:

11.5.1 Central Sector Projects

- **NHPC Projects (Hydro)**

(i) Subansiri Lower HEP (8x250 = 2000 MW), Arunachal Pradesh

The project is located in the districts Lower Subansiri/Dhemaji in Arunachal Pradesh/Assamon river Subansiri. The project was Techno-Economically cleared by CEA on 13.01.2003. The CCEA clearance was accorded on 09.09.2003 for an estimated cost of Rs. 6285.33 crores with the schedule commissioning of the project in September, 2010. The design energy is 7421.59 Gwh. The anticipated cost of the project is Rs. 19992.43 crores at January-2020 price level.

The Project envisages construction of concrete gravity dam, horse shoe type head race tunnels, circular steel lined pressure shaft and surface power house having Francis turbine driven generating sets.

Major civil works have been awarded to M/s. BGS-SGS-Soma Joint Venture and Larsen & Toubro. Ltd. Chennai on 19.12.2003. E&M works has been awarded to Consortium of M/s Alstom Power Hydraulique, France and Alstom Projects India Ltd. New Delhi on 11.02.2005. Hydro-Mechanical Package awarded to Texmaco on 19.06.2006.

All work except safety works were stalled from December, 2011 to October, 2019 due to agitation launched by various activists against construction of Subansiri Lower HE Project and as perdirections of NGT. Works restarted w.e.f. 15.10.2019 after clearance from NGT. However, work initially remained suspended w.e.f. 24.03.2020 to 20.04.2020 due to COVID-19 lockdown and further got affected due to Monsoon Period from May 2020.

Power House Civil works package has been re-awarded to M/s Patel Engineering Ltd on 01.09.2020. The project is in advance stage of construction and likely to be to be commissioned in FY 2023-25 (Four units in FY 2023-24 and remaining four units in FY 2024-25).

(ii) Teesta-VI HEP (4x125=500 MW), Sikkim

The project is located in South Sikkim district of Sikkim state on river Teesta. The project was Techno-Economically cleared by CEA on 27.12.2006 to M/s Lanco Teesta Hydro Power Ltd (LTHPL), at an estimated cost of Rs 3283.08 Crs. The project envisages construction of 23.5m high Barrage, 2 nos. of HRT of 9.5m diameter and 11.8 Km long, 4 nos. Pressure shaft each of 5.40m dia and Power House to generate 2441 MU.

Major Civil works were awarded to M/s Lanco Infrastructure Ltd in March, 2007 and E&M works to M/s Alstom Projects, India in April, 2009. About 50% projects works were completed till March, 2014. Since April 2014, project was stalled due to financial crunch with the developer.

Accordingly, the Corporate Insolvency Resolution Process (CIRP) was initiated vide order dated 16.03.2018 of Hon'ble NCLT, Hyderabad Bench. In the Bidding process, NHPC emerged as successful bidder for acquisition of LTHPL. Subsequently, the investment proposal for an estimated cost of Rs 5748.04 crore (Jul'18 PL), which includes Bid amount of Rs 907 crore for acquisition of LTHPL; was approved by the CCEA on 08.03.2019 for investment, acquisition of M/s LTHPL and execution of balance works of Teesta-VI HE Project by NHPC.

Since Nov. 2013, project was stalled due to financial crunched with the developer. The project Lenders file application in court of Hon'ble National Company Law Tribunal (NCLT), on 24th April, 2018. Last hearing of NCLT held on 29.03.2019 and order pronounced on 9.04.2019. As per the order, IRP has been appointed. NHPC Ltd. submitted EOI on dated 08.07.2019 and was shortlisted under final list of Prospective Resolution Applicants on dated 23.08.2019. The Resolution Plan submitted by NHPC on 04.12.2019.

Regarding, tendering, LOT-I (Civil works of Barrage, Desilting Basins, SFT, Intake, Part of HRT-I & HRT-II and other associated structure) awarded to M/s. Jaypee Associate Ltd on 31.03.2020 and LOT-II (Civil works of Part of HRT-I & HRT-II, Surge shaft, Pressure shaft, Powerhouse, TRT & other associated structure) awarded to M/s. Patel Engineering Limited on 22.09.2021. HM works were awarded on 27.10.2020. EM works were awarded in several packages on 14.12.2020, 04.09.2020, 22.09.2020, 01.10.2020, 06.08.2021, 16.04.2021, 21.12.2020, and 28.08.2020. The Project is expected to be commissioned by August, 2026.

Lot-I balance Civil works (Diversion Channel, Coffer Dams, Dam, Spillway & Stilling Basin, Intake Structure, Desilting Channel, SFT, HRT, Surge Shaft, Pressure Shaft, Power House, TRC and other associated structures.) was awarded to to M/s PES Engg. Pvt. Ltd on 28.06.2021 and to M/s Andritz Hydro Pvt. Ltd. on 08.07.2021 respectively. The Project is expected to be commissioned by August 2024.

(iii) Rangit-IV HEP (3x40=120 MW), Sikkim

The project is located in West Sikkim district of Sikkim state on river Rangit. The project was Techno-Economically cleared by CEA on 06.07.2007 to M/s Jal Power Corp. Ltd (JPCL), at an estimated cost of Rs 726.16 Crs with the schedule commissioning of the project in January, 2012. The design energy is 513 Gwh. The project envisages construction of 44m high and 112.95m long Dam, 1 no. of HRT of 6.40m diameter and 6.453 Km long, Surge Shaft 16m dia and 57m height,1 no. Pressure shaft of 5.50m dia and 241m long.

Major Civil works were awarded to M/s Coastal Project Pvt. Ltd in Nov, 2007 and E&M works to M/s Andritz, India in Aug, 2009. About 50% projects works were completed till Oct, 2013.

(iv) Dibang Multipurpose Project (12x240= 2880MW)-Arunachal Pradesh:

The works have recently been awarded. The Project is expected to be commissioned by 2031-32.

11.5.2 Sector Projects

APGCL Project (Hydro)

Lower Kopili (2x55+2x2.5+1x5 = 120 MW)

The project is located in Dima Hasao & Karbi Anglong districts of Assam on Kopili river.

Concurrence of project was given by CEA on 24.5.2016 at an estimated cost of Rs. 1115.91 crore (at Januaray, 2015 PL). The design energy of project is 469.58 MU and scheduled to be commissioned in 48 months from Zero date. The project has been delayed as there was delay in getting the Stage-II Forest Clearance for handing over the forest land. The Forest department of Karbi Anglong handed over the Forest land to APGCL on 3rd July, 2021. The revised cost as estimated by developer is Rs. 1795 crore. The project achieved the financial closure and loan agreement has been signed with ADB on 30th December, 2020. The Civil and Hydro-mechanical packages was awarded to L&T Ltd. and agreement was signed on 21.8.2020. The Electro-mechanical packages was awarded to Andritz Hydro Pvt. Ltd. on 9.9.2021.

The project envisages construction of concrete gravity dam with 1 no. of HRT of 7.0m diameter and 3.64 Km long, Surge Shaft of Restricted Orifice type 25m dia, Pressure shaft of 6.10m dia and 451.20m length. One surface power house for two units of 55 MW with rated head of 114 meter and one Auxilary power house for remaining capacity of 10 MW (2x2.5=5 MW + 1x5 MW). Switchyard to main power house is at voltage level of 220 kV. The expected COD of the project is March, 2025.

11.5.3 Private Sector Projects

i) Bhasmey HEP (3x17=51 MW), Sikkim

The project is located in East Sikkim district of Sikkim state on river Rangpo/Teesta. The project was Techno-Economically cleared by CEA on 24.12.2008 to M/s Gati Infrastructure Pvt. Ltd (GIPL), at an estimated cost of Rs 408.50 Crs with the schedule commissioning of the project in June, 2012. The design energy is 244.10 Gwh. The revised cost of the project is Rs. 746.01 crores at Mar.-2018 price level. The project envisages construction of 42m high and 150m long Barrage, 1 no. of HRT of 5.0m diameter and 5.463 Km long, Surge Shaft 13m dia and 97.5m height, Pressure shaft of 3.4m dia and 465m length.

Major Civil works were awarded to M/s Simplex Infrastructure Ltd in April, 2010. About 30% projects works were completed till Aug., 2016. Since September, 2016, project was stalled due to financial crunch with the developer.

ii) Rangit-II HEP (2x33=66 MW), Sikkim

The project is located in West Sikkim district of Sikkim state on river Rimbi. The project was approved by State Govt. on 15.04.2008 to M/s Sikkim Hydro Power Ventures Ltd (SHPVL), at an estimated cost of Rs 496.44 Crs with the schedule commissioning of the project in the year 2017-18. The design energy is 272 GWh. The project envisages construction of 47m high and 145m long Dam, 1 no. of HRT of 2.9m diameter and 4.745 Km long, Surge Shaft 10m dia and 65.5m height,1 no. Pressure shaft of 1.7m dia and 592m long.

Major Civil works were awarded to M/s Coastal Project Pvt. Ltd in Dec, 2011 and E&M works to M/s Gammon India Ltd. in Mar., 2012. About 30% projects works were completed till Nov, 2017. Since Dec. 2017, project is stalled due to financial crunch with the developer. The project is in NCLT since 30th July, 2020.

iii) Panan HEP (4x75=300 MW), Sikkim

The project is located in North Sikkim district of Sikkim state on river Toling Chu/Rangyong Chu. The project was Techno-Economically cleared by CEA on 07.03.2011 to M/s Himgiri Hydro Energy Pvt. Ltd (HHEPL), at an estimated cost of Rs 1833.05 Crs with the schedule commissioning of the project in July, 2015. The design energy is 1147.82 GWh. The revised cost of the project is Rs. 2615.00 crores at 2018 price level. The project envisages construction of 115m high and 126m long Dam, 1 no. of HRT of 6.0m diameter and 9.549 Km long, Surge Shaft 15m dia and 102m height,2 nos. Pressure shaft of 3.4/2.4m dia and 707.40241m long.

Major Civil works were awarded to M/s Essar Project (India) Ltd in Feb, 2014 and E&M works yet to be awarded. About 5% projects works were completed till date.

Now, construction of bridge on Mantham Lake for accessibility of site is under construction with the help of State Govt of Sikkim. The project works are likely to start after construction of the bridge.

About 48 months will be required for completion of the project after restart of works.

11.10 Hydro Power Generation Performance

Hydro Power generation during the year 2022-23 (as on 31.03.2023) in the North Eastern Region was 7.14 BU against a target of 8.34 BU, which is about 14.39 % less.

11.11 R&M Schemes (Hydro) of North Eastern Region

Fourteen (14) existing hydro schemes of North Eastern Region with an aggregate installed capacity of 849 MW have been identified for R&M works to accrue a benefit of 538 MW. The R&M activities of eight (8) schemes have already been completed at an actual expenditure of about Rs. 259 Crores to accrue a benefit of 121 MW. The remaining six (6) schemes having an aggregate installed capacity of 490 MW are under various stages of implementation and are likely to accrue a benefit of 417 MW at an estimated cost of about Rs. 2051.06 Crores. The scheme-wise status of the R&M works of the hydro schemes of North Eastern Region as on 31.03.2023 is given hereunder:

A. Schemes Completed

S. No.	Name of Scheme, Agency, State	Installed Cap. (MW)	Actual cost (Rs. Crs.)	Benefits (MW)	Status
1.	Khandong, U-1, NEEPCO, Assam	1x25	0.62	25 (Res.)	U-1 Restoration works completed in 1991-92
2.	Gumti, TPGL, Tripura	3x5	17.50	-	R&M works completed in 1994-95
3.	Khandong, NEEPCO, Assam	2x25	3.35	-	R&M works completed in 2003-04
4.	Umium St.I, MePGCL, Meghalaya	4x9	84.21	36 (LE)	RM&LE works completed in 2002-03
5.	Loktak, NHPC, Manipur	3x30 (Derated)	17.88	15(Res.)	R&M works completed in 2011-12
6.	Umium St.II, MePGCL, Meghalaya	2x9	55.67	18(LE) + 2 (U)	R&M works completed in 2011-12
7.	Kopili, NEEPCO, Assam	2x50	50.92	-	R&M works completed in 2014-15
8.	Khandong, NEEPCO, Assam	1x25	29.18	25(LE)	R&M works completed in 2014-15
	Sub Total(A)	**359**	**259.33**	**121**	

B. Ongoing–Under Implementation

S. No.	Name of Scheme, Agency, State	Installed Cap. (MW)	Est. cost (Rs. Crs.)	Benefits (MW)	Status
9.	Khandong Power Station, NEEPCO, Assam	2x23	278.63	46(LE)	i. Tender for main Turbine- Generator package was floated and are under final stages of awarding the work. ii. Tender for civil works have also floated.
10.	Kopili Power Station, NEEPCO, Assam	4x50	1075.19	200(LE)	Order for Procurement/ Refurbishment of Underwater/ Turbine parts of Unit II, III and IV placed with Andritz. Refurbishment of underwater parts of unit U# III & IV completed. Refurbishment of underwater parts of remaining two units by AHPL is under progress.
11.	Kyrdemkulai (Umium St.III), MePGCL, Meghalaya	2x30	408	60(LE) + 6(U)	LOA issued on 12th January 2023 to M/s. Andritz Hydro Pvt. Ltd for E&M works. HM & Civil works - Under Tendering
12.	Gumti, TPGL, Tripura	3x5	15.65	-	DPR Cleared by CEA on 30.11.2018.
13.	Loktak, NHPC, Manipur	3x35	273.59	105 (LE)	**E&M:** Three out of four E&M Packages i.e. EM-2 (Bus Duct), EM-3 (EOT Crane) & EM-4 (DG Set) are awarded. **Civil:** Three out of five Civil packages have been awarded. Work under progress. **HM:** HM Package has been awarded and work is in progress.
14	Umiam-Umtru Stage-IV, MePGCL, Meghalaya	2x30	-	-	Tender Document for RLA Studies issued to shortlisted firms to submit their budgetary offer.
	Sub Total(B)	**490**	**2051.06**	**417**	
	Total(A+B)	**849**	**2,310.39**	**538**	

Abbreviations: MW – Mega Watt; Res. – Restoration; U – Uprating; LE – Life Extension

CHAPTER-12

HUMAN RESOURCE DEVELOPMENT

12.0 Training of Manpower in CEA

Human Resource is essential for carrying out any business or service by an organization and the same is required to be developed through technical, managerial and behavioral training. Keeping this in view, HRD Division of CEA has been organizing various training programmes in technical, managerial, IT, health and other areas to keep officers abreast of the latest technological developments as well as to bring about attitudinal changes. HRD Division has also been making efforts to keep stock of the infrastructure available for the development of human resources in the Power Sector.

12.1 Training Policy for Central Power Engineering Service (CPES) officers of CEA

Training Policy for technical Group A & B officers of CEA has been prepared and approved by CEA. The same has been sent to Ministry of Power. This policy broadly covers the various training needs for officers of all levels in CEA. The broad objectives of the Training Policy are as under: -

- To enable CPES officers of CEA to discharge their functions effectively.
- To provide practical exposure to the CPES officers in the area of construction and Operation & Maintenance (O&M) of various types of Power Plants as well as Transmission & Distribution facilities, Grid Operation, Tariff related issues, Power Market etc. which would enhance their technical competencies.
- To enable the officers to draw plans, advise and monitor Power Sector projects with the strong background knowledge/experience of the sector.
- To familiarize the officers with the best practices in the application of advanced technologies in Power Sector.
- To develop and enhance the capabilities in the CPES officers to deal with rapid developments and challenges encountered by the Power Sector from time to time.
- To enhance the managerial competencies of the officers to enable them to play a leading role in the Power Sector so that the management can channelize the expertise of CEA officers in an effective manner.

12.2 Induction Training programme

Training programme for exposure on general overview of Generation. Transmission System/Technology etc. for recently recruited 78 nos. ADs of CEA in two batches consisting of 40 ADs & 38 Assistant Directors respectively has been conducted in various Organization/Utilities like PGCIL, NTPC, POSOCO, CERC, BSES, TPDDL, IEX, PTC, NICE, BHEL .

12.3 Mid-Career/ Refresher Training Programmes

Mid-career Training of 48 Deputy Directors of CEA has been conducted at NPTI, Faridabad for enrichment of the existing knowledge with recent trends in Power Sector and to prepare the officers of CEA in leadership roles.

Various refresher training programmes for CEA officers were conducted at professional institutes of National and International repute like CBIP, IEEE, NAHRD, INCOLD, IEX, POSOCO, BIS, IEEE etc. The officers/officials were deputed for various in-service refresher/Domestic training programmes, technical courses, workshops, seminars, conferences etc. at above institutes. The Man-days for all refresher training programmes conducted during the financial year 2022-23 are 75.

12.4 Foreign Visits/Training programmes for CEA Officers

The CEA officers were deputed to the Foreign visits/ training programmes to give them exposure to technological trends in the developed countries. During the period of 2022-23, a total of 23 nos. officers of CEA at various levels visited foreign nations under 24 programme. The details of the foreign visits undertaken by the CEA officers is as follows:-

Sl. No	Purpose of the Visit	Name & Designation of the Officer	Country
1	Study Tour on "Financial Management in Utilities - Fostering Competition" to USA Knowledge Exchange tour to Germany European Offshore Wind Seminar & Study Tour' held in Germany and Denmark	Shri Ajay Telengonkar, Member (E&C)	Germany and Denmark
2	Indian Ministerial delegation to the 13th IRENA General Assembly	Shri Ajay Telengonkar, Member (E&C)	UAE
3	Study Tour on "Financial Management in Utilities - Fostering Competition" to USA Knowledge Exchange tour to Germany European Offshore Wind Seminar & Study Tour' held in Germany and Denmark	Shri Mangal Hembram,, PCE	Germany And Denmark
4	foreign deputation of the following Indian delegation to visit Bhutan in order to find appropriate way forward on some joint hydro-power projects currently under implementation in Bhutan in addition to review the current state of play in India's hydro-power cooperation with Bhutan	Shri Pradeep Kumar Shukla, Chief Engineer	Bhutan

5	Study Tour on "Financial Management in Utilities - Fostering Competition" to USA Knowledge Exchange tour to Germany European Offshore Wind Seminar & Study Tour' held in Germany and Denmark	Shri MM Dhakate, Chief Engineer	Germany And Denmark
6	India-Nepal 7th joint standing technical committee (JSTC) and 9th India-Nepal Joint Committee on Water Resources(JCWR)	Shri Shravan Kumar, Chief Engineer	Nepal
7	Nomination for participation in UNFCCC COP27	Shri Vijay Menghani, Chief Engineer	Egypt
8	Participation at Singapore for KOWEPO Arbitration Matter	Shri VK Singh, Chief Engineer	Singapore
9	Visit to Bhutan of the Eight-Member Inter Government Group(IGG) to discuss issues related to Punatsangchhu-I HEP	Shri Manoj Tripathi, Chief Engineer	Bhutan
10	Study Tour on Electricity Markets and Power System Modelling	Shri Indra Kumar Mehra, Director	Denmark
11	Energy Planning Course in the area of Energy under DFC Scholarship programme, Denmark Inspection of Gateway Panels Punatsangchhu-II	Shri Deepak Kumar, Director	Denmark
12	Programme on Power Trading at Nord Pool Academy, Norway Power Market Study Tour in London.	Ms Shivani Sharma, Director	London
13	Programme on Power Trading at Nord Pool Academy, Norway Power Market Study Tour in London.	Shri Subhro Paul, Director	London

14	Renewable Energy (RE) Integration in Power Systems	Shri Praveen Kamal Mishra, Director	Denmark
15	Study Tour on Power System Modelling	Ms Jyotsana Kapoor,Deputy, Director	Denmark
16	Study Tour on Power System Modelling	Shri Vikas Sachan Deputy, Director	Denmark
17	Study Tour on Power System Modelling	Shri Pranay Garg Deputy, Director	Denmark
18	Study Tour on Electricity Markets and Power System Modelling	Shri Jitendra Kumar Meena, Deputy Director	Denmark
19	Study Tour on Electricity Markets and Power System Modelling	Shri Ravi Shankar, Deputy Director	Denmark
20	Energy Planning Course in the area of Energy under DFC Scholarship programme, Denmark Inspection of Gateway Panels Punatsangchhu-II	Shri Pankaj Verma, Deputy Director	Denmark
21		Shri Reetesh Tiwari, Deputy Director	Denmark
22		Shri Grija Shankar Pati,Assistant Director	Denmark
23		Shri Sonam Srivastava,Assistant Director	Denmark
24	Study Tour on "Financial Market Derivatives and Battery Energy Storage System"	Shri Praveen Kumar Sahukari Deputy Director	Brussels and Norway

12.5 Training under Apprentice Act, 1961(Amendment rules 2015)

As per Apprentice Act 1961, (amendment rules 2015), Apprenticeship Training is being imparted at CEA to Graduate/Diploma Engineers. As per the requirement of the Board of Apprentice Training (BOAT), six modules namely Planning of Power sector, Thermal Power Projects, Hydroelectric Power Project, Power System Planning, Power Grid Operation and Power Distribution System were developed and the Apprenticeship Training is being imparted as per these modules. During the year 2022-23, 4 apprentice trainees have joined under the Apprentice Act 1961.The rate of monthly stipend for graduate and diploma Trainee are Rs 9000/ and Rs 8000/- respectively.

12.6 Summer Training/ Winter Training

During the financial year 2022-23, summer and winter training/internship been were given to 52 nos of students from reputed Institutes/Colleges in CEA.

12.7 In-house Presentations

In house presentations are arranged by various industries/organizations in CEA to keep CEA officers abreast of the latest technologies. During the year 2022-23, 10 technical presentations has been organized.

12.8 Recognition of Training Institutes

To fulfill its statutory duty under Section 73(g) of Electricity Act 2003 and Central Electricity Authority (measures relating to safety and electric Supply) Regulations 2010, CEA has been assessing the Power Sector training institutes for their evaluation in terms of infrastructure, utilization and quality of training programmes and facilitate CEA's accreditation for them in line with the CEA Guidelines for Recognition for Training Institutes for Power Sector. CEA has been advising /recommending various measures to the training institutes/Power Sector organizations for improvement in the training infrastructure and methodologies for enhancing the skills and productivity of the personnel.

- During the period 2022-23, the following 28 nos. training institutes/Centers were visited and assessed for recognition:-

S.No	Name of the Institute
1	Chennai Power and Desalination Training Institute (CPDIT) Chennai.
2	Thermal Training. Institute & Research Centre, Vallur , NCTPS, Chennai
3	MERC Training Academy , Kolathur, Chennai
4	STEAG (erstwhile Evonik) Power Plant Learning Centre, Noida.
5	Gujarat Energy Training & Research Institute, Vadodara, Gujarat.
6	GMR Energy Development Center, Odisha.
7	Central Power Training Institute, Rourkela, Odisha.
8	EDC-PGCIL, Hyderabad (T. S.), Telangana.
9	OHPC Training Centre, Bhubaneswar, Odisha.
10	RLI (Regional Learning Institute),VindhyaNagar, Madhya Pradesh.
11	Power Plant Training Simulator Centre (WBPDCL), Bakreswar, West Bengal.
12	Training Institute Wanakbori (GTI), Gujarat.
13	Power Generation Training Institute (PGTI), Korba- East, Chhattisgarh.
14	Rosa Learning & Development Centre, Shahjahanpur, Uttar Pradesh.
15	Regional Training Center, MSETCL, Chandrapur, Maharashtra.
16	Essar Power Learning Centre, Devbhumi, Gujarat.
17	Distribution Training Institute, CESC, Kolkata.
18	TTI, PSPCL, Patiala.
19	Central Training Institute, Nayagaon, Jabalpur, Madhya Pradesh.
20	REC Institute of Power Management & Training, Hyderabad, Telangana.
21	Distribution Operations & Safety Excellence Centre (DOSEC), New Delhi.
22	TPSDI, Jojobera, Jamshedpur, Jharkhand
23	Nabha Technical Training Institute (NTTI), Rajpura, Patiala.

24	BSES Yamuna Training Centre, New Delhi.
25	NPTI, Faridabad, Haryana.
26	Regional Training Center, Waluj, Aurangabad, EHV CC,O&M Zone Aurangabad
27	Regional Training Center, MSETCL, Babhaleshwar,, Maharashtra
28	BSES Rajdhani Training Centre, New Delhi

12.9 Revision of guidelines for recognition of Training institute in Power Sector.

Trained Manpower is an essential prerequisite for the rapid development of all areas of the power sector. The trained manpower comprises of skilled engineers, supervisors, managers, technicians and operators.

With rapidly advancing technology Skill manpower needs to be regularly upgraded through training. Hon'ble Minister of Power has directed HRD Division, CEA to review the Guidelines for Recognition of training institutes for power sector. Accordingly HRD Division has taken up for revision of existing guidelines issued in 2019 to make it more stringent in order to improve the quality training.

ANNEXURES

Annexure-3A

Details of Inter-regional Transmission lines as on 31.03.2023

	Transmission Capacity in MW
EAST-NORTH	
Dehri-Sahupuri 220 kV S/c	130
Muzaffarpur-Gorakhpur 400 kV D/c (with Series Cap+TCSC)	2,000
Patna – Balia 400kV D/c (Quad)	1,600
Biharshariff – Balia 400kV D/c(Quad)	1,600
Barh – Balia 400kV D/c (Quad)	1,600
Gaya - Balia 765kV S/c	2,100
Sasaram-Allahabad/Varanasi 400kV D/C line (Sasaram HVDC back to back has been bypassed)	1,000
Sasaram - Fatehpur 765kV2x S/c	4,200
Barh-II-Gorakhpur 400kV D/c (Quad) line	1,600
Gaya-Varanasi 765 kV S/c line	2,100
LILO of Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole at new pooling station in Alipurduar and addition of second 3000 MW module	3,000
Biharsharif-Varanasi 400kV D/c line (Quad)	1,600
Sub-total	**22,530**
EAST-WEST	
Budhipadar-Korba 220 kV 3 ckts.	390
Rourkela-Raipur 400 kV D/c with series comp.+TCSC	1,400

Ranchi –Sipat 400 kV D/c with series comp.	1,200
Rourkela-Raipur 400 kV D/c (2nd) with series comp.	1,400
Ranchi - Dharamjayagarh - WR Pooiling Station 765kV S/c line	2,100
Ranchi - Dharamjaygarh 765kV 2nd S/c	2,100
Jharsuguda-Dharamjaygarh 765kV D/c line	4,200
Jharsuguda-Dharamjaygarh 765kV 2nd D/c line	4,200
Jharsuguda- Raipur 765kV D/c line	4,200
Sub-total	**21,190**
WEST- NORTH	
Auriya-Malanpur 220 KV D/c	260
Kota - Ujjain 220 KV D/c	260
Vindhyachal HVDC back-to-back	500
Gwalier-Agra 765 kV 2 x S/c	4,200
Zerda-Kankroli 400kV D/c	1,000
Champa Pool- Kurukshetra HVDC Bipole	3,000
Gwalior-Jaipur 765kV 2xS/c lines	4,200
RAPP-Sujalpur 400kV D/c	1,000
Adani(Mundra) - Mahendranagar HVDC bipole	2,500
Upgradation of Champa Pool- Kurukshetra HVDC Bipole	3,000
Jabalpur - Orai 765kV D/c line	4,200
LILO of Satna - Gwalior 765kV 2xS/c line at Orai	4,200
Banaskantha-Chittorgarh 765kV D/c line	4,200
Vindhyachal-Varanasi 765kV D/c line	4,200
Sub-total	**36,720**
EAST- SOUTH	
Balimela-Upper Sileru 220kV S/c	130
Gazuwaka HVDC back-to-back	1,000

Talcher-Kolar HVDC bipole	2,000
Upgradation of Talcher-Kolar HVDC Bipole	500
Angul - Srikakulum	4,200
Sub-total	**7,830**
WEST- SOUTH	
Chandrapur HVDC back-to-back	1,000
Kolhapur-Belgaum 220kV D/c	260
Ponda – Nagajhari 220kV D/c	260
Raichur - Sholapur 765kV S/c line (PG)	2,100
Raichur - Sholapur 765kV S/c line (Pvt. Sector)	2,100
Narendra - Kolhapur 765kV D/c (ch at 400kV)	2,200
Wardha - Hyderabad 765kV D/c line(Part of Wardha – Nizamabad line)	4,200
Raigarh –Pugalur HVDC line with with Raigarh and Pugalur Station HVDC Terminal (Pole-I , Pole-II ,Pole-III and Pole-IV each 1500 MW charged)	6,000
Sub-total	**18,120**
EAST- NORTH EAST	
Birpara-Salakati 220kV D/c	260
Malda - Bongaigaon 400 kV D/c	1,000
Siliguri - Bongaigaon 400 kV D/c (Quad) line	1,600
Sub-total	**2,860**
NORTH EAST-NORTH	
Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole$	3,000
Sub-total	**3,000**
TOTAL (CUMULATIVE)	**112,250**

Annexure – 3B

Names of the Schemes notified through Tariff Based Competitive Bidding (TBCB) as on 31.03.2023

a) Schemes already commissioned/ready for commissioning by Transmission Service Providers: (44 Nos.)

1. Transmission system associated with IPPs of Nagapattinam / Cuddalore Area- Package A
2. Transmission system for Strengthening in SR for Import of Power from ER.
3. ATS of Unchahar TPS
4. NR System strengthening Scheme- NRSS-XXXI(Part-A)
5. Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-A)
6. Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-B)
7. Transmission System Strengthening associated with Vindhyachal – V
8. Strengthening of Transmission system beyond Vemagiri
9. Transmission system associated with LTA applications from Rajasthan SEZ Part-A
10. New WR-NR 765 kV Inter- Regional Corridor
11. Transmission system associated with LTA applications from Rajasthan SEZ Part-B
12. Transmission system associated with LTA applications from Rajasthan SEZ Part-C
13. System Strengthening Scheme in Eastern Region ERSS XXI
14. System strengthening for WR
15. System strengthening common for WR and NR
16. Scheme for enabling import of NER/ER surplus by NR
17. Part ATS for RAPP U-7&8 in Rajasthan
18. Eastern Region System Strengthening Scheme-VII
19. Northern Regional System Strengthening Scheme, NRSS-XXIX
20. Connectivity lines for Maheshwaram 765/400 kV S/S

21. Common Transmission system for phase-II generation projects in Orissa and immediate evacuation system for OPGC project (Orissa)
22. Creation of new 400 kV GIS substations in Gurgaon area and Palwal as a part of ISTS
23. NER System Strengthening Scheme II
24. Connectivity system for Khargone TPP (2x660MW)

25. Eastern Region System Strengthening Scheme-VI
26. Northern Region System Strengthening Scheme, NRSS-XXXI (Part-B)
27. Western Region System Strengthening – II under Project – B (Maharashtra)
28. Western Region System Strengthening – II under Project – C (Gujarat)
29. Additional system strengthening for Sipat STPS
30. Additional system strengthening for Chhattisgarh (B)
31. System strengthening for IPPs in Chhattisgarh and other generation projects in western region
32. Transmission System for Ultra Mega Solar Park in Fatehgarh, Distt. Jaisalmer Rajasthan
33. Transmission System Associated with LTA applications from Rajasthan SEZ Part-D
34. Transmission System required for evacuation of power from Kudgi TPS (3x800 MW in Phase-I) of NTPC Ltd.
35. Transmission System for Patran 400kV S/S
36. Krishnapattnam UMPP- Synchronous interconnection between SR and WR (Part-B)
37. Transmission system strengthening in Indian system for transfer of power from new HEP's in Butan
38. North Eastern Region Strengthening Scheme (NERSS-VI)
39. Transmission System for Western Region Strengthening Scheme – 21 (WRSS – 21) Part – A – Transmission System Strengthening for Relieving Over Loadings Observed in Gujarat Intra-State System Due to Re-injections in Bhuj PS
40. Transmission System for Transmission System Associated with RE Generations at Bhuj-II, Dwarka & Lakadia
41. Transmission System for Jam Khambaliya Pooling Station and Interconnection of Jam Khambaliya Pooling Station for Providing Connectivity to RE Projects (1500 MW) in Dwarka (Gujarat) and Installation of 400/220 kV ICT along with Associated Bays at CGPL Switchyard
42. WRSS – 21 Part – B – Transmission System Strengthening for Relieving Over Loadings Observed in Gujarat Intra-State System Due to Reinjections in Bhuj PS
43. 765 kV System Strengthening Scheme in Eastern Region. ERSSXVIII
44. Transmission System for providing connectivity to RE Projects at Bhuj-II (2000 MW) in Gujarat

b) Schemes under implementation by the Transmission Service Providers: (33 Nos.)

1. Transmission system associated with LTA applications from Rajasthan SEZ Part-A, Phase-II
2. Transmission system associated with LTA applications from Rajasthan SEZ Part-F, Phase-II
3. Transmission system associated with LTA applications from Rajasthan SEZ Part-B, Phase-II
4. Transmission system associated with LTA applications from Rajasthan SEZ Part-C, Phase-II
5. Transmission system associated with LTA applications from Rajasthan SEZ Part-D, Phase-II
6. Transmission system associated with LTA applications from Rajasthan SEZ Part-G, Phase-II
7. Transmission system for evacuation of power from Neemuch Solar Park (1000 MW)
8. System Strengthening Scheme for Eastern and North Eastern Region
9. Additional 400kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool
10. Transmission System for 400 kV Udupi (UPCL) – Kasargode D/C Line
11. Western Region Strengthening Scheme-XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme-IX (NERSS-IX)
12. Transmission System for evacuation of power from Pakaldul HEP in Chenab Valley HEPs – Connectivity System
13. Additional inter regional AC link for import into southern region i.e Warora-Warangal and Chilakaluripeta – Hyderabad – Kurnool 765 kV link
14. System strengthening in northern region (NRSS XXXVI) along with LILO of Sikar-Neemrana 400 kV D/C line at Babai(RVPNL)
15. Immediate evacuation for North Karanpura (3x660MW) generation project of NTPC(ERSS XIX)
16. Transmission scheme for evacuation of 3GW RE injection at Khavda P.S. under Phase-I
17. Establishment of new 220/132kV substation at Nangalbibra.
18. Evacuation of Power from RE Sources in Koppal Wind Energy Zone (Karnataka) (2500 MW)
19. Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra.
20. Transmission Scheme for Solar Energy Zone in Gadag (1000 MW), Karnataka – Part-A, Phase-I
21. Transmission System for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh
22. Evacuation of Power from RE Sources in Karur/ Tiruppur Wind Energy Zone. (Tamil Nadu) (2500 MW)
23. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part A, Gujarat.
24. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part B, Gujarat.
25. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part C, Gujarat.
26. Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park
27. Establishment of Khavda Pooling Station-3 (KPS3) in Khavda RE Park
28. Transmission Network Expansion in Gujarat associated with integration of RE projects from Khavda potential RE zone
29. Transmission System Strengthening Scheme for Evacuation of Power from Solar Energy Zones in Rajasthan (8.1GW) under Phase-II Part-E.
30. Western Region Expansion Scheme-XXVII (WRES-XXVII)

31. Western Region Expansion Scheme-XXVIII (WRES-XXVIII) and Western Region Expansion Scheme-XXIX (WRES-XXIX)
32. ISTS network expansion scheme in Western Region & Southern Region for export of surplus power during high RE scenario in Southern Region
33. Inter-regional ER-WR interconnection

c) Schemes under bidding process by Bid Process Coordinators: (15 Nos.)

1. Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka.
2. Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh.
3. Transmission system for evacuation of power from Chhatarpur SEZ (1500 MW)
4. Transmission scheme for injection beyond 3 GW RE power at Khavda PS1 (KPS1)
5. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part A1
6. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part A3
7. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part B1
8. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part C1
9. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part D
10. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part F
11. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part G
12. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part H
13. Creation of 400/220 kV, 2x315 MVA S/S at Siot, Jammu & Kashmir.
14. Transmission system for evacuation of power from Luhri Stage-I HEP
15. North Eastern Region Expansion Scheme-XVI (NERES-XVI)

Annexure – 3 C

Issues Pertaining to Transmission System Planning taken up with the National Committee on Transmission during 2022-23

09th meeting of National Committee on Transmission held on 28.09.2022

1. Augmentation of ISTS for interconnection of HVPNL transmission schemes
2. Scheme to relieve high loading of WR-NR Inter Regional Corridor (400 kV Bhinmal Zerda line)
3. Eastern Region Expansion Scheme-XXIX (ERES-XXIX)
4. Augmentation of transformation capacity at Kallam PS by 2x500 MVA, 400/220 kV ICTs (3rd & 4th) along with 220 kV bays for RE interconnection
5. Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-1) (Bikaner Complex)
6. Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under Phase-III Part I
7. Augmentation of 1x1500MVA ICT at 765/400 kV Kanpur (GIS) substation (Part of Transformer augmentation at various substations for evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part J)
8. North Eastern Region Expansion Scheme-XVI (NERES-XVI)
9. Modification of scope under Western Region Expansion Scheme-XXV (WRES-XXV) scheme on account of space constraints at Raigarh (Kotra) S/s
10. Modification of future space provision in "Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park" scheme
11. Modification of future space provision in Transmission system for evacuation of power from Chhatarpur SEZ (1500MW) scheme
12. Transmission System for Evacuation of Power from RE Projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh
13. Resumption of bidding process of transmission schemes at Bidar and Ananthapuram
14. Supply and Installation of OPGW on existing main lines which are to be LILOed under various transmission schemes

10th meeting of National Committee on Transmission held on 07.11.2022

1. Transmission System for Evacuation of Power from RE Projects in Rajgarh (1000 MW) SEZ in Madhya Pradesh - Phase-II

2. Future space provision in Transmission system for evacuation of power from Chhatarpur SEZ (1500 MW) scheme
3. Modification in notified Transmission schemes "Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park" & "Transmission scheme for injection beyond 3 GW RE power at Khavda PS1"
4. Resumption of bidding process of transmission schemes at Bidar, Ananthapuram and Kurnool
5. Requirement of additional space (Future provision) for ICTs/bays at RE pooling station planned in Rajasthan Phase-III scheme (20 GW)
6. Requirement of additional space (Future provision) for ICTs/bays at RE pooling station planned in Kurnool, Ananthapur & Bidar REZs

11th meeting of National Committee on Transmission held on 28.12.2022 & 17.01.2023

1. Transmission System for Evacuation of Power from RE Projects in Rajgarh 1000 MW Solar Energy Zone (SEZ) in Madhya Pradesh - Phase-II
2. Transmission system for evacuation of additional 7 GW RE power from Khavda RE park under Phase-III
3. Transmission scheme for injection beyond 3 GW RE power at Khavda PS2 (KPS2)
4. Transmission scheme for evacuation of power from Dhule 2 GW REZ
5. Scheme for drawal of 4000 MW power by MPSEZ UTILITIES LIMITED (MUL)
6. Western Region Expansion Scheme XXXIII (WRES-XXXIII): Part A
7. Western Region Expansion Scheme XXXIII (WRES-XXXIII): Part B
8. Western Region Expansion Scheme XXXIII (WRES-XXXIII): Part C
9. Approval of various transmission elements at 400/220 kV Bikaner-II PS by CTUIL
10. Transmission system for evacuation of power from Shongtong Karcham HEP (450 MW) and Tidong HEP (150 MW)
11. Additional 1x500 MVA 400/220 kV (9th) ICT, for injection from any additional RE project (other than 4000 MW injection under SECI bids upto Tranche IV) at Bhuj PS
12. Urgent requirement of KPS1 Augmentation and KPS2 / KPS3 establishment schemes

13. Change in scope of the "Transmission scheme for evacuation of 4.5 GW RE Injection at Khavda PS under Phase-II- Part B"
14. Modifications in the scheme “Transmission scheme for evacuation of 4.5 GW RE injection at Khavda PS under Phase II- Part D”
15. Modification in scope of work of “Transmission Network Expansion in Gujarat to increase ATC from ISTS: Part C” scheme
16. Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under Phase-III Part C3 and E3
17. OPGW installation on existing 400 kV Jallandhar (PG) – Kurukshetra (PG) line which is to be LILOed at 400 kV Dhanansu (PSTCL)
18. OPGW installation on existing 400 kV Koldam (Indigrid) – Ludhiana (PG) line which is to be LILOed at 400 kV Ropar (PSTCL)
19. OPGW installation on existing 400 kV Kota – Merta line which is to be LILOed at 765/400 kV Beawar (ISTS) S/s
20. OPGW replacement on existing 400 kV Agra – Ballabhgarh
21. OPGW replacement on existing 400 kV Kishenpur – Wagoora line
22. Redundant communication System for Bhinmal (PG) and Kankroli (PG) ISTS stations
23. OPGW installation on 220 kV Anta (NTPC) - Bhilwara Line
24. Evaluation of functioning of National Grid
25. Comprehensive presentation by CTU apprising NCT of measures taken for ensuring development of an efficient, co-ordinated and economical ISTS for smooth flow of electricity

12th meeting of National Committee on Transmission held on 24.03.2023

1. Implementation timeframe for Inter State Transmission System (ISTS) projects
2. Implementation Modalities for Reconductoring works
3. Transmission system for evacuation of power from Rajasthan REZ Ph-IV (Part-2: 7.5 GW) (Jaisalmer/Barmer Complex)
4. Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-IV (7 GW)
5. Transmission System for Evacuation of Power from potential renewable energy zone in Khavda area of Gujarat under Phase-V (8 GW)
6. Provision of Dynamic Reactive Compensation at KPS1, KPS3 and Navsari (New) Substations
7. Transmission scheme for evacuation of power from Neemuch/Mandsaur 2 GW WEZ

8. Transmission System for Evacuation of Power from RE Projects in Rajgarh 1000 MW SEZ in Madhya Pradesh - Phase-II
9. Transmission System for Evacuation of Power from RE Projects in Solapur (1500 MW) SEZ in Maharashtra
10. Transmission scheme for injection beyond 3 GW RE power at Khavda PS2 (KPS2)
11. Eastern Region Expansion Scheme-XXXIV (ERES-XXXIV)
12. Modifications in Transmission system for evacuation of power from REZ in Rajasthan (20 GW) under Phase-III Part I
13. Transmission scheme for drawal of 4000 MW power by MPSEZ Utilities Limited (MUL)
14. ERES-XXIX - variation in NCT cost and DPR cost estimate
15. Updation/Modification in the transmission scheme “Transmission system for Evacuation of power from REZ in Rajasthan (20GW) under Phase-III Part-C1”
16. Updation/Modification in the transmission scheme “Transmission system for Evacuation of power from REZ in Rajasthan (20 GW) under Phase-III Part-C1, Part F”
17. Transmission system for evacuation of power from Shongtong Karcham HEP (450 MW) and Tidong HEP (150 MW)

Annexure-3D

Transmission Lines Completed During FY- 2022-23

As on 31-Mar-2023

Voltage Level (kV)	Name of Transmission Lines	Circuit Type	Executing Agency	Line Length (cKM)	Month of Completion
1.	**2.**	**3.**	**4.**	**5.**	**6.**
765 kV					
CENTRAL SECTOR					
1	Reconfiguration of BhujPS- Lakadia PS as to establish Bhuj-II-Lakadia line as well as Bhuj-II-Bhuj-II line	D/C	PGCIL	106	JUN-22
2	Lakadia PS -Bhuj II line (A portion of Reconfiguration of Bhuj PS - Lakadia PS Bhuj-II-Lakadia (Bhuj-Bhuj II) (Loop out portion)	D/C	PGCIL	106	JUL-22
3	LILO of 765kV Gr. Noida (765kV)- Hapur(765) line at Meerut	S/C	PGCIL	70	MAR-23
Total of CENTRAL SECTOR				**282**	
PRIVATE SECTOR					
4	Dharamjaygarh Pool section B - Raigarh (Tamnar) Pool line (G-TTPL-TBCB)	D/C	SGL	137	JUN-22
5	Lakadia PS - Banaskantha PS	D/C	APL	351	JUL-22
6	Bhuj PS - Lakadia PS	D/C	APL	215	OCT-22

7	Lakadia - Vadodara Transmission line	D/C	SGL	670	JAN-23
Total of PRIVATE SECTOR				**1373**	
Total of 765 kV				**1655**	
400 kV					
CENTRAL SECTOR					
8	LILO of Kishanganj (POWERGRID) - Darbhanga (DMTCL) (QUAD) line at Saharsa (New)	D/C	PGCIL	78	APR-22
9	Rampur -Sambhal line	D/C	PGCIL	149	JUL-22
10	Re-conductoring of Maithon RB - Maithon line	D/C	PGCIL	63	JUL-22
11	Jeerat (New) - Subhasgram (PM-JTL-TBCB)	D/C	PGCIL	214	AUG-22
12	Bina - Guna line	D/C	PGCIL	214	SEP-22
13	Diversion of Dhauliganga - Bareilly 400 kV D/C line (operated at 220kV) at Bareilly end from Bareilly (UP) to Bareilly (PG) line (one ckt charged)	D/C	PGCIL	8	NOV-22
14	LILO of both ckt.of 400 kV D/C Dhauliganga - Bareilly (PG) line at Jauljivi (2 Ckts charged)	D/C	PGCIL	3	NOV-22
15	Diversion of Dhauliganga -Bareilly 400kV D/C (operated at 220kV) at Bareilly end from Bareilly to Bareilly (PG) line (balance one Ckt Charged)	D/C	PGCIL	8	DEC-22
16	LILO of both Ckt. of 400kV D/C Dhauliganga -Bareilly (PG) line at Jaulijvi (Balance 2 Ckts Charged)	D/C	PGCIL	3	DEC-22
17	Re-conductring of the NP Kunta-Kolar (Twin Moose) section with high capacity conductors (like twin HTLS equivalent or QM)	S/C	PGCIL	131	DEC-22
18	NTPC Limited -Bhadla-II (On D/C Tower)	S/C	NTPC Ltd.	25	FEB-23
19	NTPC ltd 300MW Power Plant -Common (PS) of NTPCs 250MW and 300MW Solar Project	S/C	NTPC Ltd.	1	FEB-23
20	Lower Subhansiri - Biswanath Chariyali line -I	D/C	PGCIL	354	FEB-23
21	LILO of 400kV Bareilly (PGCIL) - Moradabad line (Ckt-1) at Rampur	D/C	PGCIL	5	MAR-23

	s/s (under Mohanlalgani Intrastate Project)				
22	Mohindergarh - Bhiwani line	D/C	PGCIL	122	MAR-23
23	Reconducting of Kolhapur (PG)- Kolhapur (MSETCL) (Ckt-1) under TS Strengthening beyond Kolhapur for export of power from Solar and Wind Energy Zones in Southern Region	D/C	PGCIL	40	MAR-23
24	Simbhavali -Meerut line	D/C	PGCIL	57	MAR-23
Total of CENTRAL SECTOR				**1475**	
STATE SECTOR					
25	LILO of Nabinagar -II - Patna (PG) at Jakkanpur (New)	D/C	BSPTCL	33	APR-22
26	Indore (PGCIL) - Ujjian (GEC-I)	DCDS	MPPTCL	91	MAY-22
27	Badaun-Sambhal Line	D/C	UPPTCL	90	MAY-22
28	Gokarna - New Chanditala	D/C	WBSETCL	360	MAY-22
29	Hadala-Shapar line with (Twin AL-59) conductor	D/C	GETCO	129	JUN-22
30	Ashta (400kV)- Ujjain (400kV) line	DCDS	MPPTCL	180	JUN-22
31	LILO of Karad - Lonikand at Jejuri	D/C	MSETCL	22	NOV-22
32	Varanasi (PG)-Jaunpur Line	D/C	UPPTCL	145	NOV-22
33	LILO of one ckt of Khandwa (PGCIL) - Rajgarh (PGCIL) at Chhegaon	DCDS	MPPTCL	3	DEC-22
34	Yadadri TPP switchyard - Damaracherla S/S	D/C	TSTRANSCO	10	DEC-22
35	LILO of 400kV HNPCL- Kamavarapukota TMDC line to proposed 400/220/11 kV Guddigudem S/S	D/C	APTRANSCO	41	JAN-23
36	Lahal GISS - Chamera (PS) (Both Ckts.)	D/C	HPPTCL	71	JAN-23
37	Bus Extn. from Old Switchyard - New Switchyard for evacuation arrangement for 1x660MW Generation of Bhusawal	D/C	MSETCL	1	JAN-23
38	Various DTLs from Solar Park-Pavagada (PS)	D/C	KSPDCL	87	FEB-23
39	Kalaburagi (Ferozabad) MC tower of 400kV YTPS -BPS line near Merched Village at Kalaburagi	D/C	KPTCL	234	MAR-23

40	Kamuthi - Newly constructed Ottapidara	D/C	TANTRANSCO	143	MAR-23
41	Manali - Pulianthoppe	D/C	TANTRANSCO	19	MAR-23
42	LILO of both circuits of 400kV Khammam - Mamidipally to Choutuppal S/S	D/C	TSTRANSCO	33	MAR-23
Total of STATE SECTOR				**1692**	
PRIVATE SECTOR					
43	Extn. ofESSAR-Lakadia/Bhachau (Tripple snow bird) line upto Jamkhambaliya PS	D/C	APL	37	APR-22
44	Jaunpur -Obra (Twin)	D/C	APL	334	JUN-22
45	LILO of 2nd Ckts. of Zebra -Ranchodpura 400 kV D/C line at Banaskantha (PG) PS	D/C	SGL	35	JUL-22
46	LILO of Bhachau - EPGL (Tiple) line at Lakadia PS	D/C	APL	77	SEP-22
47	North Karanpura - Chandwa (Jharkhand) NKSTPP line (NKTL - TBCB)	M/C	APL	26	OCT-22
48	North Karanpura - Chandwa (Jharkhand) PS line (NKTL -TBCB)	D/C	APL	50	OCT-22
49	Adani Generation Switchyar-Fatehgarh (PS)	D/C	AREPRL	1	FEB-23
50	Avaada Energy Private Limited -Bikaner (PS)	S/C	AVAADA	14	FEB-23
51	Ayana Renewable Power One Pvt. Ltd. Plant- Bikaner (PS)	S/C	AYANA	10	FEB-23
52	Ayana Renewable Power Three Power Plant Common (PS) of Ayana Renewable Power One and Three Pvt. Ltd. -Bikaner (PS)	S/C	AYANA	1	FEB-23
53	Common Pooling Point of both Azure Bikaner 500MW Plants -Bikaner	S/C	AZURE	3	FEB-23
54	RENEW (Jharkhand Four) PowerPlant- Common (PS) of RENEW (Jharkhand Four) -Bikaner (PS)	S/C	RENEWSOLARENERGY	13	FEB-23
55	ReNew Solar Power Plant Switchyard -Bikaner	S/C	RENEWSOLARPOWER	4	FEB-23
Total of PRIVATE SECTOR				**605**	
Total of 400 kV				**3772**	

230 kV					
CENTRAL SECTOR					
56	NTPC ltd -Tuticorin-II (GIS)	S/C	NTPC Ltd.	18	FEB-23
Total of CENTRAL SECTOR				**18**	
STATE SECTOR					
57	Vellalavidhuthi 400 kV SS - Nemmeli Thippayakudy 230 kV SS	S/C	TANTRANSCO	23	APR-22
58	Sembatty-Checkanurani	S/C on D/C	TANTRANSCO	16	JUN-22
59	Ingur - Arasur (PGCIL)	S/C	TANTRANSCO	54	OCT-22
60	RA Puram-Mylapore Feeder UG Cable	S/C	TANTRANSCO	4	OCT-22
61	230 kV D/C line on tower with Zebra conductor for rerouting the existing 230kV PUSHEP - Arasur and Shenbagapudur- arasur feeders in between loc. 306-309	D/C	TANTRANSCO	2	DEC-22
62	Basin Bride - Pulianthope (UG Cable)	S/C	TANTRANSCO	1	FEB-23
63	Extn. of new EGT supply Laying of 230kV XLPE AI UG cable for a route length of 1Km from CTT tower - Metering point inside consumer premises	S/C	TANTRANSCO	1	FEB-23
64	Tondiarpet SS to Pulianthope GIS SS (UG Cable)	D/C	TANTRANSCO	5	FEB-23
65	Vellalaviduthi 400 kV SS - Thuvakudy 230 kV SS	S/C	TANTRANSCO	48	FEB-23
66	LILO of Existing Paramathi - Alundur at Valayapatty	D/C	TANTRANSCO	60	MAR-23
67	LILO of T. Sipcot -Savasapuram 230kV Feeder - the Ottapidaram	D/C	TANTRANSCO	12	MAR-23
Total of STATE SECTOR				**226**	
PRIVATE SECTOR					
68	Betam Wind Energy-Tuticorin-II	S/C	BWEPL	18	FEB-23
69	Green Infra Renewable- Tuticorin-II	S/C	GREENINFRA	35	FEB-23
70	GRT Jewllers (India) Private Limited-Tuticorin-II (GIS)	S/C	GRT	7	FEB-23

71	JSW Future Energy Ltd-Tuticorin-II	S/C	JSWFuture	23	FEB-23
72	Mytrah Wind Farms-Tirunelveli (PS)	D/C	MYTRAH	16	FEB-23
73	Orange Sironj - Tuticorin-II	S/C	ORANGE	29	FEB-23
74	Sprng Renewable-Pugalur	S/C	SPRNG	4	FEB-23
Total of PRIVATE SECTOR				**132**	
Total of 230 kV				**376**	
220 kV					
CENTRAL SECTOR					
75	MTPS - Ramgarh (Bypassing Gola SS)	S/C	DVC	211	JUN-22
76	MTPS- Ranchi (PG) (Bypassing Gola SS)	S/C	DVC	232	JUN-22
77	Guna-Shivpuri line	D/C	PGCIL	203	AUG-22
78	Parulia - Burdwan line	D/C	DVC	207	SEP-22
79	Bhind -Morena line	D/C	PGCIL	109	SEP-22
80	Guna - Guna line	D/C	PGCIL	53	SEP-22
81	Disconnection of 220 kV LILO arrangement of Dhauliganga - Bareilly at Pithoragarh and connecting it to Jauljivi (one ckt charged	D/C	PGCIL	24	NOV-22
82	Disconnection of 220kv LILO arrangement of Dhauliganga -Bareilly at Pithoragarh and connecting it to Jaulivi (balance one Ckt. charged)	D/C	PGCIL	24	DEC-22
83	UT Chandigarh s/s -Punchkula (PG) s/s line under establishment of 220kV GIS at UT Chandigarh along with 220 kV D/C line from Chandigarh GIS to 400/220kV Punchkula (PG) s/s (Only Ckt.-1)	D/C	PGCIL	24	JAN-23
84	NTPC Ltd 300MW Power Plant-Bhadla-II (PS)	S/C	NTPC Ltd.	19	FEB-23
85	NTPC Ltd (90MW) Power Plant -Common (PS) of NTPCs (150MW) and (90MW) Solar Project at Devikoot-Fatehgarh-II (PS)	S/C	NTPC Ltd.	2	FEB-23
86	Solar Project at Devikoot(150MW) -Fatehgharh-II (PS)	S/C	NTPC Ltd.	2	FEB-23

87	Re-conducting of Alipurduar - Solakati 220kV line with Single GTLS conductor under NERSS-XII	D/C	PGCIL	202	MAR-23
88	UT Chandigarh S/s - Panchkula (PG) s/s line under Establishment of 220/22 kV GIS at UT Chandigarh along with 220 kV D/C line from Chandigarh GIS-400/220 kV Panchkula (PG) s/s (Ckts-II)	D/C	PGCIL	24	MAR-23
89	(Assam) Rangia - Amingaon line	D/C	PGCONSULTANCY	198	MAR-23
90	(Assam) Tinsukia - Behiating (new Dibrugarh)	D/C	PGCONSULTANCY	336	MAR-23
91	(Nagaland) New Kohima - Mokokchung (PG)	D/C	PGCONSULTANCY	276	MAR-23
92	(Sikkim) Rangpo (PG) - Samardong	D/C	PGCONSULTANCY	5	MAR-23
Total of CENTRAL SECTOR				**2151**	
STATE SECTOR					
93	Biharsharif - Asthawan (New)	D/C	BSPTCL	40	APR-22
94	Saharsa (New) - Khagaria (New)	D/C	BSPTCL	72	APR-22
95	Pirana (PG) - Barejadi line	D/C	GETCO	46	APR-22
96	LILO of 2nd Ckts. of 220kV Kunihar- Panchkula line	D/C	HPPTCL	4	APR-22
97	Sector 69-Sector72 Ckt.-II	D/C	HVPNL	2	APR-22
98	Kodungallur - Irinjalakuda	D/C	KSEB	28	APR-22
99	Eklahare - Pimpalgaon	D/C	MSETCL	88	APR-22
100	Passian-Dhablan line (Railway) line	D/C	PSTCL	8	APR-22
101	LILO of Lakhwar- Dehradun at Vyasi	D/C	PTCUL	71	APR-22
102	Dindi -Existing Kondamallepally line	D/C	TSTRANSCO	66	APR-22
103	LILO of 220kV Roza-Budaun at Datagang (220) line	D/C	UPPTCL	14	APR-22
104	LILO of One ckt 220 kV Sohawal (PG) -New Tanda line at Ayodhya (220)	D/C	UPPTCL	26	APR-22
105	LILO of one ckt. Fatehpur-Unchahar at Malwan	D/C	UPPTCL	64	APR-22

106	Muzaffarpur (PG) - Gouraul line	D/C	BSPTCL	20	MAY-22
107	LILO of both Ckts. 220kV Tharad-Deodar line at Mera s/s with AL-59 Conductor line	M/C	GETCO	40	MAY-22
108	Benkikere S/s - proposed Hosadurga line	D/C	KPTCL	82	MAY-22
109	Pandiabili PGCIL - Pratapsasan line	D/C	OPTCL	61	MAY-22
110	Barabanki - Satrikh Road line	D/C	UPPTCL	49	MAY-22
111	LILO of 220kV Sambhal -Chandausi line at Sambhal (400)	D/C	UPPTCL	32	MAY-22
112	Rajarhat (PGCIL) - Barasat 220kV s/s	D/C	WBSETCL	17	MAY-22
113	Kalapaka -HPCL-I and II	D/C	APTRANSCO	22	JUN-22
114	LILO of VTS Ckt.-I Kamavarapukota at Nuziveedu line	S/C	APTRANSCO	2	JUN-22
115	LILO of Ara (PG) - Khagaul (BSPTCL) at Naubatpur (New)	D/C	BSPTCL	27	JUN-22
116	Naubatpur (New) - Bhusaula (New)	D/C	BSPTCL	32	JUN-22
117	Naubatpur (New) - Bihta (BSPTCL)	D/C	BSPTCL	40	JUN-22
118	Sheiikhopursarai-Asthawan (New)	D/C	BSPTCL	35	JUN-22
119	LILO of both Ckts. pf 220kV Bhimasar-Chardava line at proposed 220kV Vankada (Nichi Mandal) with AL-59 conductor with OPGW	M/C	GETCO	5	JUN-22
120	Shapar - Babara line (AL-59)	D/C	GETCO	139	JUN-22
121	Dehan - Hamirpur	D/C	HPPTCL	116	JUN-22
122	Sunda-Hatkoti	D/C	HPPTCL	50	JUN-22
123	LILO of both Ckt. of 220kV RTPP Salempur at 220kV S/S at Bakana (Ckt.-I)	D/C	HVPNL	15	JUN-22
124	LILO of both Ckt. of 220kV RTPP Salempur at 220kV S/S at Bakana (Ckt.-II)	D/C	HVPNL	15	JUN-22
125	Vijayapura proposed -Aaheri line	D/C	KPTCL	124	JUN-22
126	LILO point -PGCIL Indore at Indore (NZ) line	DCDS	MPPTCL	21	JUN-22
127	Rewa 220 - Rewa UMSP 220kV line	DCDS	MPPTCL	77	JUN-22

128	LILO on 220kV ONGC-Panvel S/S at 220kV Panvel TSS	D/C	MSETCL	2	JUN-22
129	LILO of KTPS V-Lower Sileru-II - proposed Pump House-1 at B.G. Kottur	D/C	TSTRANSCO	33	JUN-22
130	Karmnasa (New) - Pusauli (BSPTCL) (TM)	D/C	BSPTCL	73	JUL-22
131	Raxaul (New) - Gopalganj (TM/ Single Zebra)	D/C	BSPTCL	130	JUL-22
132	Saharsa (New) - Begusarai	D/C	BSPTCL	187	JUL-22
133	Dwarka -PPK -II U/G	D/C	DTL	11	JUL-22
134	Tughlakabad - R.K.Puram (U/G Cable)	D/C	DTL	26	JUL-22
135	Badhana - Dadri Toe Jhajjar	D/C	HVPNL	30	JUL-22
136	LILO of Nagda -Daloda line at Nagda (220kV) line	DCDS	MPPTCL	2	JUL-22
137	Amrapur - Thaptitanda line	D/C	MSETCL	145	JUL-22
138	LILO of Budhipadar - Tarkera at Bamra	S/C	OPTCL	11	JUL-22
139	LILO of 220kv Sambhal -Gajraula line at Sambhal (400)	D/C	UPPTCL	91	JUL-22
140	Wadakkanchery - Kunnamkulam	M/C	KSEB	45	AUG-22
141	LILO on 220kV Badnera - Dhamangaon line for 150MW Solar plant of M/s Avadhaa at Dhamangaon Dist Amravati	S/C	MSETCL	19	AUG-22
142	Jalandhar (PGCIL) - Kartarpur	D/C	PSTCL	12	AUG-22
143	Damaracherla - Miryalaguda (Ckt.-I)	D/C	TSTRANSCO	16	AUG-22
144	LILO of 220kV Gonda (400) - Bahraich line at Balrampur (220)	D/C	UPPTCL	99	AUG-22
145	LILO of 220kV Hardoi - Sahjahanpur (PG) at Mallawan (220)	D/C	UPPTCL	86	AUG-22
146	LILO of 220kV Jahangirpur (765)-IITGNL line at Jewar (220)	D/C	UPPTCL	14	AUG-22
147	LILO of 220kV Sarojini Nagar - Bachhrawan line at Vijnor (220)	D/C	UPPTCL	9	AUG-22
148	LILO from existing 200kV HSR -Hoody line (proposed GIS) at Shobha Dream Acres line	D/C	KPTCL	1	SEP-22

149	LILO on existing 220kV Ahemadnagar - Bhose line for 400 kV Karjat S/s	D/C	MSETCL	72	SEP-22
150	Barnala - Handiaya Rly. S/Stn. (Railway Deptt.)	D/C	PSTCL	2	SEP-22
151	LILO of 220kV Meerut - Amroha at Chandpur line	D/C	UPPTCL	51	SEP-22
152	LILO of 220 kV Panki (220) - Bhauti (PG) Kanpur (400) line at Kidwai Nagar Govindnagar (Kanpur) line	D/C	UPPTCL	6	SEP-22
153	Modipuram-II Bagpat PG line	D/C	UPPTCL	77	SEP-22
154	Rajarhat (PG) - Newtown- II C 220kV DC/CKt. UG Cable line	D/C	WBSETCL	23	SEP-22
155	LILO of 220kV Chorania - Sadla line and 220kV Sadla- Gondal line at 220kV Shapar s/s	M/C	GETCO	5	OCT-22
156	Panchgaon 400 kV - Panchgaon 220 kV	D/C	HVPNL	1	OCT-22
157	Vairag- Avaada Solar Park	S/C	MSETCL	26	OCT-22
158	LILO on 220kV Girwali - Hingoli line at 220kV Kurunda S/S	D/C	MSETCL	1	NOV-22
159	LILO of Balimela-Malkangir line at Kalimela	D/C	OPTCL	72	NOV-22
160	Gajwel - Siddipet line (on Galvanized Towers with Mosse ACSR)	D/C	TSTRANSCO	65	NOV-22
161	Bareilly (400) - Amaria line	D/C	UPPTCL	77	NOV-22
162	Rasra (400) - Bhadaura (Gazipur) line	D/C	UPPTCL	111	NOV-22
163	2nd Circuit stringing of 220kV Darbhanga (400/220)-Samastipur (New) line	D/C	BSPTCL	46	DEC-22
164	Muzaffarpur (PG) - Chhapra (New)	D/C	BSPTCL	129	DEC-22
165	Ambetha- Devdha	D/C	GETCO	20	DEC-22
166	LILO of one Ckt of 220kV D/C Amreli - Babara line at proposed 220kV Patkhilori	D/C	GETCO	43	DEC-22
167	220kV D/C line from 765kV S/stn. PGCIL Bhiwani to 220kV S/stn HVPNL Bhiwani	D/C	HVPNL	29	DEC-22
168	LILO of one Ckt. 220kV D/C FGPP- Pallaline at 220kV S/S Sector-78 Faridabad	D/C	HVPNL	4	DEC-22
169	220kV SCDC line from 220kV Ner S/S - 100MW Solar power plant by M/s. Avaada MH Solar Pvt. Ltd.	S/C	MSETCL	14	DEC-22

170	LILO of Kharghar -Kalwa (TIFFII-(Trombay section) at Pawne S/S by underground cable	D/C	MSETCL	1	DEC-22
171	Damaracherla - Miryalaguda (Ckt.-II)	D/C	TSTRANSCO	16	DEC-22
172	Raebareli (400) - Sangipur line	D/C	UPPTCL	26	DEC-22
173	LILO of VTS- 3 and 4 -Piduguralla	D/C	APTRANSCO	1	JAN-23
174	Pulivendula - Mutyalacheruvu	D/C	APTRANSCO	109	JAN-23
175	LILO of Hiranagar-Gladni at Chowadhi	S/C	JKPDD	1	JAN-23
176	LILO on 220kV MC/DC towers from 220kV Narendra-Haveri line to proposed S/S (for a distance of 2.418 kms)	D/C	KPTCL	19	JAN-23
177	Mundayad - Thalasseri line	D/C	KSEB	43	JAN-23
178	LILO of one Ckt. of Bhopal -Ashta line at 220kv Bairagarh line	DCDS	MPPTCL	7	JAN-23
179	Koradi-II - Uppalwadi UG and O/H line	D/C	MSETCL	14	JAN-23
180	LILO of Budhipadar - Tarkera at Kuanramunda	D/C	OPTCL	32	JAN-23
181	Kethireddypally - Chandanvally s/s	D/C	TSTRANSCO	25	JAN-23
182	Galiveedu PSS-1-NP Kunta (CKt.-I)	D/C	APSPCL	9	FEB-23
183	Galiveedu PSS-1- NP Kunta (Ckt.-II)	D/C	APSPCL	9	FEB-23
184	Galiveedu PSS-3-NP Kunta (Ckt-1)	D/C	APSPCL	3	FEB-23
185	Galiveedu PSS-3-NP Kunta (Ckt.II)	D/C	APSPCL	3	FEB-23
186	NP Kunta PSS2-NP Kunta (CKt.-1)	D/C	APSPCL	2	FEB-23
187	NP Kunta Pss2-NP Kunta (Ckt-2)	D/C	APSPCL	2	FEB-23
188	NP Kunta PSS3-NP Kunta (Ckt-1)	D/C	APSPCL	5	FEB-23
189	NP Kunta PSS3-NP Kunta (Ckt-2)	D/C	APSPCL	5	FEB-23
190	NP Kunta PSS4 -NP Kunta (Ckt-1)	D/C	APSPCL	7	FEB-23
191	NP Kunta PSS4 -NP Kunta (Ckt-2)	D/C	APSPCL	7	FEB-23
192	LILO of Jetpur - Sardargadh line at Shapur s/s	D/C	GETCO	12	FEB-23

193	LILO on Lalpar - Sartanpar line at Wankaner (M/C tower by replacement of existing 132kV towers) (AL-59)	D/C	GETCO	76	FEB-23
194	Chatra - Pakribarwadih	D/C	JUSNL	120	FEB-23
195	Tibber -Sohal line	D/C	PSTCL	7	FEB-23
196	Chibramau- Farrukhabad line	D/C	UPPTCL	52	FEB-23
197	LILO of Jaunpur -Gajokhar at Junpur LIne	D/C	UPPTCL	59	FEB-23
198	LILO of one Ckt of Azamgarh-II -Bhadoi line at Machhlisahar (Jaunpur)	D/C	UPPTCL	78	FEB-23
199	LILO of Sarnath - Sahupuri at Bhadaura	D/C	UPPTCL	154	FEB-23
200	LILO of VSS - Kakinada line at Parawada in Visakhapatnam District	D/C	APTRANSCO	1	MAR-23
201	LILO of Khagaul (BSPTCL) - Sipara (BSPTCL) at Jakkanpur (New)	S/C	BSPTCL	50	MAR-23
202	Maszid Moth - Tughlakabad (U/G) Cable	D/C	DTL	14	MAR-23
203	LILO of Jetpur-Visavadar line at Bhesan s/s	D/C	GETCO	5	MAR-23
204	Jagalur (Hiremallanahole) - Chitradurga	D/C	KPTCL	72	MAR-23
205	Kalaburagi (Ferozabad) Line1 from proposed Kalaburagi s/s (Ferozabad) - Existing line at Shahabad (Sedam)	D/C	KPTCL	34	MAR-23
206	Kalaburagi (Ferozabad) line 2 from proposed 400/220 kV Kalaburagi s/s - Existing 220kV S/C line from Shahapur-Kapnoor line at Shahapppur	D/C	KPTCL	7	MAR-23
207	LILO from Kothipura - Tubinakere at Channapatna	D/C	KPTCL	7	MAR-23
208	LILO line on M/C Towers from 220kV RTPS - Sedam - Ramasamudra S/S	M/C	KPTCL	37	MAR-23
209	Aug. of 1st Ckt from Rajpura - Mandi Gobindgarh 1 with HTLS	S/C	PSTCL	32	MAR-23
210	Aug. of 2nd Ckts from Rajpura-Mandi Gobindgarh 1 with HTLS	S/C	PSTCL	32	MAR-23
211	Malout - Abohar	S/C on D/C	PSTCL	30	MAR-23
212	Verpal-Dhukhniwaran line	D/C	PSTCL	6	MAR-23

213	Balotra -HRRL (Refinery) HPCL Rajasthan Refinery Ltd line from 220kV GSS RVPNL Balotra	S/C	RVPNL	29	MAR-23
214	Bhiwadi -DFCCIL TSS Mundana (Deposit work of DFCCIL Railway)	D/C	RVPNL	6	MAR-23
215	Jodhpur (400 kV GSS) - Banar	D/C	RVPNL	21	MAR-23
216	Samardong - Dikchu Pool line	D/C	SIKKIM	45	MAR-23
217	LILO of both circuits of Malkaram - Narketpally to Choutuppal SS (Multi circuit towers)	M/C	TSTRANSCO	61	MAR-23
218	Boner - Aligarh (400) line	S/C	UPPTCL	18	MAR-23
219	LILO of 220kV Muzaffarnagar - Modipuram (220) at Khatauli (220)	D/C	UPPTCL	2	MAR-23
220	LILO of Moradabad (400) - Rampur (220) at Rampur (765) line	D/C	UPPTCL	17	MAR-23
221	LILO of KTPP-Howrah at Proposed Food Park (GIS) s/s	D/C	WBSETCL	2	MAR-23
Total of STATE SECTOR				**4898**	
PRIVATE SECTOR					
222	ABC Bhadla Solar Power Plant -Bhadla-II P(S)	S/C	ABCSolar	12	FEB-23
223	ACME Bhadla Solar Power Plant-Bhadla	S/C	ACME	10	FEB-23
224	ACME Solar Holdings Ltd. Power Plant - Bhadla -II (PS)	S/C	ACME	10	FEB-23
225	Adani Green Energy Nine Solar Power Project-Fatehgarh-II (Scope od ISTS)	S/C	AHEJL	45	FEB-23
226	Adani Grren Energy Seven Ltd. Plant -Fatehgarh-II (PS)	S/C	AHEJL	25	FEB-23
227	Alfanar -Energy Private Limited (AEPL-Kotda Madh) - Bhuj (PS)	S/C	ALFANAR	66	FEB-23
228	CLP India Private Limited -Jam Khambhaliya (PS)	S/C	APRAAVA	43	FEB-23
229	Mahoba Solar Power Plant Switch YArd -Bhadla	S/C	AREHL	16	FEB-23
230	Mahoba Solar (UP) Private Limeted Power Project-Fatehgarh-II (New) PS	D/C	AREHL	72	FEB-23
231	Mahoba Solar (UP) Private Limited-Bhadla	S/C	AREHL	16	FEB-23
232	AREPRL Solar Park-Bhadla	D/C	AREPRL	35	FEB-23

233	Avaada Energy Pvt Ltd Solar Power Plant - Bhadla-II (PS)	S/C	AVAADA	22	FEB-23
234	Avikiran Solar India Private Limited -Bhuj PS	S/C	AVIKIRAN	83	FEB-23
235	Avikiran Surya India Pvt. Solar Power Plant- Bikaner PS	S/C	AVIKIRAN	10	FEB-23
236	Chhugar PS -Dayapar/Ratadiaya (PS)	S/C	AWEKL	37	FEB-23
237	Dayapar / Ratadiya PS-Bhuj (with Capacity of at least 725 MW at Nominal Voltage)	D/C	AWEKL	37	FEB-23
238	Murchbana/Mokhra PS - Dayapar/Ratadiya (PS)	S/C	AWEKL	37	FEB-23
239	SBESS-Indore (PG)	S/C	AWEMPL	70	FEB-23
240	Azure 130MW Plant-Bhadla	S/C	AZURE	14	FEB-23
241	AZURE Solar PV Plant -Bhadla-2-Bhadla	S/C	AZURE	21	FEB-23
242	AZURE Solar PV Plant Bhadla -Bhadla	S/C	AZURE	4	FEB-23
243	IWISL (Dayapar)-Bhuj (PS)	D/C	CONTINUUM	73	FEB-23
244	EDEN Cite ISTS RAj Power Plant -Fatehgarh-II (New) (PS)	S/C	EDEN	13	FEB-23
245	Essel Solar Park- Bhadla	D/C	ESUCRL	76	FEB-23
246	Green Infra Wind Energy Ltd. (GIWEL) -(Bhuj) - Bhuj (PS)	S/C	GIWEL	64	FEB-23
247	Green Infra Wind Energy Ltd. (GIWEL-Roha)- Bhuj(PS)	S/C	GIWEL	65	FEB-23
248	Hero Solar Generation Switchyard-Bhadla	S/C	HEROSOLAR	10	FEB-23
249	IWISL -Bhuj (PS)	D/C	INOX	77	FEB-23
250	Mahindra Susten 250MW Solar Project-Bhadla	S/C	MAHINDRA	16	FEB-23
251	Mahindra Susten Solar Power Project- Bhadla-II	S/C	MAHINDRA	19	FEB-23
252	Netra-Bhuj (PS)	S/C	NETRA	81	FEB-23
253	OKWPL - Bhachau (PS)	D/C	OSTRO	69	FEB-23
254	POWERICA Ltd. -Jam Khambaliya (PS)	S/C	POWERICA	1	FEB-23
255	ReNew Wind Energy (AP2) Private Limited- Bhuj (PS)	S/C	RENEW	73	FEB-23
256	ReNew Power Limited -Hiriyur	S/C	RENEWPOWER	78	FEB-23

257	RPVPL- Bhachau	D/C	RENEWPOWER	48	FEB-23
258	Construction 220kV S/C each from Jaisalmer I Project and Jaisalmer-II Project upto Common point of Jaisalmer -I Project and Jaisalmer-II Project-II -Fatehgarh-II	S/C	RENEWSOLARENERGY	17	FEB-23
259	Construction 220kV S/C line from Jaisalmer I Project and Jaislamer II Project upto common point Common point of Jaisalmer -I Project and Jaisalmer II Project - Fatehgarh -II	D/C	RENEWSOLARENERGY	7	FEB-23
260	Jaisalmer-3 Plant - Fatehgarh-II	S/C	RENEWSOLARENERGY	19	FEB-23
261	Jaisalmer-4 Project-Fatehgarh-II (PS)	S/C	RENEWSOLARPOWER	8	FEB-23
262	RUMS Ltd. Switchyard -Rewa (PS)	3xD/C	RUMSL	10	FEB-23
263	SBE Renewables Ten Private Ltd Power Project-Fatehgarh-II (PS)	D/C	SBERTPL	57	FEB-23
264	SBER Eleven Solar Power Project -Bikaner	S/C	SBSR	11	FEB-23
265	SEI Sunshine PSS_Shivpuri (MPPTCL)	D/C	SEISUNSHINE	4	FEB-23
266	Sherisha Rooftop Solar SPV Four Private Ltd.- Raipur (Capacity at least200MW at Nominal Voltage)	S/C	SHERISHA	1	FEB-23
267	Sitac-Bhuj-II	S/C	SITAC	60	FEB-23
268	SESPL -Bhuj-II	S/C	SRIJAN	20	FEB-23
269	Tata Power Green Energy Ltd Solar Power Plant-Bikaner-I (PS)	S/C	TATAGREEN	19	FEB-23
270	Tata Power Renewable Energy Limited-Bhadla	S/C	TATARENEW	46	FEB-23
271	TPREL 500 MW Solar Power Project Chhayan- Bhadla	S/C	TATARENEW	46	FEB-23
Total of PRIVATE SECTOR				**1773**	
Total of 220 kV				**8822**	
Grand Total				**14625**	

Annexure-3E

Sub-Stations Completed During FY - 2022-23

As on 31-Mar-23

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	**2.**	**3.**	**4.**	**5.**	**6.**
765 kV					
CENTRAL SECTOR					
1	Establishment of 765/400/220 KV Bhuj-II Substation (T/F-I of 1500 MVA)	765/400	PGCIL	1500	JUN-22
2	Meerut (765/400 kV 2x1500 MVA)	765/400	PGCIL	3000	MAR-23
3	Rampur (765/400 kV 2x1500 MVA)	765/400	PGCIL	3000	MAR-23
4	Extension 765/400/220 kV Fatehgarh-II PS (1500 MVA ICT-4th)	765/400	PGCIL	1500	MAY-22
5	Vadodara (Aug.) (3rd ICT)	765/400	PGCIL	1500	MAY-22
6	Establishment of 765/400/220 KV Bhuj-II Substation (ICT-II)	765/400	PGCIL	1500	NOV-22
7	Extn. at Bhadla-II PS (1500MVA ICT-3rd) at Bikaner (PG)	765/400	PGCIL	1500	OCT-22
	TOTAL CENTRAL SECTOR			**13500**	
	TOTAL 765 kV			**13500**	
400 kV					
CENTRAL SECTOR					

8	Extn. at 400/220 kV Muzaffarpur S/S (Extn. including ICT)	400/220	PGCIL	500	APR-22
9	Farakka (400/220 kV ICT) S/S	400/220	PGCIL	315	APR-22
10	ICT at Indore	400/220	PGCIL	500	APR-22
11	Extension at 765/400/220kV Bhadla-II (500MVA 400/220 kV ICT 6)	400/220	PGCIL	500	AUG-22
12	Extension at 765/400/220kV Fatehgarh-II (400/220 kV 500MVA ICT-7th) under Phase-II Part B1	400/220	PGCIL	500	DEC-22
13	ICT at Shujalpur	400/220	PGCIL	500	JAN-23
14	Rampur (400/220 kV 2x500 MVA)	400/220	PGCIL	1000	JAN-23
15	Sambhal (400/220 kV2x500 2x160 MVA)	400/220	PGCIL	1320	JUL-22
16	Establishment of 765/400/220 KV Bhuj-II Substation (4x500 MVA 400/220 kV)	400/200	PGCIL	2000	JUN-22
17	ICT at Morena	400/220	PGCIL	500	JUN-22
18	Extension 400/220kV Bhadla-II PS (500MVA ICT) (Fatehgarh-II and Bhadla-II)	400/220	PGCIL	500	JUN-22
19	Simbhavali (400/220 kV2x500 and 220/132KV2x200 MVA)	400/220	PGCIL	1400	MAR-23
20	1x500MVA 400/220kV ICT (8th) at Bhadla (PG)	400/220	PGCIL	500	MAR-23
21	1x500MVA 400/220kV ICT at Fatehgarh-II (under Phase II Part B1)	400/220	PGCIL	500	MAR-23
22	Meerut (400/220 kV 2x500 MVA)	400/220	PGCIL	1000	MAR-23
23	ICT Replacement at Ludhiana (1x315 MVA 400/220 kV ICT by 1x500 MVA 400/220 kV ICT)	400/220	PGCIL	185	MAY-22
24	Extension at Bhadla-II PS (ICT)	400/220	PGCIL	500	MAY-22
25	Jauljivi (GIS) s/s	400/220	PGCIL	630	NOV-22
26	ICT at Hiriyur SS	400/220	PGCIL	500	OCT-22
27	Guna s/s	400/220	PGCIL	1000	SEP-22
28	Fatehgarh-II (400/220 kV 500MVA ICT-6th)	400/220	PGCIL	500	SEP-22
	TOTAL CENTRAL SECTOR			**14850**	

	TOTAL 400 kV			**14850**	
220 kV					
CENTRAL SECTOR					
29	Chandigarh (GIS) Sub station	220/66	PGCIL	320	JAN-23
30	(Assam) Samaguri (Aug.) (160-50) T/F-I	220/132	PGCONSULTANCY	110	MAR-23
31	(Assam) Amingaon (GIS)	220/132	PGCONSULTANCY	320	MAR-23
32	(Assam) Behiating (New Dibrugarh)	220/132	PGCONSULTANCY	200	MAR-23
33	(Assam) Samaguri (Aug.) (160-50) T/F-II	220/132	PGCONSULTANCY	110	MAR-23
34	(MAGHALAYA) Mawngap (GIS) (Upgradation)	220/132	PGCONSULTANCY	320	MAR-23
35	(MAGHALAYA) New Shillong (GIS)	220/132	PGCONSULTANCY	320	MAR-23
36	Bhind s/s	220/132	PGCIL	320	SEP-22
	TOTAL CENTRAL SECTOR			**2020**	
	TOTAL 220 kV			**2020**	
765 kV					
STATE SECTOR					
37	765 kV GSS Phagi (Addl T/Fs 3x500 MVA)	765/400	RVPNL	1500	APR-22
38	BARA TPS (New) 3x500 MVA ICT-2	765/400	UPPTCL	1500	MAR-23
	TOTAL STATE SECTOR			**3000**	
	TOTAL 765 kV			**3000**	
400 kV					
STATE SECTOR					
39	Jakkanpur (GIS) s/s (ICT-I of 500 MVA)	400/220/132	BSPTCL	500	APR-22
40	Rasra (New) T/F-I	400/220	UPPTCL	500	APR-22
41	Jetpur (Aug.)	400/220	GETCO	185	AUG-22

42	Bhopal T/F Replacement/Aug. of 315 MVA by 500 MVA	400/220	MPPTCL	185	AUG-22
43	Zerda S/s	400/200	GETCO	500	AUG-22
44	Bhachunda (T/F-III)	400/220	GETCO	500	DEC-22
45	Jaunpur S/s (T/F-I)	400/220	UPPTCL	315	DEC-22
46	Damaracherla S/S	400/220	TSTRANSCO	1000	DEC-22
47	Shamli T/F-I	400/220	UPPTCL	500	FEB-23
48	Gajwel Sangareddy S/S	400/220	TSTRANSCO	185	FEB-23
49	Veltoor Mahaboobnagar S/S	400/220	TSTRANSCO	185	FEB-23
50	Suryapet (Aug.)	400/220/132	TSTRANSCO	160	JAN-23
51	Guddigudem S/S	400/220/11	APTRANSCO	1080	JAN-23
52	Aligarh (Augmentation) T/F-II	400/220	UPPTCL	500	JUL-22
53	Bhilwara (T/F Replacement of 315 MVA by 500 MVA)	400/220	RVPNL	185	JUN-22
54	400/220/66 kV Shapar S/S (400/220 kV 2x500 MVA)	400/220	GETCO	1000	JUN-22
55	Raita (Raipur) (Addl T/F)	400/220	CSPTCL	315	MAR-23
56	Naubatpur GIS (Balanced) (400/220 kV T/F-II of 500 MVA	400/220	BSPTCL	500	MAR-23
57	Ottapidaram	400/230	TANTRANSCO	1000	MAR-23
58	Pulianthope (GIS)	400/230	TANTRANSCO	945	MAR-23
59	Devanahalli Hardware Park SS (Additional 500 MVA T/F)	400/220	KPTCL	500	MAR-23
60	Kalaburagi (Ferozabad) (T/F-I)	400/220	KPTCL	500	MAR-23
61	Choutuppal S/S (T/F-I)	400/220	TSTRANSCO	500	MAR-23
62	Jakkanpur (GIS) s/s (ICT-II)	400/220	BSPTCL	500	MAR-23
63	Aug. at Manubolu (Nellore)	400/220	APTRANSCO	500	MAR-23
64	Ottapidaram (2X200)	400/110	TANTRANSCO	400	MAR-23
65	400 kV S/s Nehtaur BijnaurT/F-III (Capacity Augmentation)	400/132	UPPTCL	200	MAR-23

66	Bhogat S/S (400/220 kV 500 MVA T/F) (2X500)	400/220	GETCO	1000	MAR-23
67	Thervoikandigai (Addl T/F)	400/230	TANTRANSCO	315	MAY-22
68	Rajpura	400/220	PSTCL	500	MAY-22
69	Khedamara (Bhilai) (Addl T/F)	400/220	CSPTCL	315	MAY-22
70	Addl. 400 KV X-mer at Ashta	400/220	MPPTCL	315	OCT-22
	TOTAL STATE SECTOR			**15785**	
	TOTAL 400 kV			**15785**	
	230 kV				
	STATE SECTOR				
71	Erode (T/F-I)	230/110	TANTRANSCO	100	NOV-22
	TOTAL STATE SECTOR			**100**	
	TOTAL 230 kV			**100**	
	220 kV				
	STATE SECTOR				
72	Vizhinjam (T/F-I)	220/110	KSEB	100	APR-22
73	Metrajpally LI SS (2x31.5 MVA)	220/11	TSTRANSCO	63	APR-22
74	Rasra (New) T/F-I and II	220/132	UPPTCL	320	APR-22
75	Nirpura S/s (T/F-II)	220/132	UPPTCL	160	APR-22
76	Babina s/s (Jhansi) (T/F-I)	220/132	UPPTCL	160	APR-22
77	Ayodhya (New) T/F-I	220/132	UPPTCL	160	APR-22
78	Tiruvuru	220/132	APTRANSCO	300	APR-22
79	HSIIDC Bawal (Aug.)	220/33	HVPNL	100	APR-22
80	Bhalwani substation (T/F Replacement 25MVA by 50 MVA)	220/33	MSETCL	25	APR-22
81	Morti Ghaziabad T/F-III	220/33	UPPTCL	60	APR-22

82	Sirsi (Esale) s/s (Addl T/F)	220/110	KPTCL	55	APR-22
83	Vrindawan Mathura (New) T/F-II	220/132	UPPTCL	160	AUG-22
84	Sunda S/S	220/132	HPPTCL	200	AUG-22
85	Bina (Replacement/Aug.3x40MVA by 200 MVA)	220/132	MPPTCL	80	AUG-22
86	Rewa Augmentation of Xmer (200-160)	220/132	MPPTCL	40	AUG-22
87	Gajwel (Aug.)	220/132	TSTRANSCO	60	AUG-22
88	Bah Agra (Capacity Augmentation) (160-100)	220/132	UPPTCL	60	AUG-22
89	Balrampur (T/F-I)	220/132	UPPTCL	160	AUG-22
90	Bijnor Lunknow (T/F-I)	220/132	UPPTCL	160	AUG-22
91	Dulhipar Sant Kabir Nagar (New) T/F-II	220/132	UPPTCL	160	AUG-22
92	Kasganj (New) T/F-II	220/132	UPPTCL	160	AUG-22
93	Mallawan Hardoi (T/F-I)	220/132	UPPTCL	160	AUG-22
94	Jewar (T/F-I)	220/33	UPPTCL	60	AUG-22
95	Ambhetha (Chikhali) (Aug.)	220/66	GETCO	110	AUG-22
96	Kangashiyali (Aug.)	220/66	GETCO	60	AUG-22
97	Khanpur (Aug.)	220/66	GETCO	60	AUG-22
98	Kosamba (Aug.)	220/66	GETCO	60	AUG-22
99	Vartej (Aug.)	220/66	GETCO	60	AUG-22
100	Vav (Aug.)	220/66	GETCO	110	AUG-22
101	Sunda (Addl. T/F)	220/66	HPPTCL	100	AUG-22
102	Bhawanigarh (Addl. T/F)	220/66	PSTCL	100	AUG-22
103	Ladhowal (Addl. T/f)	220/66	PSTCL	160	AUG-22
104	Majra (Addl. T/F)	220/66	PSTCL	100	AUG-22
105	Pawane GIS	220/22	MSETCL	100	DEC-22
106	Dev Nagar GIS	220/33	DTL	400	DEC-22
107	Mallawan S/s Hardoi (T/F-II)	220/132	UPPTCL	160	DEC-22
108	Guna Addl. T/F	220/132	MPPTCL	160	DEC-22

109	Kadur (Addl T/F)	220/66	KPTCL	100	DEC-22
110	Sadla (Aug.)	220/66	GETCO	160	DEC-22
111	220 kV GSS Laxmangarh (Addl. T/F)	220/132	RVPNL	100	DEC-22
112	Palanpur (Aug.)	220/66	GETCO	60	DEC-22
113	Mutyalacheruvu	220/132	APTRANSCO	100	FEB-23
114	Raja ka Talab Varanasi T/F- II (New)	220/132	UPPTCL	160	FEB-23
115	Chhuri (Addl T/F)	220/132	CSPTCL	160	FEB-23
116	Piduguralla	220/132/33	APTRANSCO	160	FEB-23
117	Talangpore s/s	220/66	GETCO	160	FEB-23
118	Sankhari S/S	220/66	GETCO	110	FEB-23
119	Morbi-KSY S/S	220/66	GETCO	60	FEB-23
120	Agiyol S/S	220/66	GETCO	110	FEB-23
121	Mau (T/F T-4)	220/33	HVPNL	100	FEB-23
122	Kidwainagar (Govindnagar) Kanpur (GIS) T/F- II	220/33	UPPTCL	60	FEB-23
123	Pratap Vihar Ghaziabad (Hybrid) (New) T/F- III	220/33	UPPTCL	60	FEB-23
124	Latehar GSS (PGCIL)	220/132	JUSNL	400	FEB-23
125	Machhlisahar (Jaunpur) T/F- I	220/132	UPPTCL	160	FEB-23
126	Nighasan Lakhimpur Kheri T/F- II (Capacity Augmentation)	220/132	UPPTCL	100	FEB-23
127	Jewar (New) (T/F-II)	220/33	UPPTCL	60	JAN-23
128	Rampur (Aug.) T/F-III	220/132	UPPTCL	100	JAN-23
129	Kuanramunda S/s (T/F)	220/132	OPTCL	160	JAN-23
130	Chandanvally (T/F -I)	220/132	TSTRANSCO	100	JAN-23
131	Niwaliphata substation (T/F Aug)	220/132	MSETCL	100	JAN-23
132	Bamra S/s (T/F -I)	220/132	OPTCL	160	JAN-23
133	Shiggaon (Ganjigatti) S/S (2x100MVA 220/110/11kV)	220/110	KPTCL	100	JAN-23
134	Thalassery (GIS) (2 100 MVA T/F)	220/110	KSEB	200	JAN-23

135	Kansari (Aug.)	220/66	GETCO	60	JAN-23
136	Popda (Aug.)	220/66	GETCO	160	JAN-23
137	Chowadi GSS (220/33 kV 1 Unit)	220/33	JKPDD	53	JAN-23
138	Uppalwadi Substation (1 x 50 MVA) (TF-II)	220/33	MSETCL	50	JAN-23
139	Kalimela S/s (T/F- II)	220/33	OPTCL	20	JAN-23
140	Bhalwani substation (T/F-II replacement of 25MVA by 50 MVA)	220/33	MSETCL	25	JUL-22
141	Damoh (Aug. of 160 by 200 MVA)	220/132	MPPTCL	40	JUL-22
142	Katni 400 kV S/S (Addl. X-mer)	220/132	MPPTCL	160	JUL-22
143	Amrapur (Pathardi) S/S	220/132	MSETCL	200	JUL-22
144	Balapur (Aug.)	220/132	MSETCL	100	JUL-22
145	Satara MIDC	220/132	MSETCL	100	JUL-22
146	Azizpur (New) T/F-II	220/132	UPPTCL	160	JUL-22
147	Baruipur GIS	220/132	WBSETCL	320	JUL-22
148	Gurugram sector-72 S/S (Aug.)	220/33	HVPNL	100	JUL-22
149	Rangala Rajpur s/s (3rd T/F)	220/33	HVPNL	100	JUL-22
150	Dehan s/s (GEC-I)	220/132	HPPTCL	200	JUL-22
151	400/220/66 kV Shapar S/S (220/66kV 2x160 MVA)	220/66	GETCO	320	JUL-22
152	T.K.Halli (Addl T/F)	220/66	KPTCL	100	JUL-22
153	Singarapet 230/110 KV SS (Second unit)	220/110	TANTRANSCO	100	JUL-22
154	Saundatti (Addl T/F)	220/110	KPTCL	100	JUL-22
155	Dadri Toe S/s (T/F-I)	220/33	HVPNL	100	JUL-22
156	AP Carbides s/s in Kurnool Dist (Aug)	220/132	APTRANSCO	60	JUL-22
157	Bemetara (Addl T/F)	220/132	CSPTCL	160	JUL-22
158	Mungeli (Addl T/F)	220/132	CSPTCL	160	JUL-22
159	Bhusaula (GIS) s/s (T/F-I)	220/33	BSPTCL	100	JUN-22
160	Balligavi (Addl T/F)	220/110	KPTCL	100	JUN-22

161	Vijayapura (Addl T/F)	220/110	KPTCL	100	JUN-22
162	Godisahi S/s (2x63 MVA)	220/33	OPTCL	126	JUN-22
163	Aaheri	220/110	KPTCL	200	JUN-22
164	Athani (Addl T/F)	220/110	KPTCL	100	JUN-22
165	400/220/132 kV GIS S/s Shamli (New) T/F-II	220/132	UPPTCL	200	JUN-22
166	Amloh (Aug. of 100 to 160 MVA)	220/66	PSTCL	60	JUN-22
167	Bakana s/s (T/F-II)	220/66	HVPNL	160	JUN-22
168	Faridabad Sector-78 GIS	220/33	HVPNL	200	JUN-22
169	220 kV GSS Goner	220/132	RVPNL	160	MAR-23
170	Chowadi GSS (220/33 kV 3x53.33 MVA)	220/33	JKPDD	107	MAR-23
171	Bhusaula (GIS) s/s (T/F-II)	220/33	BSPTCL	100	MAR-23
172	220 KV GSS Khushkhera Aug.(160-100)	220/132	RVPNL	60	MAR-23
173	220 kV S/s Bhadaura Ghazipur (New) T/F- I	220/132	UPPTCL	100	MAR-23
174	Khatauli S/s (T/F-I)	220/132	UPPTCL	160	MAR-23
175	Ramasamudra	220/110	KPTCL	200	MAR-23
176	Shiggaon (Ganjigatti) (T/F II)	220/110	KPTCL	100	MAR-23
177	Jakkanpur (GIS) s/s (160 MVA T/F-I)	220/132	BSPTCL	160	MAR-23
178	Indi (3rd T/F)	220/110	KPTCL	100	MAR-23
179	220 kV Ranavav	220/132	GETCO	50	MAR-23
180	Bishnah GSS Aug.(3x160-2x160)	220/132	JKPDD	160	MAR-23
181	220 KV Khanpur	220/66	GETCO	60	MAR-23
182	220 kV Mota	220/66	GETCO	60	MAR-23
183	Rajula (1x160 1x100)	220/66	GETCO	260	MAR-23
184	Channapatna S/S	220/66	KPTCL	100	MAR-23
185	Hunsur (Thammadahally) Mysuru District	220/66	KPTCL	200	MAR-23
186	MRS Shivamogga (Additional 100MVA T/F)	220/66	KPTCL	100	MAR-23
187	Dhanansu SS (T/F I)	220/66	PSTCL	100	MAR-23

188	Patti (Augmentation of 100 to 160 MVA)	220/66	PSTCL	60	MAY-22
189	Ammavaripalli in Ananthapur (Aug.) (2x50 - 1x50)	220/33	APTRANSCO	50	MAY-22
190	Gurgaon Sector-69 GIS (T/F-I)	220/33	HVPNL	100	MAY-22
191	Hosdurga (Madure)	220/66	KPTCL	200	MAY-22
192	Chithirapuram (T/F-II)	220/66	KSEB	63	MAY-22
193	BBMB Jamalpur (Augmentation of 100 to 160 MVA)	220/66	PSTCL	60	MAY-22
194	Vizhinjam (T/F-II)	220/110	KSEB	100	MAY-22
195	Ettumanoor	220/110	KSEB	200	MAY-22
196	Malwan S/S (Fatehpur)	220/132	UPPTCL	320	MAY-22
197	Khair Aligarh T/F (Capacity Augmentation)	220/132	UPPTCL	160	MAY-22
198	Bhaukhari (Basti) (GIS) (New) T/F-I and II	220/132	UPPTCL	400	MAY-22
199	Pithampur Sec-I Addl. Xmer	220/132	MPPTCL	160	MAY-22
200	Chapda 220 KV S/s Addl. 160 MVA X-mer	220/132	MPPTCL	160	MAY-22
201	Goraul GSS	220/132	BSPTCL	320	MAY-22
202	Asthawan GSS (2x160 3x50)	220/132	BSPTCL	320	MAY-22
203	Amariya (T/F-II)	220/132	UPPTCL	100	NOV-22
204	Kalimela S/s (T/F-I)	220/33	OPTCL	20	NOV-22
205	Bhose (Aug)	220/33	MSETCL	50	NOV-22
206	Masudpur (Aug) (Addl T/F)	220/33	HVPNL	100	NOV-22
207	Kurunda S/S	220/132/33	MSETCL	200	NOV-22
208	Seoni Addl. T/F	220/132	MPPTCL	200	NOV-22
209	Pimpalgaon (ICT-II)	220/132	MSETCL	100	NOV-22
210	Bhinmal Aug (160-100)	220/132	RVPNL	60	NOV-22
211	Modipuram-II (T/F-I)	220/132	UPPTCL	160	OCT-22
212	Sangipur S/s Pratapgarh (T/F-I)	220/132	UPPTCL	160	OCT-22
213	Kidwainagar S/s Kanpur (T/F-I)	220/33	UPPTCL	60	OCT-22

214	Malegaon (Aug)	220/33	MSETCL	50	OCT-22
215	Dabaspet T/F-I (Aug)	220/66	KPTCL	50	OCT-22
216	Akiveedu SS (Addl T/F)	220/33	APTRANSCO	50	OCT-22
217	Visavadar (Aug.)	220/66	GETCO	50	OCT-22
218	Jetpur (Aug)	220/66	GETCO	60	OCT-22
219	Gerwani (Addl T/F)	220/132	CSPTCL	160	OCT-22
220	Timbdi (Aug.)	220/132	GETCO	50	OCT-22
221	Barwaha Addl. T/F	220/132	MPPTCL	160	OCT-22
222	Kukshi 220 KV S/s Addl. 160 MVA X-mer	220/132	MPPTCL	160	OCT-22
223	Ayodhya (New) T/F-II	220/132	UPPTCL	160	OCT-22
224	Damoh (Addl T/F)	220/132	MPPTCL	160	SEP-22
225	Bhopal (Aug. of 160 by 200 MVA)	220/132	MPPTCL	40	SEP-22
226	Belmuri GIS	220/132	WBSETCL	320	SEP-22
227	Malerkotla (Augmentation of 100 to 160 MVA)	220/66	PSTCL	60	SEP-22
228	Doddaballapura (Addl T/F)	220/66	KPTCL	100	SEP-22
229	220/66kV GIS S/S at sobha dreams acres	220/66	KPTCL	300	SEP-22
230	Bijnor Road S/s Lucknow (T/F-II)	220/132	UPPTCL	160	SEP-22
231	Chhegaon Addl. T/F	220/132	MPPTCL	200	SEP-22
232	Allipura (Addl T/F)	220/110	KPTCL	100	SEP-22
233	Robertsganj (Aug)	220/132	UPPTCL	160	SEP-22
234	Farrukhabad S/s (T/F-I)	220/132	UPPTCL	160	SEP-22
235	Faridpur (Bareilly) S/s	220/132	UPPTCL	100	SEP-22
236	Chandpur (Bijnor) S/s	220/132	UPPTCL	320	SEP-22
	TOTAL STATE SECTOR			**21647**	
	TOTAL 220 kV			**21647**	
765 kV					

PRIVATE SECTOR					
237	Lakadia s/s	765/400	APL	3000	OCT-22
	TOTAL PRIVATE SECTOR			**3000**	
	TOTAL 765 kV			**3000**	
400 kV					
PRIVATE SECTOR					
238	Jam Khambhaliya GIS	400/220	APL	2000	APR-22
	TOTAL PRIVATE SECTOR			**2000**	
	TOTAL 400 kV			**2000**	
	GRAND TOTAL			**75902**	

Annexure-4A

Power Supply Position for 2022-23 (Revised)								
	Energy				Peak			
State /	April,2022 - March,2023				April,2022 - March,2023			
System /	Energy Requirement	Energy Supplied	Energy not Supplied		Peak Demand	Peak Met	Demand not Met	
Region	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
Chandigarh	1,788	1,788	0	0.0	407	407	0	0.0
Delhi	35,143	35,133	10	0.0	7,695	7,695	0	0.0
Haryana	61,451	60,945	506	0.8	12,768	12,768	0	0.0
Himachal Pradesh	12,649	12,542	107	0.8	2,071	2,071	0	0.0
UT of J&K and Ladakh	19,639	19,322	317	1.6	3,137	2,967	170	5.4
Punjab	69,522	69,220	302	0.4	14,311	14,311	0	0.0
Rajasthan	101,801	100,057	1,745	1.7	17,399	17,206	193	1.1
Uttar Pradesh	144,251	143,050	1,201	0.8	27,369	26,589	780	2.8
Uttarakhand	15,647	15,386	261	1.7	2,594	2,594	0	0.0
Northern Region (##)	463,088	458,640	4,449	1.0	77,337	76,561	776	1.0
Chhattisgarh	39,051	38,979	72	0.2	5,399	5,399	0	0.0
Gujarat	137,960	137,916	44	0.0	21,464	21,382	82	0.4

Madhya Pradesh	92,326	91,969	358	0.4	17,347	17,238	109	0.6
Maharashtra	186,573	186,461	111	0.1	30,935	28,846	2,089	6.8
Dadra & Nagar Haveli and Daman & Diu	9,960	9,960	0	0.0	1,278	1,278	0	0.0
Goa	4,674	4,674	0	0.0	718	718	0	0.0
Western Region (##)	475,743	475,157	586	0.1	71,677	71,677	0	0.0
Andhra Pradesh	72,302	71,893	410	0.6	13,167	12,293	874	6.6
Telangana	77,832	77,799	34	0.0	15,497	15,497	0	0.0
Karnataka	75,688	75,663	26	0.0	15,828	15,828	0	0.0
Kerala	27,747	27,726	21	0.1	4,699	4,370	329	7.0
Tamil Nadu	114,798	114,722	77	0.1	17,729	17,729	0	0.0
Puducherry	3,051	3,050	1	0.0	501	501	0	0.0
Lakshadweep (#)	64	64	0	0.0	12	12	0	0.0
Southern Region (##)	371,467	370,900	567	0.2	64,337	64,337	0	0.0
Bihar	39,545	38,762	783	2.0	7,852	6,631	1,221	15.5
DVC	26,339	26,330	9	0.0	3,402	3,396	7	0.2
Jharkhand	13,278	12,288	990	7.5	2,253	1,918	336	14.9
Odisha	42,631	42,584	47	0.1	6,566	6,391	175	2.7
West Bengal	60,348	60,274	74	0.1	10,125	9,900	225	2.2
Sikkim	587	587	0	0.0	124	124	0	0.0
Andaman- Nicobar (*#*)	348	348	0	0.1	62	62	0	0.0

Eastern Region (##)	182,791	180,888	1,903	1.0	28,275	27,218	1,057	3.7
Arunachal Pradesh	915	892	24	2.6	167	167	0	0.0
Assam	11,465	11,465	0	0.0	2,379	2,376	3	0.1
Manipur	1,014	1,014	0	0.0	248	248	0	0.0
Meghalaya	2,237	2,237	0	0.0	404	404	0	0.0
Mizoram	645	645	0	0.0	159	159	0	0.0
Nagaland	926	873	54	5.8	168	167	1	0.5
Tripura (*)	1,547	1,547	0	0.0	333	333	0	0.0
North-Eastern Region (##)	18,758	18,680	78	0.4	3,603	3,603	0	0.0
All India	1,511,847	1,504,264	7,583	0.5	215,888	207,231	8,657	4.0
(#) Lakshadweep and Andaman & Nicobar Islands are stand- alone systems, power supply position of these, does not form part of regional requirement and supply.								
(*) Excludes the supply to Bangladesh.								
Note:								
1. Power Supply Position Report has been compiled based on the data furnished by State Utilities/ Electricity Departments. The MU & MW figures has been rounded off to nearest unit place.								
2. (##) The Regional figures include data of other miscellaneous entities drawing power directly from ISTS.								

Annexure-4B

Allocation from Conventional Central Generating Stations and Bhutan Stations								31.03.2023									
S.No.	**Region / State**	**Firm Share**						**Dedicated Power**	**Un-Allocated Power**							**Total Share from C.G.S. and Bhutan Stations**	
		Firm Power from Regional Pool and Bhuta	**Firm from Other Regions and Bhutan**	**Non Firm**	**Total Firm Power**				Unallocated Power from Regional Pool and Bhutan	Allocation from other Region / Bhutan	**Total Allocation of Un-Allocated Power (*)**						

		n															
		MW	**MW**	**MW**	**MW**	**% Regional Total**	**% of All India Total**	**MW**	MW	% Regional Total	% of All India Total	MW	**MW**	**% Regional Total**	**% of All India Total**	**MW**	**% Regional Total**	**% of All India Total**
		1	**2**	**3**	**4=1+2+3**	**5**	**6**	**7**	8	9	10	11	**12=8+11**	**13**	**14**	**15=4+7+12**	**16**	**17**
1	Chandigarh	166.6	3.0	0.0	169.6	0.7	0.2	0.0	115.7	4.5	1.2	0.0	115.7	3.7	1.1	285.3	1.0	0.3

2	Delhi	3064.0	741.7	0.0	3805.7	16.3	4.9	0.0	50.0	1.9	0.5	130.0	180.0	5.8	1.7	3985.6	14.3	4.2
3	Haryana	1871.6	418.3	48.0	2337.9	10.0	3.0	431.0	8.7	0.3	0.1	15.0	23.7	0.8	0.2	2792.6	10.0	2.9
4	Himachal Pradesh	1374.5	23.0	0.0	1397.5	6.0	1.8	0.0	15.0	0.6	0.2	0.0	15.0	0.5	0.1	1412.5	5.1	1.5
5	UT of Jammu & Kashmir and Ladakh	1614.1	127.9	35.0	1777.0	7.6	2.3	89.0	1217.6	47.3	13.1	118.1	1335.6	42.9	13.0	3201.6	11.4	3.4
6	Punjab	1639.9	820.3	100.0	2560.2	11.0	3.3	0.0	45.2	1.8	0.5	30.0	75.2	2.4	0.7	2635.4	9.4	2.8
7	Rajasthan	1950.9	132.2	125.0	2208.1	9.5	2.8	550.0	667.5	26.0	7.2	15.0	682.5	21.9	6.6	3440.5	12.3	3.6
8	Uttar Pradesh	7107.4	624.8	66.0	7798.3	33.4	10.0	440.0	148.7	5.8	1.6	101.9	250.6	8.0	2.4	8488.9	30.4	8.9
9	Uttarakhand	941.0	48.8	0.0	989.7	4.2	1.3	0.0	300.0	11.7	3.2	135.4	435.4	14.0	4.2	1425.1	5.1	1.5

10	PowerGrid	6.3	0.0	0.0	6.3	0.0	0.0	0.0	3.3	0.1	0.0	0.0	3.3	0.1	0.0	9.6	0.0	0.0
11	Railways NR	0.0	291.2	0.0	291.2	1.2	0.4	0.0	0.0			0.0	0.0			291.2		0.3
	Northern Region	**19736.3**	**3231.1**	**374.0**	**23341.4**	**100.0**	**29.9**	**1510.0**	**2571.7**	**100.0**	**27.8**	**545.3**	**3117.0**	**100.0**	**30.2**	**27968.4**	**100.0**	**29.4**
12	Chhattisgarh	2402.3	143.0	0.0	2545.3	12.3	3.3	50.0	25.0	0.9	0.3	0.0	25.0	0.9	0.2	2620.3	9.5	2.8
13	Gujarat	4798.6	1505.7	0.0	6304.2	30.5	8.1	160.0	658.1	23.9	7.1	32.7	690.7	24.4	6.7	7155.0	26.0	7.5
14	Madhya Pradesh	4307.5	574.0	0.0	4881.4	23.6	6.3	1520.0	250.0	9.1	2.7	40.0	290.0	10.2	2.8	6691.4	24.3	7.0
15	Maharashtra	5643.9	148.1	0.0	5792.0	28.0	7.4	2028.7	651.6	23.6	7.0	0.0	651.6	23.0	6.3	8472.3	30.8	8.9
16	DNH &DD	259.5	5.0	0.0	264.4	1.3	0.3	248.7	1029.7	37.4	11.1	0.0	1029.7	36.4	10.0	1542.9	5.6	1.6

17	Goa	418.3	102.0	0.0	520.3	2.5	0.7	19.7	108.6	3.9	1.2	0.0	108.6	3.8	1.1	648.5	2.4	0.7
18	PowerGrid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	0.3	0.1	0.0	7.3	0.3	0.1	7.3	0.0	0.0
19	HWP of DAE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	0.5	0.2	0.0	14.0	0.5	0.1	14.0	0.1	0.0
20	BARC Facilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.4	0.1	0.0	10.0	0.4	0.1	10.0	0.0	0.0
21	Railways WR	0.0	361.5	0.0	361.5	1.7	0.5	0.0	2.3	0.1	0.0	0.0	2.3	0.1	0.0	363.9	1.3	0.4
	Western Region	**17830.0**	**2839.1**	**0.0**	**20669.1**	**100.0**	**26.5**	**4027.1**	**2756.6**	**100.0**	**29.8**	**72.7**	**2829.3**	**100.0**	**27.5**	**27525.5**	**100.0**	**28.9**
22	Andhra Pradesh	1854.3	0.0	0.0	1854.3	11.1	2.4	0.0	124.3	5.8	1.3	0.0	124.3	5.2	1.2	1978.6	10.2	2.1
23	Telangana	2017.0	0.0	0.0	2017.0	12.1	2.6	0.0	274.6	12.8	3.0	200.1	474.6	19.9	4.6	2491.6	12.8	2.6

24	Karnataka	3597.7	450.0	0.0	4047.7	24.3	5.2	0.0	696.6	32.5	7.5	0.0	696.6	29.2	6.8	4744.4	24.4	5.0
25	Kerala	1537.5	150.0	0.0	1687.5	10.1	2.2	360.0	232.6	10.9	2.5	0.0	232.6	9.8	2.3	2280.1	11.7	2.4
26	Tamil Nadu	6104.8	439.2	0.0	6544.0	39.3	8.4	0.0	560.4	26.1	6.1	37.8	598.2	25.1	5.8	7142.2	36.8	7.5
27	Puducherry	338.6	0.0	0.0	338.6	2.0	0.4	0.0	247.2	11.5	2.7	0.0	247.2	10.4	2.4	585.8	3.0	0.6
28	NLC	166.0	0.0	0.0	166.0	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	166.0	0.9	0.2
29	PowerGrid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	0.4	0.1	0.0	8.3	0.3	0.1	8.3	0.0	0.0
32	Railways	0.0	11.0	0.0	11.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0	0.1	0.0
	Southern Region	**15616.0**	**1050.2**	**0.0**	**16666.2**	**100.0**	**21.4**	**360.0**	**2144.0**	**100.0**	**23.1**	**237.9**	**2381.9**	**100.0**	**23.1**	**19408.0**	**100.0**	**20.4**

33	Bihar	5409.1	0.0	0.0	5409.1	37.4	6.9	710.0	931.4	61.8	10.1	0.0	931.4	61.8	9.0	7050.4	41.6	7.4
34	DVC	3173.6	0.0	0.0	3173.6	22.0	4.1	0.0	15.1	1.0	0.2	0.0	15.1	1.0	0.1	3188.7	18.8	3.4
35	Jharkhand	1533.2	50.0	0.0	1583.2	11.0	2.0	0.0	138.8	9.2	1.5	0.0	138.8	9.2	1.3	1722.0	10.2	1.8
36	Odisha	1598.4	200.0	0.0	1798.4	12.4	2.3	0.0	218.2	14.5	2.4	0.0	218.2	14.5	2.1	2016.6	11.9	2.1
37	West Bengal	2172.0	0.0	0.0	2172.0	15.0	2.8	292.0	186.7	12.4	2.0	0.0	186.7	12.4	1.8	2650.7	15.6	2.8
38	Sikkim	84.3	0.0	0.0	84.3	0.6	0.1	0.0	15.4	1.0	0.2	0.0	15.4	1.0	0.1	99.7	0.6	0.1
39	PowerGrid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.2	0.0	0.0	2.5	0.2	0.0	2.5	0.0	0.0
40	Railways	230.8	0.0	0.0	230.8			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	230.8	1.4	0.2

	Eastern Region	**14201.2**	**250.0**	**0.0**	**14451.2**	**100.0**	**18.5**	**1002.0**	**1508.0**	**100.0**	**16.3**	**0.0**	**1508.0**	**100.0**	**14.6**	**16961.3**	**100.0**	**17.8**
41	Arunachal Pradesh	284.5	0.0	0.0	284.5	10.1	0.4	0.0	4.1	1.5	0.0	6.7	10.7	2.3	0.1	295.3	9.0	0.3
42	Assam	1248.0	142.5	0.0	1390.5	49.2	1.8	0.0	140.9	49.9	1.5	160.9	301.8	64.3	2.9	1692.3	51.3	1.8
43	Manipur	185.5	0.0	0.0	185.5	6.6	0.2	0.0	26.1	9.2	0.3	0.0	26.1	5.6	0.3	211.6	6.4	0.2
44	Meghalaya	206.8	0.0	0.0	206.8	7.3	0.3	0.0	67.5	23.9	0.7	0.0	67.5	14.4	0.7	274.3	8.3	0.3
45	Mizoram	169.7	0.0	0.0	169.7	6.0	0.2	0.0	27.1	9.6	0.3	4.9	32.0	6.8	0.3	201.7	6.1	0.2
46	Nagaland	173.3	0.0	0.0	173.3	6.1	0.2	0.0	13.8	4.9	0.1	14.7	28.5	6.1	0.3	201.9	6.1	0.2
47	Tripura	408.8	0.0	0.0	408.8	14.5	0.5	0.0	2.9	1.0	0.0	0.0	2.9	0.6	0.0	411.7	12.5	0.4

48	PowerGrid	1.5	0.0	0.0	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0
49	Railways	0.0	5.5	0.0	5.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.2	0.0
	North-Eastern	**2678.1**	**148.0**	**0.0**	**2826.1**	**100.0**	**3.6**	**0.0**	**282.4**	**100.0**	**3.0**	**187.2**	**469.6**	**100.0**	**4.6**	**3295.7**	**100.0**	**3.5**
	All India	**70,062**	**7,518**	**374**	**77,954**	**100**	**100**	**6,899**	**9,263**	**100**	**100**	**1043**	**10,306**	**100**	**100**	**95,159**	**100**	**100**
Note :	1. Firm share includes merchant power and capacity allocated / diverted from other stations located within / outside the region.																	
	2. Grand Total power does not include power allocated to Bangladesh. Total Power allocated to Bangladesh = 250 MW (100 MW each from NR and WR and 50 MW from ER NTPC stations' unallocated power).																	
	3. Grand Total power does not include surrendered power by various beneficiaries.																	
	(*) It includes specific allocation to various beneficieries.																	

Annexure- 5A

PFRS under 50 000 MW Hydroelectric Initiative

Statewise List of Schemes

	Scheme	Consultant	Installed Capacity			Head (m)	Annual Energy (GWh)	Tariff (Rs/kWh)
			Nos of Units	Size(MW)	Total (MW)			
Andhra Pradesh								
1	Pondugala	WAPCOS	3	27	81	18.67	399.36	3.48
	Total (Andhra Pradesh) 1 schemes		3		81			
Arunachal Pradesh								
2	Agoline	NHPC	3	125	375	163.00	1267.38	3.51
3	Amulin	NHPC	3	140	420	132.00	1716.40	3.37
4	Ashupani	NHPC	2	15	30	395.00	126.45	8.75
5	Attunli	NHPC	4	125	500	264.00	2247.32	2.35
6	Badao	NEEPCO	4	30	120	154.50	441.00	2.32
7	Bhareli-I	NEEPCO	8	140	1120	97.00	4112.40	1.85
8	Bhareli-II	NEEPCO	5	120	600	51.00	2345.00	1.67
9	Chanda	NEEPCO	4	27.5	110	175.67	401.91	2.67
10	Demwe	NHPC	12	250	3000	138.00	10823.82	1.97
11	Dengser	NHPC	4	138	552	120.	2666.7	3.26

						00	1	
12	Dibbin	NEEPCO	2	50	100	151.24	335.72	2.23
13	Duimukh	NHPC	3	50	150	65.00	551.48	8.50
14	Elango	NHPC	3	50	150	363.00	583.14	5.00
15	Emini	NHPC	4	125	500	125.00	1695.45	3.51
16	Emra-II	NHPC	3	130	390	278.00	1648.09	3.02
17	Etabue	NHPC	3	55	165	378.00	683.66	3.43
18	Etalin	NHPC	16	250	4000	385.00	16071.60	1.70
19	Hirong	NHPC	4	125	500	285.00	2535.80	1.62
20	Hutong	WAPCOS	12	250	3000	166.77	9901.00	1.28
21	Kalai	WAPCOS	10	260	2600	193.21	10608.64	1.01
22	Kameng Dam	NEEPCO	5	120	600	65.00	2345.55	2.29
23	Kapakleyak	NEEPCO	4	40	160	245.00	627.95	1.74
24	KurungI&II	NHPC	3	110	330	151.00	1435.40	4.04
25	Mihumdon	NHPC	4	100	400	286.00	1451.75	3.60
26	Mirak	NHPC	3	47	141	136.40	748.44	3.42
27	Naba	NHPC	4	250	1000	221.00	3995.25	2.14
28	Nalo	NHPC	4	90	360	221.00	1733.00	3.27

29	Naying	NHPC	4	250	1000	245.00	5077.15	1.18
30	Niare	NHPC	4	200	800	205.00	3356.62	2.02
31	Oju-I	NHPC	4	175	700	257.00	3291.58	2.08
32	Oju-II	NHPC	4	250	1000	322.00	4629.93	1.46
33	Pakke	NEEPCO	2	55	110	452.50	335.26	3.33
34	Papu	NEEPCO	2	100	200	238.00	505.00	2.94
35	Phanchung	NEEPCO	2	30	60	157.13	174.83	3.24
36	Ringong	NHPC	3	50	150	166.50	659.07	3.61
37	Sebu	NEEPCO	2	40	80	123.00	227.53	3.71
38	Simang	NHPC	3	30	90	125.00	417.82	5.43
39	Talong	NEEPCO	3	100	300	171.67	915.50	2.24
40	Tarangwarang	NEEPCO	2	15	30	185.55	93.81	2.88
41	Tato-II	NHPC	4	175	700	168.00	3465.90	1.48
42	Tenga	NEEPCO	4	150	600	875.00	1046.50	3.52
43	Utung	NEEPCO	3	33.3	100	291.00	359.13	3.10
	Total (Arunachal Pr.) 42 schemes		**182**		**27293**			
Chhattisgarh								
44	Kotri	WAPCOS	3	50	150	36.99	330.95	5.48
45	Nugur-I	WAPC	5	34	170	24.5	316.13	4.89

		OS				4		
46	Nugur-II	WAPCOS	5	42	210	16.66	787.78	4.16
47	Rehar-I	WAPCOS	3	57	171	46.84	264.38	8.70
48	Rehar-II	WAPCOS	3	49	147	38.17	290.32	5.16
	Total (Chhattisgarh) - 5 schemes		**19**		**848**			
Himachal Pradesh								
49	Bajoli Holi	HPSEB	3	60	180	278.00	762.98	2.03
50	Bardang	HPSEB	*3*	*38*	114	55.00	438.41	2.91
51	Chamba	HPSEB	3	42	126	110.00	646.82	1.48
52	Chhatru	HPSEB	3	36	108	160.00	455.72	2.89
53	Gharopa	HPSEB	3	38	114	169.00	534.25	2.09
54	Gondhala	HPSEB	3	48	144	134.00	586.08	1.92
55	Jangi Thopan	HPSEB	3	160	480	174.14	1779.45	2.00
56	Khab-I	SJVNL	3	150	450	170.00	1551.00	2.24
57	Khab-II	SJVNL	3	62	186	70.00	640.00	3.04
58	Khoksar	HPSEB	3	30	90	99.00	351.91	2.46
59	Luhri	HPSEB	3	155	465	88.00	1825.13	2.41
60	Thopan Powari	HPSEB	3	160	480	161.14	1786.26	1.81
61	Tidong-I	HPSEB	2	30	60	511.50	211.65	2.71

62	Tidong-II	HPSEB	2	35	70	575.00	256.18	2.02
63	Yangthang	HPSEB	3	87	261	186.45	938.02	2.08
	Total (Himachal Pr.) 15 schemes		**43**		**3328**			
Jammu & Kashmir								
64	Barinium	WAPCOS	2	120	240	117.77	1170.34	2.54
65	Bichlari	WAPCOS	2	17.5	35	462.60	148.29	1.11
66	Dumkhar	NHPC	3	15	45	27.80	219.18	4.66
67	Kanyunche	NHPC	3	15	45	28.76	223.02	4.71
68	Karkit	NHPC	3	10	30	26.90	153.11	5.40
69	Kawar	WAPCOS	4	80	320	74.00	1426.56	1.09
70	Khalsi	NHPC	3	20	60	33.00	272.60	4.10
71	Kiru	WAPCOS	4	107.5	430	105.33	1935.77	0.77
72	Ratle	WAPCOS	4	140	560	92.33	2483.37	1.40
73	Shamnot	WAPCOS	4	92.5	370	56.33	1650.19	1.69
74	Shuas	WAPCOS	2	115	230	115.70	1117.87	2.94
75	Takmaching	NHPC	3	10	30	18.53	145.52	5.54
76	Ujh	WAPCOS	4	70	280	143.33	465.06	5.06
	Total (J & K) - 13 schemes		**41**		**2675**			
Karnataka								

77	Agnashini	KPCL	4	150	600	427.00	1431.00	1.07
78	Gangavali	KPCL	2	200	400	378.30	759.00	1.46
79	Gundia	KPCL	2	150	300	600.00	616.00	1.41
80	Kalinadi Stage-III	KPCL	2	150	300	407.67	610.00	1.67
81	Tamankal	KPCL	2	150	300	87.29	401.00	3.32
	Total (Karnataka) - 5 schemes		**12**		**1900**			
Kerala								
82	Karappara Kuriarkutty PH1 PH2	WAPCOS	2 2	18 15	66	390.00 307.00	126.10	7.88
83	Perianjakully	WAPCOS	2	30	60	282.90	86.30	6.25
	Total (Kerala) - 2 schemes		**6**		**126**			
Madhya Pradesh								
84	Basania	NHPC	3	30	90	38.00	240.00	17.23
85	Bauras	NHPC	3	18.33	55	17.50	248.43	3.96
86	Hoshangabad	NHPC	3	20	60	16.50	288.21	4.10
	Total (Madhya Pradesh) - 3 schemes		**9**		**205**			
Maharashtra								
87	Ghargaon	WAPCOS	4	13	52	9.84	74.47	15.50
88	Hiranyakeshi	WAPCOS	2	9	18	36.10	23.76	20.26

89	Kadvi	WAPCOS	2	11	22	36.30	29.59	34.03
90	Kasari	WAPCOS	2	12.5	25	40.67	33.32	18.16
91	Kumbhi	WAPCOS	2	8.5	17	37.48	22.93	35.19
92	Kunghara	WAPCOS	4	18	72	12.77	133.40	11.34
93	Pranhita	WAPCOS	2	24	48	25.30	135.96	10.32
94	Samda	WAPCOS	4	13	52	10.64	83.40	14.11
95	Wainganga	WAPCOS	5	21	105	19.74	246.15	3.86
	Total (Maharashtra) - 9 schemes		**27**		**411**			
Manipur								
96	Khongnum Chakka st.-II	WAPCOS	2	33.5	67	281.25	192.84	4.59
97	Nunglieban	WAPCOS	2	52.5	105	82.42	268.93	5.16
98	Pabaram	WAPCOS	2	95	190	116.67	474.77	4.33
	Total (Manipur) - 3 Nos. schemes		**6**		**362**			
Meghalaya								
99	Mawblei	WAPCOS	2	70	140	400.33	303.66	4.44
100	Mawhu	WAPCOS	3	40	120	438.15	482.96	1.40
101	Mawput	WAPCOS	3	7	21	93.42	83.95	4.07
102	Nongkolait	WAPCOS	2	60	120	463	332.87	1.97
103	Nongnam	WAPCOS	2	25	50	215.17	212.59	2.44

104	Rangmaw	WAPCOS	2	32.5	65	321.00	229.60	2.32
105	Selim	WAPCOS	2	85	170	433.67	534.68	2.02
106	Sushen	WAPCOS	2	32.5	65	114.58	220.6	3.85
107	Umduna	WAPCOS	3	19	57	253.17	231.24	1.68
108	Umjaut	WAPCOS	3	23	69	375.20	276.70	1.51
109	Umngi	WAPCOS	2	27	54	304.75	89.65	2.86
	Total (Meghalaya) - 11 Nos. schemes		**26**		**931**			
Mizoram								
110	Boinu	WAPCOS	4	160	640	158.67	1118.93	4.83
111	Lungleng	WAPCOS	5	163	815	219.67	1169.06	4.17
112	Tlawng	WAPCOS	2	22.5	45	123.67	151.67	5.84
	Total (Mizoram) - 3 Nos. schemes		**11**		**1500**			
Nagaland								
113	Dikhu	NEEPCO	4	35	140	79.44	513.41	2.8
114	Tizu	NEEPCO	3	50	150	64.19	568.41	2.56
115	Yangnyu	NEEPCO	2	20	40	115	176.45	4.48
	Total (Nagaland) - 3 Nos. schemes		**9**		**330**			
Orissa								
116	Baljori	WAPCOS	2	89	178	165.75	479.8	5.9

117	Lower Kolab	WAPCOS	3	155	465	196.9	845.86	7.1
118	Naraj	WAPCOS	7	41	287	16.14	759.31	4.92
119	Tikarpara	WAPCOS	7	37	259	16.97	828.37	3.69
	Total (Orissa) - 4 Nos. schemes		**19**		**1189**			
Sikkim								
120	Dikchu	NHPC	3	35	105	352	469	2.15
121	Lachen	NHPC	3	70	210	350	865.94	2.35
122	Lingza	NHPC	3	40	120	736	477.51	2.85
123	Panan	NHPC	4	50	200	312	762	2.15
124	Rangyong	NHPC	3	47	141	723.18	639.52	2.7
125	Ringpi	NHPC	2	35	70	1106.4	317.41	3.17
126	Rongni Storage	NHPC	3	65	195	442	**510.35**	8.6
127	Rukel	NHPC	3	11	33	537.1	149.41	5.48
128	Talem	NHPC	3	25	75	393.19	305.48	4.34
129	Teesta-I	NHPC	4	80	320	576.85	1298.12	1.8
	Total (Sikkim) - 10 Nos. schemes		**31**		**1469**			
Uttaranchal								
130	Arakot Tiuni	UJVNL	3	24	72	250.2	382.9	1
131	Badrinath	WAPCOS	2	70	140	459.67	702.7	0.81
132	Bagoli Dam	UJVNL	3	24	72	139.5	340.7	4.1
133	Bhaironghati	WAPC	2	32.5	65	108.	293.18	1.8

		OS				9		
134	Bogudiyar - Sirkari Bhyal	WAPCOS	2	85	170	344.47	744	1.99
135	Bokang Baling	WAPCOS	3	110	330	455.2	1124.62	1.68
136	Chhunger - Chal	WAPCOS	2	120	240	292.83	853.28	1.13
137	Deodi	WAPCOS	2	30	60	560.3	296.76	1.37
138	Devsari	WAPCOS	3	100	300	227.5	878.5	2.77
139	Gangotri	WAPCOS	1	55	55	336.33	264.76	1.62
140	Garba Tawaghat	WAPCOS	3	210	630	470.97	2483.11	0.9
141	Gohana Tal	WAPCOS	2	30	60	584.52	269.35	1.64
142	Harsil	WAPCOS	3	70	210	281.33	920.57	1.1
143	Jadh Ganga	WAPCOS	2	25	50	142.6	220.88	2.19
144	Jakhol Sankri	UJVNL	3	11	33	364	**144.24**	1.71
145	Jelam Tamak	WAPCOS	2	30	60	195.58	268.12	1.71
146	Kalika Dantu	WAPCOS	2	115	230	**99.75**	1067.3	2.95
147	Karmoli	WAPCOS	2	70	140	**419.7**	**621.31**	1.3
148	Khartoi Lumti Talli	WAPCOS	2	27.5	55	56.6	241.51	3
149	Lata Tapovan	UJVNL	4	77.5	310	265	1123	2.21
150	Maleri Jelam	WAPCOS	2	27.5	55	200.33	243.07	1.8
151	Mapang - Bogidiyar	WAPCOS	2	100	200	465.07	882.04	1.3

152	Naitwar-Mori	UJVNL	3	11	33	76	151	1.85
153	Nand Prayag	UJVNL	3	47	141	72	794	2.05
154	Ramganga	UJVNL	3	22	66	100.1	327	3.25
155	Rishi Ganga - 1	WAPCOS	2	35	70	536.17	327.3	1.18
156	Rishi Ganga - II	WAPCOS	1	35	35	236.96	164.64	2.22
157	Rupsiabagar Khasiyabara	WAPCOS	2	130	260	449.47	1195.63	1.59
158	Sela Urthing	WAPCOS	2	115	230	255.5	816.73	1.4
159	Sirkari Bhyol Rupsiabagar	WAPCOS	3	70	210	388.97	967.97	1.55
160	Taluka Sankri	UJVNL	2	70	140	564.9	559.47	1.33
161	Tamak Lata	UJVNL	4	70	280	291.4	1040.7	2.3
162	Urthing Sobla	UJVNL	4	70	280	414.96	**1360.2**	1.49
	Total (Uttaranchal) - 33 Nos. schemes		**81**		**5282**			
	Grand Total - 162 Nos. schemes		**525**		**47930**			

Annexure-5B

Hydro Capacity Addition vis-à-vis Target during the Year 2021-22

Sl. No.	Particular	Unit Nos.	Capacity (MW)		Capacity Addition		Remarks/Critical Issues
A.	**State Sector**		**Target**	**Actual**	**As Programmed**	**Actual/ Anticipated**	
1	**Pallivasal** KSEB, Kerala 2x30=60 MW	Unit #1 Unit # 2	30 30		December'21 December'21	2022-23 2022-23	**Slipped**
2	**Thottiyar** KSEB, Kerala 1x30+1x10=40MW	Unit #1 Unit # 2	10 30		December'21 December'21	2022-23 2022-23	**Slipped**
	Sub- total (A):		**100 MW**	**-**			
B.	**Private Sector**						
3	**Sorang** HSPCL, H.P. 2x50=100 MW	Unit #1 Unit # 2	50 50	50 50	June'21 June'21	23.09.2021 21.09.2021	**Commissioned** **Commissioned**
4	**Bajoli Holi** GMRBHHPPL, H.P. 3x60=180 MW	Unit #1 Unit # 2 Unit # 3	60 60 60	60 60 60	June'21 June'21 June'21	25.03.2022 27.03.2022 28.03.2022	**Commissioned** **Commissioned** **Commissioned**
5	**Rongnichu** MBPCL, Sikkim 2x56.5=113 MW	Unit #1 Unit # 2	56.5 56.5	56.5 56.5	May'21 May'21	25.06.2021 30.06.2021	**Commissioned** **Commissioned**
	Sub- total (B):		**393 MW**	**393 MW**			
	Total (A+B)		**493 MW**	**393 MW**			

Annexure-5C

Hydro Capacity addition Programme vis-a-vis achievement for 2022-23

Sl. No.	Particular	Unit Nos.	Capacity (MW)		Capacity Addition		Remarks/Critical Issues
			Target	Actual	As Programmed	Actual(A)/ Anticipated	
A	**Central Sector**						
1	Naitwar mori 2X30=60MW	Unit #1 Unit # 2	30 30		Dec'22 Jan'23	Slipped	-Extended Monsoon -Slow progress of works
2	Subansiri Lower 8x250= 2000 MW	Unit #1 Unit #2	250 250		Jan'23 Feb'23	Slipped	Extended Monsoon & damage to protection wall of power house / collapse of DT-2
3	Tehri PSS 4x250= 1000 MW	Unit #1	250		Mar'23	Slipped	Geological constraints
	Sub total (A)		**810 MW**	-			
B	**State Sector**						
1	Pallivasal KSEB, Kerala 2x30=60 MW	Unit #1 Unit # 2	30 30		Mar'23 Mar'23	Slipped	-Extended Monsoon -Slow progress of works
2	Thottiyar KSEB, Kerala 1x30+1x10=40MW	Unit #1 Unit # 2	10 30		Feb'23 Mar'23	Slipped	-Extended Monsoon -Slow progress of works

Sl. No.	Particular	Unit Nos.	Capacity (MW)		Capacity Addition		Remarks/Critical Issues
			Target	Actual	As Programmed	Actual(A)/ Anticipated	
3	Vyasi 2x60=120 MW	Unit #1 Unit # 2	60 60	60 60	Apr'22 May'22	May'22 (A) April'22(A)	U#1 Commissioned on 24.05.2022 U# 2 Commissioned on 22.04.2022
	Sub- total (B):		**220 MW**	**120 MW**			
C.	**Private Sector**						
1	Tidong-I 2x50= 100 MW	Unit #1	50		Mar'23	Slipped	-Delay in clearance of transmission line -Pressure shaft misalignment issues
	Sub- total (C):		**50 MW**				
	Total (A+B +C)		**1080 MW**	**120 MW**			

Annexure-5D

Hydro Capacity addition Programme for 2023-24

Sl. No.	Name of Project	State/ Implem. Agency	Unit No.	Capacity (MW)	Date of Commissioning (As per developer)	Most likely scenario (as assessed by CEA)
	Central Sector					
1	Naitwar Mori 2x30=60 MW	Uttarakhand /SJVNL	U-1 U-2	30 30	May'23 May' 23	June'23 July'23
2	Subansiri Lower 8x250=2000 MW	Arunachal Pradesh/NHPC	U-1 U-2 U-3 U-4	250 250 250 250	June'23 July'23 Aug'23 Dec'23	Aug'23 Sept'23 Jan'24 Mar'24
3	Parbati St. II 4X200=800 MW	Himachal Pradesh/NHPC	U-1 U-2 U-3 U-4	200 200 200 200	Mar'24 Mar'24 Mar'24 Mar'24	Not likely during 2023-24
4	Tehri PSS 4x250= 1000 MW	Uttarakhand/ THDC	U-1 U-2 U-3 U-4	250 250 250 250	Aug'23 Sept'23 Nov.'23 Dec.'23	Oct'23 Nov'23 Jan'24 Feb'24
		Sub- total (Central):		**2860**	**2860**	**2060**
	State Sector					
5	Pallivasal 2x30= 60 MW	Kerala/ KSEB Ltd.	U-1 U-2	30 30	June'23 June'23	Dec'23 Dec'23
6	Thottiyar 1x30 + 1x10= 40 MW	Kerala/ KSEB Ltd.	U-1 U-2	30 10	Jul'23 Nov'23	Dec'23 Mar'24

		Sub- total (State):		**100**	**100**	**100**
	Private Sector					
7	Tidong-I 3x50=150 MW	Himachal Pradesh/ M/s Statkraft India Pvt. Ltd.	U-1 U-2 U-3	50 50 50	June'24 June'24 June'24	Not likely during 2023-24
8	Pinnapuram 4X240+2X120=1200 MW	M/s Greenko Energies Pvt. Ltd.	U-1 U-2 U-3 U-4 U-5 U-6	240 240 240 240 120 120	Jan'24 Jan'24 Feb'24 Feb'24 Mar'24 Mar'24	Jan'24 Feb'24 Mar'24
		Sub- total (Private):		**1350**	**1350**	**720**
Total (CS+SS+PS)				**4310**	**4310**	**2880**

Total capacity likely to be achieved by 31.03.2024 – 2880 MW

Annexure- 5E

State-wise List of Hydro RMU&LE schemes programmed for completion during 2022-27

Sl. No	Name of Project, Agency Inst. Cap. (No.x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Capacity after RMU&LE	Category	Year of Completion
A. Completed Schemes									
Himachal Pradesh									
1	Bhabha Power House, HPSEB (3x40)	SS	3x40	90.14	43.01	120 (LE)	120	RM&LE	Completed in 2022-23
Uttar Pradesh									
2	Rihand, UPJVNL (6x50)	SS	6x50	132.20	129.55	300 (LE)	300	RM&LE	Completed in 2022-23
Uttarakhand									
3	Tiloth (Maneri Bhali - I), UJVNL (3x30)	SS	3x30	384.66	171.27	90 (LE)	90	RM&LE	Completed in 2022-23
Telangana									
4	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	815.6	R&M	Completed in 2022-23
5	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	29.74	1.50	-	61.2	R&M	Completed in 2022-23
Karnataka									
6	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.60	2.69	-	28	R&M	Completed in 2022-23
7	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	2.75	2.75	-	55	R&M	Completed in 2022-23
Sub Total(A)			**1469.80**	**666.26**	**365.11**	**510 [510(LE)+ 0(U)]**	**1469.80**		
B. Ongoing Schemes – Under Implementation									
Himachal Pradesh									
8	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	570.38	540.00(LE)+ 90.00 (U)	630	RMU&LE	2023-24
Punjab									
9	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	95.48	8.52	-	600	R&M	2023-24
Uttarakhand									
10	Chilla Ph B, UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	156	RMU&LE	2025-26

11	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	88.54	51 (LE)	51	RM&LE	2023-24
12	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	6.93	33.75 (LE)	33.75	RM&LE	2025-26
Uttar Pradesh									
13	Obra, UPJVNL (3x33)	SS	3x33	58.8	46.57	99 (LE)	99	RM&LE	2023-24
Telangana									
14	Pochampad HPS Stage -1, TSGENCO (3x9)	SS	3x9	9.655	-	-	27	R&M	2026-27
Andhra Pradesh									
15	Upper Sileru Power House, APGENCO (4x60)	SS	4x60	10.93	4.94	-	240	R&M	2026-27
16	Nagarjunasagar Right Canal Power House, APGENCO (3x30)	SS	3x30	6.4	2.47	-	90	R&M	2025-26
17	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	4.58	0.59	36 (LE)	36	RM&LE	2025-26
18	Hampi Canal PH, APGENCO (4x9)	SS	4x9	-	-	36 (LE)	36	RM&LE	2025-26
Karnataka									
19	Nagjhari (Unit-1 to 3) KPCL (6x150)	SS	3x150 (U-1 to 3)	266.00	43.28	450 (LE)	450	RM&LE	2025-26
20	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	169.18	11.35	42 (LE)	42	RM&LE	2024-25
21	Kadra Dam Power House, KPCL(3x50)	SS	3x50	44.47	30.82	-	150	R&M	2024-25
22	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.60	12.4	-	120	R&M	2024-25
23	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	2.21	-	240	R&M	2023-24

Annexure- 5F

State-wise List of Hydro RMU&LE schemes programmed for completion during 2027-32

Sl. No	Name of Project, Agency Inst. Cap. (No. X MW)	CS/SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Capacity after RMU&LE	Category	Completion Target
A. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
1	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	328.4	4.17	115 (LE) + 10.83 (U)	125.83	RMU&LE	2027-28
	Sub Total(A)		**115**	**328.4**	**4.17**	**125.83 115 (LE) + 10.83 (U)**	**125.83**		
B. Ongoing Schemes – Under RLA Studies									
Jammu & Kashmir (UT)									
2	Salal Stage-II, (Unit 4,5 &6)NHPC (6x115)	CS	3x115	-	-	345 (LE)	345	RM&LE	2027-32
Himachal Pradesh									
3	Chamera-I, NHPC (3x180)	CS	3x180	-	-	540 (LE)	540	RM&LE	2027-32
Uttarakhand									
4	Tanakpur, NHPC (3x31.4)	CS	3x31.4	-	-	94.2 (LE)	94.2	RM&LE	2027-32
5	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240 (LE)	240	RM&LE	2027-32
6	Khodri, UJVNL (4x30)	SS	4x30	169.63	-	120 (LE)	120	RM&LE	2027-32
Tamil Nadu									
7	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	60	RM&LE	2027-32
8	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	175	RM&LE	2027-32
9	Kundah-III, TANGEDCO(3x60)	SS	3x60	-	-	180 (LE)	180	RM&LE	2027-32
10	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	100	RM&LE	2027-32
11	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	40	RM&LE	2027-32

12	Mettur Tunnel, TANGEDCO(4x50)	SS	4x50	-	-	200 (LE)	200	RM&LE	2027-32
13	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	30	RM&LE	2027-32
14	Sholayar-II, TANGEDCO(1x25)	SS	1x25	-	-	25 (LE)	25	RM&LE	2027-32
15	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	35	RM&LE	2027-32
16	Kadamparai PH, TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	400	RM&LE	2027-32
17	Aliyar, TANGEDCO (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2027-32
18	Lower Mettur-I , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
19	Lower Mettur-II , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
20	Lower Mettur-III , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
21	Lower Mettur-IV , TANGEDCO (2x15)	SS	2x15	-	-	30 (LE)	30	RM&LE	2027-32
Sub Total (B)			**2764.20**	**354.51**	**0.00**	**2764.20 [2764.20 (LE)+ 0(U)]**	**2764.20**		
Total (A+B)			**2879.20**	**682.91**	**4.17**	**2890.03 [2879.20 (LE)+ 10.83(U)]**	**2890.03**		

Annexure-6A

Thermal Capacity Addition Programme (RFD) for the year 2022-23

Sl. No.	Project Name	Unit No.	Capacity (MW)	Developer / Imp. Agency	State	Trial Run/ COD anticipated at the Beginning of the year	Capacity Achieved (MW)	Actual Date of Cap. Addition (Trial Run) / Remarks
CENTRAL SECTOR								
1	Barh STPP-I	2	660	NTPC	Bihar	Dec-22		Non availability of Experts from Russia for TG package resulted in delay of commissioning of the Unit
2	North Karanpura STPP	1	660	NTPC	Jharkhand	May-22	660	18-01-2023
3	Ghatampur TPP	1	660	NUPPL (JV of NLC & UPRVUNL)	U.P.	Dec-22		Slow progress in CHP, AHP, CWPH, FPOS have delayed the project. Additionally Financial mismanagement by BoP Package contractor also delayed the commissioning of BoP packages.
4	Telangana STPP-I	1	800	NTPC	Telangana	Aug-22		tube leakage problems in Reheater & super heater coils delayed the commissioning of the unit.
		2	800			Feb-23		
Total Central Sector			**3580**				**660**	
STATE SECTOR								
5	Sri Damodaran Sanjeevaiah TPP St-	1	800	APGENCO	Andhra Pradesh	Jul'21	800	09-03-2023

	II							
6	Yelahanka CCPP	GT+ ST	370	KPCL	Karnataka	Sep'21		due to non availability of Gas supply, commissioning of the project is held up.
7	Dr. Narla Tata Rao TPS St-V	1	800	APGENCO	Andhra Pradesh	Oct'21		Non-readiness of CHP/AHP system is delaying commissioning of Unit
8	North-Chennai TPP St-III	1	800	TANGEDCO	Tamil Nadu	Dec'21		Non-readiness of CHP/AHP system and problems in CW Pumps resulted in delay of commissioning of the Unit.
Total State Sector			**2770**				**800**	
Total Thermal Capacity			**6350**				**1460**	

PLANT-WISE COAL RECEIPT AND CONSUMPTION IN 2022-23

ANNEXURE-6B

Figures in Thousand Tonnes

S.No	Name of TPS	Capacity (MW)	Receipt			Consumption
			Indigenous	Import	Total	
1	PANIPAT TPS	710	3482	222	3704	3469
2	RAJIV GANDHI TPS	1200	4592	425	5018	4861
3	YAMUNA NAGAR TPS	600	2804	235	3039	2939
4	GH TPS (LEH.MOH.)	920	2610	75	2685	2548
5	ROPAR TPS	840	2700	75	2775	2635
6	CHHABRA-I PH-1 TPP	500	1739	49	1788	2225
7	KOTA TPS	1240	5763	0	5763	5754
8	SURATGARH TPS	1500	4685	8	4693	4719
9	KALISINDH TPS	1200	4182	65	4247	4118
10	SURATGARH STPS	1320	2843	199	3042	3014
11	CHHABRA-I PH-2 TPP	500	2083	0	2083	1586
12	CHHABRA-II TPP	1320	4446	249	4695	4680
13	ANPARA TPS	2630	12824	0	12824	12323
14	HARDUAGANJ TPS	1265	3994	0	3994	3761
15	OBRA TPS	1000	4236	0	4236	4336
16	PARICHHA TPS	1140	3829	0	3829	3726
17	DSPM TPS	500	2653	0	2653	2592
18	KORBA-WEST TPS	1340	7182	0	7182	7031

19	MARWA TPS	1000	3335	0	3335	3413
20	GANDHI NAGAR TPS	630	2479	68	2547	2563
21	UKAI TPS	1110	3696	131	3827	3769
22	WANAKBORI TPS	2270	7513	130	7642	7535
23	AMARKANTAK EXT TPS	210	939	0	939	897
24	SANJAY GANDHI TPS	1340	6308	0	6308	6059
25	SATPURA TPS	1330	2558	0	2558	2419
26	SHREE SINGAJI TPP	2520	9541	0	9541	9461
27	BHUSAWAL TPS	1210	5070	684	5755	5677
28	CHANDRAPUR(MAHARASHTRA) STPS	2920	11083	1488	12571	11940
29	KHAPARKHEDA TPS	1340	6213	543	6755	6614
30	KORADI TPS	2190	9155	548	9703	9360
31	NASIK TPS	630	2258	206	2464	2491
32	PARAS TPS	500	2383	0	2383	2377
33	PARLI TPS	750	3020	0	3020	3007
34	DAMODARAM SANJEEVAIAH TPS	2400	3917	75	3992	3944
35	Dr. N.TATA RAO TPS	1760	9271	0	9271	9340
36	RAYALASEEMA TPS	1650	7154	0	7154	7116
37	BELLARY TPS	1700	5628	21	5650	5574
38	RAICHUR TPS	1720	5250	11	5261	5310
39	YERMARUS TPP	1600	3266	0	3266	3089
40	METTUR TPS	840	4560	0	4560	4417

41	METTUR TPS - II	600	2108	345	2454	2360
42	NORTH CHENNAI TPS	1830	7492	766	8258	8039
43	TUTICORIN TPS	1050	5498	0	5498	5229
44	BHADRADRI TPP	1080	4468	0	4468	4409
45	KAKATIYA TPS	1100	4772	0	4772	4419
46	KOTHAGUDEM TPS (NEW)	1000	5190	0	5190	5038
47	KOTHAGUDEM TPS (STAGE-7)	800	2254	0	2254	2227
48	RAMAGUNDEM-B TPS	62.5	197	0	197	201
49	SINGARENI TPP	1200	5416	0	5416	5402
50	TENUGHAT TPS	420	2060	0	2060	1893
51	IB VALLEY TPS	1740	8787	0	8787	8748
52	BAKRESWAR TPS	1050	4921	0	4921	4922
53	BANDEL TPS	270	1405	0	1405	1412
54	D.P.L. TPS	550	1651	0	1651	1751
55	KOLAGHAT TPS	840	4003	0	4003	4038
56	SAGARDIGHI TPS	1600	7792	0	7792	7835
57	SANTALDIH TPS	500	2718	0	2718	2850
58	DADRI (NCTPP)	1820	5672	1212	6884	6957
59	RIHAND STPS	3000	14091	36	14127	14272
60	SINGRAULI STPS	2000	9676	0	9676	9718
61	TANDA TPS	1760	5925	828	6753	6886
62	UNCHAHAR TPS	1550	5254	707	5961	5784
63	KORBA STPS	2600	14075	98	14174	14475
64	LARA TPP	1600	8328	446	8774	8652

65	SIPAT STPS	2980	13321	695	14016	14026
66	GADARWARA TPP	1600	5015	1077	6092	5848
67	KHARGONE STPP	1320	2770	780	3550	3631
68	VINDHYACHAL STPS	4760	23874	41	23915	23816
69	MAUDA TPS	2320	8790	1462	10252	10036
70	SOLAPUR STPS	1320	3263	763	4026	3872
71	SIMHADRI	2000	8426	1302	9728	9764
72	KUDGI STPP	2400	5861	1349	7210	7019
73	RAMAGUNDEM STPS	2600	10200	764	10964	10732
74	BARAUNI TPS	710	2408	0	2408	2451
75	BARH STPS	1980	8375	309	8684	8567
76	KAHALGAON TPS	2340	10259	770	11029	10881
77	NORTH KARANPURA TPP	660	173	0	173	274
78	DARLIPALI STPS	1600	8378	0	8378	8368
79	TALCHER STPS	3000	15751	579	16330	16491
80	FARAKKA STPS	2100	7031	761	7792	7654
81	BONGAIGAON TPP	750	2974	141	3115	2988
82	INDIRA GANDHI STPP	1500	4802	592	5394	5335
83	MEJA STPP	1320	4207	407	4615	4751
84	BHILAI TPS	500	2729	170	2899	2728
85	VALLUR TPP	1500	7141	380	7521	7288
86	MUZAFFARPUR TPS	390	1967	0	1967	1985
87	NABINAGAR STPP	1980	7162	464	7626	7762
88	NABINAGAR TPP	1000	4715	232	4947	4909

89	BOKARO TPS `A` EXP	500	2004	98	2103	2202
90	CHANDRAPURA(DVC) TPS	500	2100	194	2294	2241
91	KODARMA TPP	1000	4318	453	4771	4613
92	DURGAPUR TPS	210	369	0	369	158
93	DURGAPUR STEEL TPS	1000	4194	425	4619	4593
94	MEJIA TPS	2340	9758	605	10363	10804
95	RAGHUNATHPUR TPP	1200	3427	316	3743	3700
96	MAHATMA GANDHI TPS	1320	4636	401	5038	5018
97	GOINDWAL SAHIB TPP	540	1528	0	1528	1481
98	RAJPURA TPP	1400	5903	122	6024	5821
99	TALWANDI SABO TPP	1980	8190	125	8315	8151
100	KAWAI TPS	1320	4532	918	5450	5054
101	ANPARA C TPS	1200	5083	0	5083	5202
102	BARKHERA TPS	90	274	0	274	246
103	KHAMBARKHERA TPS	90	272	0	272	219
104	KUNDARKI TPS	90	305	0	305	267
105	LALITPUR TPS	1980	7453	0	7453	7036
106	MAQSOODPUR TPS	90	268	0	268	240
107	PRAYAGRAJ TPP	1980	7722	0	7722	7604
108	ROSA TPP Ph-I	1200	4737	0	4737	4653
109	UTRAULA TPS	90	295	0	295	240
110	AKALTARA TPS	1800	6933	93	7026	6824
111	BALCO TPS	600	1636	101	1737	1874
112	BANDAKHAR TPP	300	1191	0	1191	1105

113	BARADARHA TPS	1200	5262	114	5376	5429
114	BINJKOTE TPP	600	1139	0	1139	1105
115	NAWAPARA TPP	600	2189	0	2189	2110
116	PATHADI TPP	600	2519	15	2534	2446
117	TAMNAR TPP	2400	10394	211	10605	10187
118	UCHPINDA TPP	1440	4979	0	4979	4826
119	SABARMATI (D-F STATIONS)	362	1253	238	1491	1463
120	ANUPPUR TPP	1200	5230	262	5491	5455
121	BINA TPS	500	2194	0	2194	2125
122	SEIONI TPP	600	2674	0	2674	2610
123	AMRAVATI TPS	1350	5734	12	5746	5875
124	BUTIBORI TPP	600	0	0	0	0
125	DAHANU TPS	500	1973	251	2224	2203
126	DHARIWAL TPP	600	2737	87	2824	2796
127	DISHERGARH TPP	12	48	0	48	45
128	GMR WARORA TPS	600	2701	37	2739	2760
129	TIRORA TPS	3300	14871	73	14943	14512
130	WARDHA WARORA TPP	540	1788	22	1811	1876
131	PAINAMPURAM TPP	1320	4258	1476	5734	5598
132	SGPL TPP	1320	1525	3590	5116	4807
133	VIZAG TPP	1040	3819	56	3875	3815
134	JOJOBERA TPS	240	1212	0	1212	1190
135	MAHADEV PRASAD STPP	540	2436	31	2467	2391
136	MAITHON RB TPP	1050	4437	0	4437	4351

137	DERANG TPP	1200	4853	41	4894	5542
138	KAMALANGA TPS	1050	4905	196	5100	5124
139	VEDANTA TPP	600	2725	0	2725	2623
140	BUDGE BUDGE TPS	750	3252	10	3262	3228
141	HALDIA TPP	600	3026	50	3076	3030
142	HIRANMAYE TPP	300	1455	0	1455	1482
143	SOUTHERN REPL. TPS	135	408	0	408	382
144	AVANTHA BHANDAR	600	2854	31	2884	2970
145	OP JINDAL TPS	1000	4600	116	4716	4841
146	RAIKHEDA TPP	1370	4559	476	5035	5133
147	MAHAN TPP	1200	2892	212	3104	2671
148	NIGRI TPP	1320	5262	0	5262	4792
149	SASAN UMTPP	3960	16401	0	16401	16471
150	NTPL TUTICORIN TPP	1000	3983	661	4645	4441
151	SIKKA REP. TPS	500	0	878	878	800
152	MUNDRA TPS-I & II	2640	0	3222	3222	3263
153	MUNDRA TPS-III	1980	0	2278	2278	2215
154	MUNDRA UMTPP	4000	0	4397	4397	4851
155	SALAYA TPP	1200	0	1280	1280	1017
156	JSW RATNAGIRI TPP	300	0	318	318	305
157	TROMBAY TPS	750	0	2204	2204	2191
158	SIMHAPURI TPS	600	0	61	61	61
159	THAMMINAPATNAM TPS	300	0	0	0	0
160	TORANGALLU TPS(SBU-I)	260	0	679	679	679

161	TORANGALLU TPS(SBU-II)	600	0	891	891	854
162	UDUPI TPP	1200	0	692	692	650
163	ITPCL TPP	1200	0	1558	1558	1327
164	MUTHIARA TPP	1200	75	1663	1738	1568
165	TUTICORIN TPP ST-IV	525	27	410	437	471
166	CHAKABURA TPP	30	475	0	475	474
167	KASAIPALLI TPP	270	1296	0	1296	1156
168	NIWARI TPP	90	383	0	383	383
169	RATIJA TPS	100	744	0	744	728
170	BELA TPS	270	387	0	387	362
171	MIHAN TPS	246	0	0	0	0
172	NASIK (P) TPS	1350	0	0	0	0
173	SALORA TPP	135	0	0	0	0
174	SHIRPUR TPP	150	0	0	0	0
175	TUTICORIN (P) TPP	300	0	0	0	0
176	UTKAL TPP (IND BARATH)	350	0	0	0	0
177	TITAGARH TPS	240	0	0	0	0
178	GEPL TPP Ph-I	120	0	0	0	0
179	KATGHORA TPP	35	0	0	0	0
180	SVPL TPP	63	0	0	0	0
181	SWASTIK KORBA TPP	25	0	0	0	0
TOTAL ALL INDIA		**205446**	**731652**	**55635**	**787287**	**776790**

ANNEXURE-6C

केंद्रीय विद्युत प्राधिकरण / CENTRAL ELECTRICITY AUTHORITY

Annexure-2B

ईंधन प्रबंधन प्रभाग / FUEL MANAGEMENT DIVISION

गैस पर आधारित विद्युत संयंत्र में ईंधन के वार्षिक आपूर्ति / उपभोग की अख्यायें / ANNUAL REPORT ON FUEL SUPPLY/CONSUMPTION FOR GAS BASED POWER STATIONS

2022-23

S. No	Name of Power Station	Installed Capacity (MW)	Name of the State	P/ I	Actual Generation during the months (MUs)	Domestic Gas Allotted (MMSCMD)			RLNG (Imported)- Long Term Contracts	Gas Consumed/Supplied (MMSCMD)						Alternate fuel used(KL)	
						APM /Non-APM/PMT	KGD-6 (Firm)	Total		Domestic			RLNG (Imported)		TOTAL	Naptha	HSD
										APM /Non APM/PMT	KGD-6/ Auctioned domestic gas	Total	Long Term	SPOT			
(A) CENTRAL SECTOR																	
1	NTPC, FARIDABAD CCPP	431.59	HARYANA	P	2.59	1.46	0.35	1.81	0.20	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
2	NTPC, ANTA CCPP	419.33	RAJASTHAN	P	133.99	1.31	0.24	1.55	0.50	0.00	0.00	0.00	0.07	0.05	**0.11**	3009.57	0.00
3	NTPC, AURAIYA CCPP	663.36	UTTAR PRADESH	P	224.34	2.17	0.30	2.47	1.00	0.00	0.00	0.00	0.08	0.09	**0.17**	5739.90	0.00
4	NTPC, DADRI CCPP	829.78	UTTAR PRADESH	P	683.89	2.39	0.86	3.25	0.30	0.00	0.00	0.00	0.30	0.12	**0.42**	0.00	16502.78
	Sub Total (NR)	**2344.06**			**1044.81**	**7.33**	**1.75**	**9.08**	**2.00**	**0.00**	**0.00**	**0.00**	**0.46**	**0.25**	**0.71**	**8749.47**	**16502.78**
5	NTPC, GANDHAR(JHANORE) CCPP	657.39	GUJARAT	P	267.60	2.56	0.63	3.19	0.00	0.00	0.00	0.00	0.09	0.13	**0.22**	0.00	0.00
6	NTPC, KAWAS CCPP	656.20	GUJARAT	P	264.89	3.64	2.08	5.72	0.00	0.00	0.00	0.00	0.06	0.14	**0.20**	1160.42	76.60
7	RATNAGIRI (RGPPL-DHABHOL)	1967.08	MAHARASHTRA	P	315.94	0.90	7.60	8.50	1.75	0.00	0.00	0.00	0.00	0.16	**0.16**	0.00	0.00
	Sub Total (WR)	**3280.67**			**848.43**	**7.10**	**10.31**	**17.41**	**1.75**	**0.00**	**0.00**	**0.00**	**0.15**	**0.43**	**0.58**	**1160.42**	**76.60**
8	KATHALGURI (NEEPCO)	291.00	ASSAM	I	1689.86	1.40	0.00	1.40	0.00	1.36	0.00	1.36	0.00	0.00	**1.36**	0.00	0.00
9	AGARTALA GT+ST (NEEPCO)	135.00	TRIPURA	I	845.61	0.75	0.00	0.75	0.00	0.68	0.00	0.68	0.00	0.00	**0.68**	0.00	0.00
10	MONARCHAK(NEEPCO)	101.00	TRIPURA	I	747.19	0.50	0.00	0.50	0.00	0.46	0.00	0.46	0.00	0.00	**0.46**	0.00	0.00
11	TRIPURA CCPP (ONGC)	726.60	TRIPURA	I	4936.23	2.65	0.00	2.65	0.00	2.63	0.00	2.63	0.00	0.00	**2.63**	0.00	0.00
	Sub Total (NER)	**1253.60**			**8218.89**	**5.30**	**0.00**	**5.30**	**0.00**	**5.12**	**0.00**	**5.12**	**0.00**	**0.00**	**5.12**	**0.00**	**0.00**
	Total (CS)=A	**6878.33**			**10112.13**	**19.73**	**12.06**	**31.79**	**3.75**	**5.12**	**0.00**	**5.122**	**0.60**	**0.69**	**6.41**	**9909.89**	**16579.38**

(B) STATE SECTOR																	
12	I.P.CCPP	270.00	DELHI	P	331.88	0.95	0.00	0.95	0.60	0.00	0.00	0.00	0.25	0.00	**0.25**	0.00	0.00
13	PRAGATI CCGT-III	1500.00	DELHI	P	2597.89	1.56	0.93	2.49	0.00	1.29	0.00	1.29	0.00	0.08	**1.37**	0.00	0.00
14	PRAGATI CCPP	330.40	DELHI	P	854.53	2.05	0.00	2.05	0.20	0.11	0.00	0.11	0.27	0.16	**0.54**	0.00	0.00
15	DHOLPUR CCPP	330.00	RAJASTHAN	P	0.00	1.50	0.10	1.60	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
16	RAMGARH (RRVUNL,Jaisalmer)	273.80	RAJASTHAN	I	1316.34	1.65	0.00	1.65	0.00	1.13	0.00	1.13	0.00	0.00	**1.13**	0.00	0.81
	Sub Total (NR)	**2704.20**			**5100.64**	**7.71**	**1.03**	**8.74**	**0.80**	**2.53**	**0.00**	**2.53**	**0.52**	**0.23**	**3.28**	**0.00**	**0.81**
17	DHUVARAN CCPP(GSECL)	594.72	GUJARAT	P	0.00	0.25	0.44	0.69	0.25	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
18	HAZIRA CCPP(GSEG)	156.10	GUJARAT	P	0.00	0.80	0.01	0.81	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
19	HAZIRA CCPP EXT	351.00	GUJARAT	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
20	PIPAVAV CCPP	702.00	GUJARAT	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
21	UTRAN CCPP (GSECL)	374.00	GUJARAT	P	4.64	0.00	1.45	1.45	0.24	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
22	URAN CCPP (MAHAGENCO)	672.00	MAHARASHTRA	P	1490.92	3.50	1.40	4.90	0.00	1.14	0.00	1.14	0.00	0.00	**1.14**	0.00	0.00
	Sub Total (WR)	**2849.82**			**1495.56**	**4.55**	**3.30**	**7.85**	**0.49**	**1.14**	**0.00**	**1.14**	**0.00**	**0.00**	**1.14**	**0.00**	**0.00**
23	GODAVARI (JEGURUPADU)	235.40	ANDHRA PRADESH	P	244.66	1.10	0.21	1.31	0.00	0.16	0.00	0.16	0.00	0.00	**0.16**	0.00	0.00
24	KARAIKAL CCPP (PPCL)	32.50	PUDUCHERRY	I	233.07	0.20	0.00	0.20	0.00	0.16	0.00	0.16	0.00	0.00	**0.16**	0.00	0.00
25	KOVIKALPAL (THIRUMAKOTTAI)	107.00	TAMIL NADU	I	169.92	0.45	0.00	0.45	0.00	0.19	0.00	0.19	0.00	0.00	**0.19**	0.00	0.00
26	KUTTALAM (TANGEDCO)	100.00	TAMIL NADU	I	510.82	0.45	0.00	0.45	0.00	0.33	0.00	0.33	0.00	0.00	**0.33**	0.00	0.00
27	VALUTHUR CCPP	186.20	TAMIL NADU	I	1056.12	0.89	0.00	0.89	0.00	0.62	0.00	0.62	0.00	0.00	**0.62**	0.00	0.00
	Sub Total (SR)	**661.10**			**2214.59**	**3.09**	**0.21**	**3.30**	**0.00**	**1.46**	**0.00**	**1.46**	**0.00**	**0.00**	**1.46**	**0.00**	**0.00**
28	LAKWA GT (ASEB,Maibella)	97.20	ASSAM	I	539.00	0.50	0.00	0.50	0.00	0.36	0.00	0.36	0.00	0.00	**0.36**	0.00	0.00
29	LAKWA Replacement CCPP***	69.76	ASSAM	I	504.62	0.40	0.00	0.40	0.00	0.32	0.00	0.32	0.00	0.00	**0.32**	0.00	0.00
30	**NAMRUP CCPP + ST (APGCL)**	162.40	ASSAM	I	633.36	0.66	0.00	0.66	0.00	0.66	0.00	0.66	0.00	0.00	**0.66**	0.00	0.00
31	BARAMURA GT (TSECL)	42.00	TRIPURA	I	301.58	0.40	0.00	0.40	0.00	0.33	0.00	0.33	0.00	0.00	**0.33**	0.00	0.00
32	ROKHIA GT (TSECL)	95.00	TRIPURA	I	248.87	0.50	0.00	0.50	0.00	0.30	0.00	0.30	0.00	0.00	**0.30**	0.00	0.00
	Sub Total (NER)	**466.36**			**2227.43**	**2.46**	**0.00**	**2.46**	**0.00**	**1.96**	**0.00**	**1.96**	**0.00**	**0.00**	**1.96**	**0.00**	**0.00**
	Total (SS)=B	**6681.48**			**11038.22**	**17.81**	**4.54**	**22.35**	**1.29**	**7.09**	**0.00**	**7.089**	**0.52**	**0.24**	**7.85**	**0.00**	**0.81**

(C) PVT/IPP SECTOR																	
33	RITHALA CCPP (NDPL)	108.00	DELHI	P	0.00	0.00	0.40	0.40	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
34	GAMA CCPP	225.00	UTTARAKHAND	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
35	KASHIPUR CCPP(Sravanthi)	225.00	UTTARAKHAND	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
	Sub Total (NR)	**558.00**			**0.00**	**0.00**	**0.40**	**0.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
36	BARODA CCPP (GIPCL)	160.00	GUJARAT	P	0.00	0.36	0.09	0.45	0.30	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
37	ESSAR CCPP	300.00	GUJARAT	P	0.00	0.00	1.17	1.17	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
38	PAGUTHAN CCPP (CLP)	655.00	GUJARAT	P	0.00	0.13	1.30	1.43	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
39	SUGEN CCPP (TORRENT)	1147.50	GUJARAT	P	1547.25	0.90	3.31	4.21	1.14	0.00	0.12	0.12	0.33	0.35	**0.81**	0.00	0.00
40	UNOSUGEN CCPP	382.50	GUJARAT	P	65.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.04**	0.00	0.00
41	DGEN Mega CCPP	1200.00	GUJARAT	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
42	TROMBAY CCPP (TPC)	180.00	MAHARASHTRA	P	622.70	1.50	0.00	1.50	1.00	0.41	0.00	0.41	0.00	0.00	**0.42**	0.00	0.00
43	MANGAON CCPP	388.00	MAHARASHTRA	p	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
	Sub Total (WR)	**4413.00**			**2235.10**	**2.89**	**5.87**	**8.76**	**2.44**	**0.41**	**0.13**	**0.54**	**0.33**	**0.39**	**1.26**	**0.00**	**0.00**

44	GAUTAMI CCPP	464.00	ANDHRA PRADESH	P	0.00	1.96	1.86	3.82	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
45	GMR - KAKINADA (Tanirvavi)	220.00	ANDHRA PRADESH	P	0.00	0.00	0.88	0.88	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
46	GMR-Rajamundry Energy Ltd.	768.00	ANDHRA PRADESH	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
47	GODAVARI (SPECTRUM)	208.00	ANDHRA PRADESH	P	0.00	1.04	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
48	JEGURUPADU CCPP (GVK) PHASE- II	220.00	ANDHRA PRADESH	P	0.00	1.34	0.88	2.22	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
49	KONASEEMA CCPP	445.00	ANDHRA PRADESH	P	0.00	0.00	1.78	1.78	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
50	KONDAPALLI EXTN CCPP .	366.00	ANDHRA PRADESH	P	0.00	0.00	1.46	1.46	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
51	KONDAPALLI ST-3 CCPP (LANCO)	742.00	ANDHRA PRADESH	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
52	KONDAPALLI CCPP (LANCO)	368.14	ANDHRA PRADESH	P	0.00	1.46	0.36	1.82	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
53	PEDDAPURAM (BSES)	220.00	ANDHRA PRADESH	P	0.00	0.84	0.25	1.09	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
54	VEMAGIRI CCPP	370.00	ANDHRA PRADESH	P	0.00	1.64	1.48	3.12	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
55	VIJESWARAN CCPP	272.00	ANDHRA PRADESH	P	365.34	1.32	0.00	1.32	0.00	0.25	0.00	0.25	0.00	0.00	**0.25**	0.00	0.00
56	PCIL POWER AND HOLDINGS Ltd*	30.00	ANDHRA PRADESH	P	-	0.00	0.12	0.12	0.00	-	-	-	-	-	-	-	-
57	RVK ENERGY*	28.00	ANDHRA PRADESH	P	-	0.00	0.11	0.11	0.00	-	-	-	-	-	-	-	-
58	SILK ROAD SUGAR*	35.00	ANDHRA PRADESH	P	-	0.00	0.10	0.10	0.00	-	-	-	-	-	-	-	-
59	LVS POWER*	55.00	ANDHRA PRADESH	P	-	0.00	0.22	0.22	0.00	-	-	-	-	-	-	-	-
60	KARUPPUR CCPP (LANCO TANJORE)	119.80	TAMIL NADU	I	55.15	0.50	0.00	0.50	0.00	0.11	0.00	0.11	0.00	0.00	**0.11**	0.00	0.00
61	P.NALLUR CCPP (PPN)	330.50	TAMIL NADU	I	69.11	1.50	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	15779.50	32.29
62	VALANTARVY CCPP	52.80	TAMIL NADU	I	0.00	0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**	0.00	0.00
	Sub Total (SR)	**5314.24**			**489.60**	**11.98**	**9.50**	**21.48**	**0.00**	**0.36**	**0.00**	**0.36**	**0.00**	**0.00**	**0.36**	**15779.50**	**32.29**
	Total (PVT/ IPP S)=C	**10285.24**			**2724.70**	**14.87**	**15.77**	**30.64**	**2.44**	**0.77**	**0.13**	**0.900**	**0.33**	**0.39**	**1.62**	**15779.50**	**32.29**
	GRAND TOTAL=A+B+C	**23845.05**			**23875.05**	**52.41**	**32.37**	**84.79**	**7.48**	**12.99**	**0.13**	**13.11**	**1.46**	**1.31**	**15.88**	**25689.39**	**16612.48**

Gas Consumed/Supplied v/s Gas Allotted Summary:

Category	Domestic Gas (MMSCMD)			RLNG (Imported)		TOTAL
	APM / Non - APM/ PMT	KGD-6	Total	Long Term	SPOT	
Gas alloted	52.41	32.37	**84.79**	7.48	-	**92.27**
Gas Consumed/Supplied	12.99	0.13	**13.11**	1.46	1.31	**15.88**
% Gas Consumed/Supplied w.r.t Gas Allotted	**25%**	**0%**	**15%**	**19%**	**-**	**17%**

PLF(%)	
2022-23	11.5%

Gas Supply to Pipeline connected and Isolated field connected gas based power plants:

	Pipeline (45 plants)				Isolated (17 plants)	
	Domestic	Imported		Total	Domestic	Import
		Long Term	Spot			
Gas Allocation	71.01	7.48	-	78.49	13.78	**0.00**
Gas Supply	**3.48**	**1.46**	**1.31**	**6.25**	**9.63**	**0.00**
% Gas supply w.r.t allocation	**5%**	**19%**	**-**	**8%**	**70%**	**-**
PLF (%)	**5%**				**54%**	

Plants having NIL Generation during 2021-22 **742** **MW**

APM:Administerd price mechanism, RLNG:Regasified liquefied natural gas, LT:Long term, DNR=Data not received;
MMSCM- Million Metric Standard Cubic Meters, **MMSCMD - Million Metric Standard Cubic Metres/day=MMSCM/(No. of Days in a month)**
P=Supply through Pipe Line, I=Isolated, MU -- Million Unit, KL-- Kilo Litre, (KL=1.35*MT),
HSD -- High Speed Diesel,
*PLANT UNDER SHUT DOWN
** Out of total 515 MW capacity, 300 MW electricity is being supplied to grid & balance 215 MW is used as captive geneartion.

Namrup Power Project (APGCL) Capacity Addition-ST Unit- 36.15 MW in May 2020.
Capacity of Unit No. 4 (11 MW) & Unit No. 5 (24 MW) of Namrup CCPP is being deleted as per PDM Division letter dated 19.08.2020.
NTPC gas allocation figures have been updated based on the information received from NTPC.

Annexure-9A

Outstanding Dues (More than 45 days) Of Power Utilities (Principal and Surcharge) Payable to Central Public Sector Undertakings (CPSU)

Based upon the information received from CPSUs upto 31stMar'23

All Figures in Rs Crores

STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCIL*		DVC		NLC		SJVNL		BBMB		THDC		NHDC		NTPL		TOTAL
	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	
2	3		4		5		6		7		8		9		10		11		12		13		14		15
NORTHERN REGION																									
HARYANA					8	0																			8
UHBVN																									**0.00**
DHBVN				0.00																					**0.00**
HPPC			0.00	0.00															0.00						**0.00**
HPGCL									15.49	1.99															**17.48**
TOTAL (Haryana)	**0.00**	**0.00**	**0.00**	**0.00**	**8.00**	**0.00**	**0.00**	**0.00**	**15.49**	**1.99**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**25.48**
HIMACHAL					49.90	0.00												0.00	0.00						**49.90**
HPSEB	0.00		0.00						0.77	1.70					0.00										**2.47**
Govt.of HP															0.00	0.00		0.03							**0.03**
TOTAL (Himachal)	**0.00**	**0.00**	**0.00**	**0.00**	**49.90**	**0.00**	**0.00**	**0.00**	**0.77**	**1.70**			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**52.40**
DELHI																									**0.00**
DESU																									**0.00**
DTL /NDMC	111.00				7.00	0.00			0.28	0.01						15.97									**134.26**
DPCL																									**0.00**
TPDDL			0.00						0.95	0.00									0.00	0.00					**0.95**
BYPL /BSES YAMUNA	0.00		0.00	0.00	0.00	0.00			86.21	185.86	0.00	0.00							19.63	3.70					**295.40**
BRPL/BSES RAJDHANI			0.00	0.00	0.00	0.00			-5.00	0.00									54.75	0.00					**49.75**
TOTAL (Delhi)	**111.00**	**0.00**	**0.00**	**0.00**	**7.00**	**0.00**	**0.00**	**0.00**	**82.44**	**185.87**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**15.97**	**0.00**	**0.00**	**74.38**	**3.70**	**0.00**	**0.00**	**0.00**		**480.36**
JAMMU & KASHMIR	0.00				872.40	114.20											0.00	0.00							**986.60**
J&K PDD			0.00	0.00					0.00	0.00					202.14	0.00			0.00	0.00					**202.14**
J&K PDCL/JKPCL			19.93	0.36															112.01	0.00					**132.30**
J&K SPTCL									452.82	0.07															**452.89**
TOTAL (J&K)	**0.00**	**0.00**	**19.93**	**0.36**	**872.40**	**114.20**	**0.00**	**0.00**	**452.82**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**202.14**	**0.00**	**0.00**	**0.00**	**112.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1773.93**
PUNJAB	0.00				27.90	0.00																			**27.90**
PSEB																									**0.00**
PSPCL			25.26	0.13					37.47	9.98	0.00	0.00			0.00	0.00			15.33	0.00					**88.17**
TOTAL (Punjab)	**0.00**	**0.00**	**25.26**	**0.13**	**27.90**	**0.00**	**0.00**	**0.00**	**37.47**	**9.98**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**15.33**	**0.00**	**0.00**	**0.00**	**0.00**		**116.07**
RAJASTHAN					0.00	0.00							47.36	0.00											**47.36**
RRVUNL /RSEB																	23.19	12.73							**35.92**
RRVPNL																									**0.00**
JVVNL			7.73	0.00					30.67	7.50					0.00	0.00			0.07						**45.97**
AVVNL			0.00	0.00					5.56	4.56					0.00	0.00			0.08	0.00					**10.20**
JDVVNL	0.00		0.00	0.00					3.77	4.75					0.00	0.00			0.65	0.00					**9.17**
TOTAL (Rajasthan)	**0.00**	**0.00**	**7.73**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**40.00**	**16.81**			**47.36**	**0.00**	**0.00**	**0.00**	**23.19**	**12.73**	**0.80**	**0.00**	**0.00**	**0.00**	**0.00**		**148.62**
OTHERS																									
HWB (KOTA)									7.94	0.00															**7.94**
UTTAR PRADESH	0.00				194.80	0.00	-0.03	0.00																	
UPPCL	0.00		0.00	0.12		0.00	0.00	0.00	157.34	36.62					0.00	0.00			0.00	0.00					**194.08**
UPRVUNL																									**0.00**
UPJVNL																									**0.00**
TOTAL (Uttar Pradesh)	**0.00**	**0.00**	**0.00**	**0.12**	**194.80**	**0.00**	**-0.03**	**0.00**	**157.34**	**36.62**			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**388.85**
UTTARAKHAND																									
UPCL				0.00	0.00				1.22	0.77					0.00	0.00									**1.99**
CHANDIGARH																									
CPDD				0.03	6.80	0.00			4.71	0.00							77.32	9.06	7.31						**105.23**
OTHERS																									
M/s N.F.L. Nangal																	0.06								**0.06**
B.S.L. Project S/Nagar																									**0.00**
Beas Project talwara																									**0.00**
Irrigation Wing, Nangal																									**0.00**
TOTAL (Others)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00		**0.06**
TOTAL (Northern Region)	**111.00**	**0.00**	**52.92**	**0.64**	**1166.80**	**114.20**	**-0.03**	**0.00**	**800.20**	**253.81**	**0.00**	**0.00**	**47.36**	**0.00**	**202.14**	**15.97**	**100.57**	**21.82**	**209.83**	**3.70**	**0.00**	**0.00**	**0.00**		**3100.93**
WESTERN REGION																									
GUJARAT																									**0.00**
GUVNL					0.00	0.00			4.58	1.80															**6.38**
HWB (Gujarat)																									**0.00**
GOA																									**0.00**
GOA ED					0.00	0.00																			**0.00**
MADHYA PRADESH	0.00				0.00	0.00																			**0.00**
MPPCL / MPPTCL	0.00								145.91	9.25															**155.16**
MPPMCL			0.00	0.00							0.00	0.00				0.00			0.10		93.84	0.00			**93.94**
TOTAL (Madhya Pradesh)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**145.91**	**9.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**93.84**	**0.00**	**0.00**		**249.10**
CHHATTISGARH																									
CSEB/CSPDCL			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00															**0.00**
TOTAL(CHHATTISGARH)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**													**0.00**		**0.00**
MAHARASHTRA																									**0.00**
MSEDCL					0.00	0.00			0.38	34.62					0.40	22.17									**57.57**
DADRA NAGAR & SILVASA																									**0.00**
Electricity Department					0.00				0.00	0.00															**0.00**
DAMAN & DIU																									**0.00**
Electricity Department					0.00				0.00																**0.00**
BARC																									**0.00**
IGCAR									0.00	0.00															**0.00**
TOTAL (Western Region)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**150.87**	**45.67**	**0.00**	**0.00**	**0.00**	**0.00**	**0.40**	**22.17**	**0.00**	**0.00**	**0.10**	**0.00**	**93.84**	**0.00**	**0.00**		**313.05**
SOUTHERN REGION																									
ANDHRA PRADESH																									
APEPDCL/APNPDCL /APTRAN	0.00				0.00	0.00			95.94	2.28			152.52	0.00									68.67	0.00	**319.41**
TOTAL (Andhra Pradesh)	**0.00**				**0.00**	**0.00**			**95.94**	**2.28**			**152.52**	**0.00**									**68.67**	**0.00**	**319.41**
KARNATAKA	0.00				29.10	0.00																			**29.10**
BESCOM	0.00				0.00	0.00			6.25	0.00	0.00	0.00	307.96	0.00									4.25	0.00	**318.46**
MESCOM									0.12	0.00			34.34	0.00											**34.46**

WESTERN REGION																									
GUJARAT																									**0.00**
GUVNL					0.00	0.00			4.58	1.80															**6.38**
HWB (Gujarat)																									**0.00**
GOA																									**0.00**
GOA ED					0.00	0.00																			**0.00**
MADHYA PRADESH	0.00				0.00	0.00																			**0.00**
MPPCL / MPPTCL	0.00								145.91	9.25															**155.16**
MPPMCL			0.00	0.00							0.00	0.00				0.00			0.10		93.84	0.00			**93.94**
TOTAL (Madhya Pradesh)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**145.91**	**9.25**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.10**	**0.00**	**93.84**	**0.00**	**0.00**		**249.10**
CHHATTISGARH																									
CSEB/CSPDCL			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00															**0.00**
TOTAL(CHHATTISGARH)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**0.00**	**0.00**													**0.00**		**0.00**
MAHARASHTRA																									**0.00**
MSEDCL					0.00	0.00			0.38	34.62					0.40	22.17									**57.57**
DADRA NAGAR & SILVASA																									**0.00**
Electricity Department					0.00				0.00	0.00															**0.00**
DAMAN & DIU																									**0.00**
Electricity Department					0.00				0.00																**0.00**
BARC																									**0.00**
IGCAR									0.00	0.00															**0.00**
TOTAL (Western Region)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**150.87**	**45.67**	**0.00**	**0.00**	**0.00**	**0.00**	**0.40**	**22.17**	**0.00**	**0.00**	**0.10**	**0.00**	**93.84**	**0.00**	**0.00**		**313.05**
SOUTHERN REGION																									
ANDHRA PRADESH																									
APEPDCL/APNPDCL /APTRAN	0.00				0.00	0.00			95.94	2.28			152.52	0.00									68.67	0.00	**319.41**
TOTAL (Andhra Pradesh)	**0.00**				**0.00**	**0.00**			**95.94**	**2.28**			**152.52**	**0.00**									**68.67**	**0.00**	**319.41**
KARNATAKA	0.00				29.10	0.00																			**29.10**
BESCOM	0.00				0.00	0.00			6.25	0.00	0.00	0.00	307.96	0.00									4.25	0.00	**318.46**
MESCOM									0.12	0.00			34.34	0.00											**34.46**
CESCOM	0.00								0.06	0.66	0.00	0.00	39.93	0.00									0.00	0.00	**40.65**
HESCOM	0.00								25.11	57.09	0.00	0.00	60.86	0.00									2.41	0.00	**145.47**
GESCOM	0.00								18.67	0.23	0.00	0.00	75.65	0.00									6.77	0.00	**101.32**
ESCOMS																									**0.00**
TOTAL (Karnataka)	**0.00**			**0.00**	**29.10**	**0.00**			**50.21**	**57.98**	**0.00**	**0.00**	**518.74**	**0.00**									**13.43**	**0.00**	**669.46**
TELANGANA																									
TSNPDCL/TSSPDCL	0.00				0.00	0.00			453.98	19.27			231.41	0.00									276.81	0.00	**981.47**
Kerala																									
KSEB	0.00				31.40				16.57	5.95			270.83	0.00									0.00		**324.75**
TAMILNADU																									**0.00**
TNEB/TANGEDCO	0.00		0.00	0.22	772.00	0.00			3334.38	101.56			2995.84	237.49									139.22	0.00	**7580.71**
Puducherry																									**0.00**
PED					0.00	0.00			-3.60	0.42			131.43	0.00									0.00	0.00	**128.25**
Others																									**0.00**
BHAVINI									-0.05	11.26															**11.21**
AUGF									0.00	0.00															**0.00**
TOTAL (Southern Region)	**0.00**	**0.00**	**0.00**	**0.22**	**832.50**	**0.00**	**0.00**	**0.00**	**3947.43**	**198.72**	**0.00**	**0.00**	**4300.77**	**237.49**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**498.13**	**0.00**	**10015.26**
EASTERN REGION																									**0.00**
DVC					0.00	0.00																			**0.00**
tang																									**0.00**
BIHAR(NBPDCL/SBPCL/BSEB	0.00		0.00	0.00	0.00	0.00					11.53	0.00													**11.53**
SIKKIM																									**0.00**
Electricity Department			0.00	0.00	0.00	0.00																			**0.00**
WEST BENGAL																									**0.00**
WBSEB	0.00		0.00	0.00	0.00	0.00					0.00	0.00													**0.00**
JHARKHAND																									
JBVNL/JUVNL	0.00		0.00	0.00	12.20	0.00					2956.24	0.00													**2968.44**
ODISHA																									**0.00**
GRIDCO	0.00				0.00	0.00																			**0.00**
OTHERS																									**0.00**
MEA (Power to Nepal)			0.00	0.00																					**0.00**

PTC (Regulated Power)																									**0.00**
TOTAL (Others)																									**0.00**
TOTAL (Eastern Region)	**0.00**	**0.00**	**0.00**	**0.00**	**12.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2967.77**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2979.97**
NORTH EASTERN REGION																									**0.00**
ARUNACHAL PRADESH																									
Department of Power	0.00		0.00	0.00	0.00	0.00	0.00	0.00																	**0.00**
ASSAM																									
APDCL	0.00				0.00	0.00	0.00	0.00																	**0.00**
MANIPUR																									**0.00**
Electricity Department	0.00		0.00	0.00	9.00	0.00	23.74	0.14																	**32.88**
MEGHALAYA																									**0.00**
MeEcl/MeSEB	651.00		1.20	0.00	5.10	0.00	0.00	0.00																	**657.30**
MIZORAM																									**0.00**
Electricity Department	0.00		0.00	0.00	3.40	0.30	17.33	0.26																	**21.29**
NAGALAND																									**0.00**
Department of Power	0.00		0.00		0.00	0.00	0.00	0.00																	**0.00**
TRIPURA																									**0.00**
TSECL	0.00				0.00	0.00	137.26	0.00																	**137.26**
TOTAL (NE Region)	**651.00**	**0.00**	**1.20**	**0.00**	**17.50**	**0.30**	**178.33**	**0.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**848.73**
Andaman&Nicobar																									
Electricity Deptt	0.00												0.00	1.00											**1.00**
PGCIL	0.00																								
NVVN							0.01	0.00																	
GRAND-TOTAL	**762.00**	**0.00**	**54.12**	**0.86**	**2029.00**	**114.50**	**178.31**	**0.40**	**4898.50**	**498.20**	**2967.77**	**0.00**	**4348.13**	**238.49**	**202.54**	**38.14**	**100.57**	**21.82**	**209.93**	**3.70**	**93.84**	**0.00**	**498.13**	**0.00**	**17258.95**

Note * :Rebates availed by utilities are taken into considertion in Realization of outstanding dues at the end of the month.

Utilities

APCPDCL	**Andhra Pradesh Central Power Distribution Company Ltd.**
APEPDCL	**Andhra Pradesh Eastern Power Distribution Co. Ltd.**
APGCL	**Assam Power Generation Corporation Ltd.**
APNPDCL	**Andhra Pradesh Northern Power Distribution Co. Ltd.**
APSPDCL	**Andhra Pradesh Southern Power Distribution Co. Ltd.**
APTRANSCO	**Andhra Pradesh Transmission Corporation Ltd.**
AVVNL	**Ajmer Vidyut Vitran Nigam Ltd.**
BBMB	**Bhakra Beas Management Board**
BESCOM	**Bangalore Electricity Supply Company Ltd.**
BRPL	**BSES Rajdhani Power Ltd.**
BYPL	**BSES Yamuna Power Ltd.**
CESCOM	**Chamundeshwari Electricity Supply Company Ltd.**
CPDD	**Chandigarh Power Development Department.**
DHBVN	**Dakshin Haryana Bijli Vitran Nigam**
DPCL	**Delhi Power Company Ltd.**
DTL	**Delhi Transco Ltd.**
DESU	**Delhi Electric Supply Undertaking**
DVC	**Damodar Valley Corporation**
ESCOMS	**Electricity Supply Company (Karnataka)**
GESCOM	**Gulbarga Electricity Supply Company Ltd.**
GOAED	**Goa Electricity Department**
GUVNL	**Gujarat Urja Vikas Nigam Limited**
HESCOM	**Hubli Electricity Supply Company Ltd.**
HPGCL	**Haryana Power Generation Corporation Ltd.**
HVPNL	**Haryana Vidyut Prasaran Nigam Ltd.**
UHBVN	**Uttar haryana Bijli Vitran Niagam**
HPSEB	**Himachal Pradesh State Electricity Board**
HWB(Gujarat)	**Heavy Water Board**
HPPC	**Haryana Power Purchase Centre**
HWB(Kota)	**Heavy Water Board (Kota)**
J&K PDCL	**Jammu & Kashmir Power Development Corporation Ltd.**
J&K PDD	**Jammu & Kashmir Power Development Department**
JDVVNL	**Jodhpur Vidyut Vitran Nigam Ltd.**
JVVNL	**Jaipur Vidyut Vitran Nigam Ltd.**

36 MEA	**Ministry of External Affairs**
37 MESCOM	**Mangalore Electricity Supply Company Ltd.**
38 MPPGCL	**Madya Pradesh Power Generation Co. Ltd.**
39 MPPTCL	**Madya Pradesh Power Transmission company Ltd.**
40 MPPMCL	**Madya Pradesh Power Management company Ltd.**
41 MSEDCL	**Maharashtra State Electricity Distribution Co. Ltd.**
42 TPDDL	**Tata Power Delhi Distribution Limited**
43 NEEPCO	**North Eastern Electric Power Corporation Ltd.**
44 NHDC	**Narmada Hydro Development Corporation**
45 NHPC	**National Hydro Power Corporation**
46 NLC	**Nyveli Lignite Corporation**
47 NPCIL	**Nuclear Power Corporation of India Ltd.**
48 NTPC	**National Thermal Power Corporation**
49 PED	**Pondicherry Electricity Department**
50 PGCIL	**Power Grid Corporation of India Ltd.**
51 PSPCL	**Punjab State Power Corporation Ltd.**
52 RRVPNL	**Rajasthan Rajya Vidyut Prasaran Nigam Ltd.**
53 RRVUNL	**Rajasthan Rajya Vidyut Utpadan Nigam Ltd.**
54 SJVNL	**Satluj Jal Vidyut Nigam Ltd.**
55 THDC	**Tehri Hydro Development Corporation**
56 TSECL	**Tripura State Electricity Corp. Ltd.**
57 UHBV	**Uttar Haryana Bijli Vitran Nigam**
58 UPCL	**Uttarakhand Power Corporation Ltd.**
59 UPJVNL	**Uttar Pradesh Jal Vidyut Nigam Ltd.**
60 UPPCL	**Uttar Pradesh Power Corporation Ltd.**
61 UPRVUNL	**Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd.**
62 PTC	**Power Trading Corporation**
63 NTPL	**NLC Tamilnadu Power Ltd.**

Annexure 9B

Annexure-9B

CENTRAL ELECTRICITY AUTHORITY

FINANCIAL STUDIES & ASSISTANCE DIVISION

STATEMENT SHOWING ESTIMATED AVERAGE RATES OF ELECTRICITY (FY 2021-22)

(Rates in Paise/KWh)

S. No.	Name of State/Utility	Tariff effective from	Domestic			Commercial				Agriculture			Small Industry 10KW (1500 KWh/ Month)	Medium Industry 50KW (7500 KWh/ Month)	Large Industry (11KV) 1000KW 60%L.F. (438000 KWh/ Month)	Heavy Industry (11KV) 10000KW 60%L.F. (4380000 KWh/ Month)	Heavy Industry (33KV) 20000KW 60%L.F. (8760000 KWh/ Month)	Railway Traction 12500KW (25000000 KWh/ Month)	
			1KW (100 KWh/ Month)	4KW (400 KWh/ Month)	10KW (1000 KWh/ Month)	2KW (300 KWh/ Month)	10KW (1500 KWh/ Month)	30KW (4500 KWh/ Month)	50KW (7500 KWh/ Month)	2HP (400 KWh/ Month)	5HP (1000 KWh/ Month)	10HP (2000 KWh/ Month)							
1	Andaman & Nicobar Islands	01.06.2021	245.00	546.25	715.50	826.67	1142.00	1230.67	1248.40	180.72	180.72	180.72	837.04	917.04	-	-	-	-	
2	Andhra Pradesh	01.04.2021	276.00	602.25	833.00	901.83	1029.83	1057.28	1062.77	356.00 #	356.00 #	356.00 #	726.00	726.00	783.31	783.31	735.94	763.16	
3	Arunachal Pradesh	01.06.2018	400.00	400.00	400.00	500.00	500.00	500.00	500.00	310.00	310.00	310.00	430.00	430.00	385.00	385.00	350.00	-	
4	Assam	01.04.2021	567.00	700.88	761.25	847.00	847.00	893.74	893.74	469.12	469.12	469.12	567.00 U	746.01	709.36	709.36	709.36	810.04	
													533.75 R						
5	Bihar	01.04.2021	689.00 U	814.88 U	863.37 U	855.07 U	900.29 U	907.83 U	909.34 U	604.20	604.20	604.20	866.84	895.11	830.91	-	819.14	at 132kV 900.00	at 132 kV
			683.70 R	698.28 R	705.43 R	740.23 R	788.29 R	796.30 R	797.90 R										
6	Chandigarh	01.04.2021	269.00	378.38	441.75	537.67	567.67	574.33	575.67	260.00	260.00	260.00	461.00	564.33	506.66	506.66	506.66	-	
7	Chhattisgarh	01.08.2021	408.80	500.60	688.12	746.40	945.39	962.13	962.13	540.00	540.00	540.00	595.00	698.00	1041.80	1041.80	988.46	697.22	at 132 kV
8	Dadra & Nagar Haveli	01.04.2021	185.00	228.75	283.50	383.33	404.67	408.22	408.93	75.00	75.00	75.00	406.76	482.60	557.03	557.03	-	-	
9	Daman & Diu	01.04.2021	160.00	215.00	266.00	378.33	399.67	402.67	403.93	75.00	75.00	75.00	435.75	435.75	546.58	546.58	-	-	
10	Delhi (BYPL/BRPL/NDPL)	01.10.2021	335.00	443.75	677.50	885.19	1176.85	1176.85	1176.85	204.13	204.13	204.13	1089.35	1089.35	941.75	941.75	933.14	870.39	
11	Delhi (NDMC)	01.10.2021	335.00	443.75	677.50	885.19	1176.85	1176.85	1176.85	204.13	204.13	204.13	1089.35	1089.35	941.75	941.75	933.14	870.39	
12	Goa	01.04.2021	195.00	282.50	380.00	511.67	575.67	588.78	591.27	179.00	179.00	179.00	482.41	497.08	666.75	666.75	666.75	-	
13	Gujarat	01.04.2021	393.88 U	504.56 U	565.80 U	562.00	562.00	616.67	672.00	90.00	90.00	90.00	579.33	588.46	550.68	625.98	629.53	600.00	at 132 kV
			325.19 R	432.69 R	493.96 R														
14	Torrent Power Ltd. (Ahmedabad)	01.04.2021	439.88	511.03	554.01	608.00	624.00	716.00	716.00	340.00	340.00	340.00	572.00	656.33	599.72	599.71	-	-	
15	Torrent Power Ltd. (Surat)	01.04.2021	422.63	506.72	555.74	578.00	578.00	719.78	719.78	70.00	70.00	70.00	529.83	659.80	623.65	623.64	-	-	
16	Haryana	01.04.2021	235.00	471.25	612.50	715.56	715.56	827.78	827.78	10.00	10.00	10.00	715.56	827.78	790.75	790.75	779.63	840.56	at 11kV
17	Himachal Pradesh	01.06.2021	476.85	503.53	538.22	594.13	559.47	663.48	663.48	429.50	416.00	411.50	493.83	635.78	637.97	637.97	635.15	796.67	at 66 kV
18	Jammu & Kashmir and Ladakh	01.10.2016	200.10	307.34	369.27	419.75	656.27	656.27	656.27	84.53	84.53	84.53	417.83	415.53	441.28	441.28	429.10	-	
19	Jharkhand	01.10.2020	720.00 U	667.75 U	656.50 U	680.00 U	696.67 U	696.67 U	696.67 U	512.00	512.00	512.00	759.90	759.90	649.01	649.01	626.78	838.53	at 25 kV
			615.00 R	604.00 R	601.00 R	611.67 R	638.33 R	638.33 R	638.33 R										
20	Karnataka	01.04.2021	610.93 D	861.63 D	934.66 D	1070.98 D	1085.52 D	1087.94 D	1088.42 D	0.00	0.00	0.00	824.43 D	938.17 D	900.70 D	907.42 D	905.80 D	852.84	
			574.13 F	809.51 F	875.11 F	1009.82 F	1024.35 F	1026.77 F	1027.26 F				772.73 F	884.80 F	878.86 F	883.34 F	881.58 F		
21	Kerala	08.07.2019	421.75	879.00	1019.00	860.67	1069.67	1116.33	1116.33	256.73	256.73	256.73	629.50	758.43	671.25	671.25	671.25	676.67	at 110 kV
22	Lakshadweep	01.04.2021	155.00	417.50	578.00	791.67	918.33	939.44	943.67	-	-	-	687.04	687.04	958.05	958.05	-	-	
23	Madhya Pradesh	08.07.2021	619.12 U	930.05 U	986.76 U	845.88 U	851.82 U	946.28 U	946.50 U	526.75	583.10	609.05	951.93 U	951.93 U	802.73	802.73	856.29	762.22	at 132/220kV
			598.41 R	918.93 R	975.59 R	822.32 R	828.09 R	915.64 R	915.85 R				868.37 R	868.37 R					
24	Maharashtra	01.04.2021	677.44	1015.58	1308.02	1222.18	1088.28	1863.57	1863.57	350.00	350.00	350.00	739.51	1053.31	1035.07 B	1035.07 B	1035.07	1064.44	
															1066.13 C	1066.13 C			
25	Mumbai (B.E.S.T)	01.04.2021	481.92	739.44	1006.82	992.36	861.68	1134.11	1134.11	394.00	394.00	394.00	728.49	995.25	848.03	848.03	-	841.67	at 33/11kV
26	Mumbai (Adani Electricity)	01.04.2021	636.20	800.05	969.70	1057.70	927.02	1243.01	1243.01	546.00	546.00	546.00	816.64	1097.37	907.76	907.76	-	853.89	at 33/11kV
27	Mumbai (TATA'S)	01.04.2021	534.12	802.37	1050.32	1029.87	899.19	1172.83	1172.83	398.00	398.00	398.00	759.67	1018.90	873.12	873.12	-	841.67	at 33/11kV
28	Manipur	01.05.2021	575.00	678.75	715.50	771.67	811.67	818.33	819.67	479.25	479.25	479.25	531.67	877.78	1004.41	1004.41	-	-	
29	Mizoram	01.04.2021	530.00	602.50	625.00	745.83	755.83	757.50	757.83	383.65	383.65	383.65	673.67	685.40	850.90	850.90	-	-	
30	Meghalaya	01.04.2021	465.00	575.00	629.00	782.67	809.33	813.78	814.67	347.03	347.03	347.03	782.78	782.78	817.06	816.92	783.58	-	
31	Nagaland	01.04.2020	522.50	618.13	667.25	812.00	874.40	884.80	886.88	310.00	310.00	310.00	633.33	673.33	729.03	729.90	-	-	
32	Odisha	04.04.2021	425.60	547.80	618.00	709.87	790.29	803.70	806.38	160.50	158.00	157.50	677.33	723.20	720.34	720.34	695.22	723.90	
33	Puducherry	01.04.2021	195.00	382.50	516.00	702.50	780.50	793.50	796.10	0.00 S	0.00 S	0.00 S	638.33	638.33	695.43	-	688.43	-	
34	Punjab	01.06.2021	462.17	709.64	859.03	834.32	870.02	880.98	880.98	566.00 WS	566.00 WS	566.00 WS	741.20	828.67	842.40	868.93	868.93	963.33	at 132KV
35	Rajasthan	24.11.2021	832.50	830.00	844.50	1021.67	1045.67	1155.22	1157.13	574.00	574.00	574.00	793.30	867.77	763.49	-	744.59	710.00	
36	Sikkim	01.04.2021	150.00	287.50	355.00	483.33	598.67	697.99	702.16	-	-	-	621.67 U	676.86	820.42	820.42	-	-	
													460.00 R						
37	Tamil Nadu	11.08.2017	85.00	470.00	584.00	840.88	883.58	890.69	892.12	0.00	0.00	0.00	685.13	685.13	759.98	759.98	759.98	841.75	
38	Telangana	01.04.2018	238.50	668.50	821.00	911.00	1011.00	1034.33	1039.00	257.50 $	253.50 $	251.50 $	721.00	731.00	800.11	799.77	747.12	631.65	at 33 kV
39	Tripura	01.09.2020	547.58	642.73	792.75	743.36	825.96	825.96	825.96	393.65	393.65	513.18	795.50	821.30	-	-	-	-	
40	Uttarakhand	01.04.2021	355.00	510.00	598.00	665.00	665.00	777.94	777.94	208.00	208.00	208.00	593.33	661.37	740.71	740.71	740.71	708.82	
41	Uttar Pradesh	09.08.2021	693.00 U	738.94 U	800.63 U	1042.75 U	1218.69 U	1248.31 U	1254.24 U	665.00 U	665.00 U	665.00 U	1003.33 U	1057.08 U	984.56 U	984.56 U	943.74	1270.59	Below 132KV
			446.25 R	574.22 R	659.14 R	670.08 R	670.08 R	670.08 R	670.08 R	235.00 R	235.00 R	235.00 R	928.08 R	977.80 R	910.72 R	910.72 R		1235.29	132KV & above
42	West Bengal (WBSEDCL)	01.04.2021	653.89 U	869.24 U	967.22 U	906.09 U	1053.54 U	1071.25 U	1074.79 U	510.43	510.43	510.43	782.45 U	921.04 U	964.17	964.17	958.42	936.00	at 25KV
			640.07 R	856.09 R	961.96 R	905.36 R	1053.39 R	1071.20 R	1074.76 R				762.64 R	893.67 R				936.00	at 132KV
43	West Bengal- CESC Ltd. (Kolkata)	01.04.2021	613.32	852.45	959.84	882.62	1052.82	1074.50	1078.84	-	-	-	779.72	921.79	887.12	887.12	859.52	775.33	
44	West Bengal-IPCL	01.04.2019	444.21	591.03	629.55	582.73	656.57	651.16	651.16	241.95 ^	241.95 ^	241.95 ^	512.39	618.25	626.07	626.07	451.27 ^	661.33	
45	D.V.C. Jharkhand Area	01.10.2020	520.00	468.00	457.00	550.00	550.00	550.00	550.00	317.00	317.00	317.00	616.76	616.76	540.19	540.19	524.13	621.00	

^ TOD tariff from 23:00 hrs to 06:00 hrs for IPCL in West Bengal.

Note: Electricity duty of Jharkhand is of the year 2020-21.

B : General Industry C : Seasonal Industry D : Bangalore, Devangere & Other City Municipal Corp. F : Areas under Village Panchayats U : Urban R : Rural O : Other Areas

WS: Without Subsidy # Without Demand side management measures $ For Corporate Farmers S : With Subsidy

Tariffs notified have varying parameters for various categories of consumers.The above comparision is based on certain assumed loads and electricity consumption levels in a month.

Annexure-10A

All India Sector wise/Organisation wise Target, Actual Genertion & PLF(%) for the year 2022-23

Fuel, Sector/Organisation	Target (MU)	Actual (MU)	PLF (%)
THERMAL			
CENTRAL SECTOR			
APCPL	5067	8268.17	62.92
BRBCL	5567	6926.8	79.07
DVC	41248	43084.76	73.43
JHAPL	4264	3727.99	70.93
K.B.U.N.L	2490	2991.96	87.58
MUNPL	7101	7366.82	63.71
NEEPCO.	2907	3282.66	**
NLC	20396	21959	68.87
NPGCL	9934	12924.67	78.51
NSPCL	4092	3791.95	86.57
NTECL	8143	9566.74	72.81
NTPC Ltd.	299025	321059.43	75.74
NTPL	6491	5930.01	67.69
NUPPL	1488	0	**
ONGC	4196	4936.23	**
RGPPL	3027	315.94	****
SJVNL	0	0	
THDC	0	0	
TOTAL CENTRAL SECTOR	**425436**	**456133.13**	**74.67**
STATE SECTOR			
HPGCL	12487.00	15722.58	71.51
IPGCL	453.00	331.88	**

JKSPDC	0.00	0.00	**
PPCL	5897.00	3452.42	**
PSPCL	6237.00	7449.42	48.32
RRVUNL	46180.00	39362.73	55.47
UPRVUNL	37119.00	34796.96	65.22
CSPGCL	18930.00	17709.62	71.18
GMDCL	904.00	821.94	37.53
GPPCL	1198.00	6.56	**
GSECL	25190.00	23543.35	52.07
GSEGL	689.00	0.97	**
MAHAGENCO	61090.00	53232.28	61.91
MPPGCL	30143.00	27352.08	57.82
APEPDCL	531.00	244.66	**
APGENCO	25612.00	20434.72	68.41
APPDCL	12569.00	5883.05	41.97
KPCL	22113.00	13679.32	45.66
KSEB	0.00	0.12	#
LAKSH		15.02	#
P&ED, Pudu.	226.00	233.07	#
RPCL	7097.00	4739.40	33.81
SCCL	9112.00	9304.71	88.52
TANGEDCO	32011.00	24426.98	59.96
TSGENCO	28935.00	25374.12	71.65
A&N ADM	151.00	97.31	#
DPL	2741.00	2707.16	56.19
OPGC	11474.00	11724.28	76.92
TVNL	2183.00	2585.54	70.27
WBPDC	26384.00	31854.19	85.36
APGCL	1244.00	1676.98	**
ED, Manipur	0.00	0.00	**

TSECL	552.00	550.45	**
Total STATE SECTOR	**429452**	**379313.87**	**61.86**
PVT. SEC. UTILITY			
AEML	3868.00	3498.90	79.88
A&N ADM		117.26	#
CESC	5870.00	5966.39	60.54
DPSCLTD		43.50	0.00
TATA PCL	4157.00	4770.23	63.13
TOR. POW. (UNOSUGEN)	2782.00	2798.01	88.23
TOTAL PVT SECTOR UTIL	**16677**	**17194.29**	**68.45**
PVT. SEC. IPP			
ABAN POWR	448.00	55.15	**
ACB	2226.00	1334.54	46.88
ACPL	0.00	0.00	0.00
ADHUNIK	3756.00	3497.06	73.93
AMNEPL	0.00	0.00	0.00
APGPCL	832.00	365.34	**
APL	55964.00	40995.77	50.65
BALCO	3346.00	2541.09	48.35
BELLARY	0.00	0.00	#
BEPL	1304.00	1446.63	36.70
BIPL	0.00	0.00	
BLAPPL	614.00	318.71	40.43
BSES AP	0.00	0.00	
BSES(C)	0.00	0.00	
CEPL	3164.00	2349.99	22.36
CGPL	11500.00	11730.07	33.48
CLPINDIA	0.00	0.00	
CPL	0.00	0.00	0.00
DBPCL	8176.00	7632.45	72.61

DIL	2233.00	4229.47	80.47
EPGL	4756.00	2056.52	19.56
ESSAR	0.00	0.00	
ESSARPMPL	6694.00	3782.92	35.99
GAUTAMI	0.00	0.00	
GCEL	8528.00	7084.49	59.03
GEPL	0.00	0.00	0.00
GIPCL	2748.00	2904.27	66.31
GIPL	353.00	0.00	
GMR ENERG	11634.00	11399.50	78.87
GPGSL (GVK)	3036.00	2141.36	45.27
GREL	0.00	0.00	
GVKP&IL	0.00	0.00	
HEL	4450.00	4219.33	80.28
HMEL	1008.00	1878.54	71.48
HNPC	2536.00	4838.14	53.11
IBPIL	0.00	0.00	0.00
IEPL	96.00	759.21	32.10
ITPCL	4738.00	2302.51	21.90
JhPL(HR)	7615.00	8145.93	70.45
JITPL	6619.00	7862.69	74.80
JPL	14448.00	18968.03	63.69
JPPVL	12071.00	11016.09	69.10
JSWBL	7176.00	7285.68	77.01
JSWEL	3724.00	4530.03	44.58
KONA	0.00	0.00	
KONDAPALI	646.00	0.00	
LANCO	4762.00	3235.81	61.56
LAPPL	8721.00	8129.22	77.33
LBPL	0.00	0.00	0.00

LPGCL	9649.00	11334.39	65.35
LVS POWER	0.00	0.00	
LVTPL	0.00	0.00	0.00
MADURAI P	0.00	0.00	
MBPMPL	7808.00	7518.22	71.52
MCCPL	2232.00	1513.15	57.58
MEL	232.00	0.00	0.00
MPL	7407.00	7558.98	82.18
NPL	9945.00	10379.53	84.63
PENNA	0.00	0.00	
PGPL	0.00	0.00	
PPGCL (Jaypee)	11777.00	12509.99	72.13
PPNPGCL	48.00	69.11	
RATTANINDIA	8361.00	9127.46	77.18
REGL	3802.00	3968.28	75.50
RELIANCE	0.00	0.00	
RKMPPL	6705.00	5997.92	47.55
RPSCL	6489.00	7511.05	71.45
SAMALPATI	0.00	0.00	
SCPL	712.00	537.07	61.31
SEIL	17835.00	16999.20	73.51
SEPCPPL	2029.00	922.46	0.00
SEPL	0.00	135.53	2.58
SKS	2649.00	1452.13	27.63
SPGL	439.00	0.00	
SPL	32531.00	29763.91	85.80
SPPL	0.00	0.00	0.00
SrEPL	702.00	0.00	
ST-CMSECP	1347.00	1217.31	55.58
STPL	0.00	0.00	0.00

SVPPL	0.00	0.00	0.00
TATA PCL	1698.00	1788.09	85.05
TOR. POW. (SUGEN)	4800.00	1547.25	
TOR. POW. (UNOSUGEN)	1890.00	65.15	
TPDDL	0.00	0.00	
TRNE	3042.00	2588.65	49.25
TSPL	12181.00	11535.85	66.51
UPCL	3968.00	1410.93	13.42
VEDANTA	2029.00	3323.09	63.22
VEMAGIRI	0.00	0.00	
VESPL	0.00	0.00	0.00
VIP	0.00	0.00	0.00
VVL	0.00	0.00	0.00
WPCL	13180.00	13415.48	65.45
TOTAL PVT SECTOR IPP	**385409**	**353226.72**	**56.18**
PVT. SEC. IMP			
GIPCL	120.00	0.00	
ICCL	198.00	310.58	
NALCO	96.00	32.08	
TOTAL PVT SECTOR IMP	**414**	**342.66**	**0.00**
TOTAL IPP & IMP	**385823**	**353569.38**	**56.18**
TOTAL PVT. SECTOR	**402500**	**370763.67**	**56.64**
THERMAL TOTAL	1257388.00	1206210.67	64.15
NUCLEAR			
CENTRAL SECTOR			
DAE	0	0	
NPCIL	43324	45861.09	77.22
TOTAL CENTRAL SECTOR	**43324**	**45861.09**	**77.22**
TOTAL NUCLEAR	**43324**	**45861.09**	**77.22**

HYDRO			
CENTRAL SECTOR			
BBMB	9644	10824.72	
DVC	290	236.61	
NEEPCO.	5151	5202.44	
NHDC	3265	5443.49	
NHPC	**11168**	**10320.35**	
NHPC	**1205**	**0**	
NHPC	14495	14130.46	
NTPC Ltd.	3100	3132.81	
SJVNL	8888	9130.48	
THDC	4162	4539.97	
TOTAL CENTRAL SECTOR	**61368**	**62961.33**	
STATE SECTOR			
HPPCL	772.00	904.16	
HPSEB	1628.00	1779.35	
JKSPDC	4866.00	5056.98	
PSPCL	3780.00	3702.06	
RRVUNL	480.00	967.43	
UJVNL	5035.00	5177.21	
UPJVNL	1519.00	974.04	
CSPGCL	274.00	237.37	
GSECL	965.00	1340.85	
MAHAGENCO	3963.00	3941.02	
MPPGCL	2389.00	2230.78	
SSNNL	3099.00	4792.29	
APGENCO	2995.00	3940.88	
KPCL	12337.00	12964.04	
KSEB	7414.00	7989.00	

TANGEDCO	3913.00	5965.77	
TSGENCO	3852.00	6010.07	
APGENCO	605.00	543.73	
JUUNL	110.00	168.99	
OHPC	5363.00	4919.08	
TUL	5652.00	6152.57	
WBSEDCL	1550.00	1989.56	
APGCL	380.00	481.60	
MeECL	1106.00	980.25	
TOTAL STATE SECTOR	**74047.00**	**83209.08**	
PVT SECTOR UTL			
BHIRA HPS	900.00	401.60	
BHIRA PSS HPS	0.00	537.91	
BHIVPURI HPS	285.00	329.74	
KHOPOLI HPS	285.00	299.54	
TOTAL PVT SEC. UTIL	**1470**	**1568.79**	
PVT SEC. IPP			
ALLAIN DUHANGAN	658.00	640.14	
BAJOLI HOLI HPS	500.00	421.51	
BASPA HPS	1300.00	1351.93	
BHANDARDHARA HPS	36.00	19.28	
BUDHIL HPS	293.00	274.22	
CHANJU-I HPS	158.00	140.03	
CHUZACHEN HPS	537.00	503.92	
DIKCHU HPS	460.00	535.90	
JORETHANG LOOP	412.00	433.47	
KARCHAM WANGTOO	4131.00	4284.87	
MAHESHWAR HPS	0.00	0.00	
MALANA HPS	336.00	320.86	
MALANA-II HPS	348.00	343.54	

RONGNICHU HPS	442.00	434.84	
SHRINAGAR HPS	1310.00	1514.06	
SINGOLI BHATWARI	402.00	465.95	
SORANG HPS	392.00	318.29	
TASHIDING HPS	421.00	445.94	
TIDONG HPS	50.00	0.00	
VISHNU PRAYAG HPS	1590.00	1910.82	
TOTAL PVT SEC. IPP	**13776**	**14359.57**	
TOTAL PVT. SEC.	**15246**	**15928.36**	
TOTAL HYDRO	**150661**	**162098.77**	

Note: PLF is calculated for Coal & Lignite based power station only.
** Gas Based Station
# Diesel Based Station

Annexure-10B

ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS LOCATED IN THE REGIONS OF MAIN LAND AND ISLANDS

(As on 31.03.2023)

(UTILITIES)

Region	Ownership/ Sector	Mode wise breakup									Grand Total
		Thermal					Nuclear	Renewable			
		Coal	Lignite	Gas	Diesel	Total		Hydro	RES*(MNRE)	Total	
Northern Region	State	17885.00	250.00	2878.90	0.00	21013.90	0.00	6008.25	737.20	6745.45	27759.35
	Private	22324.33	1080.00	558.00	0.00	23962.33	0.00	3241.00	31897.67	35138.67	59101.00
	Central	15248.34	250.00	2344.06	0.00	17842.40	1620.00	11502.51	379.00	11881.51	31343.91
	Sub Total	**55457.67**	**1580.00**	**5780.96**	**0.00**	**62818.63**	**1620.00**	**20751.76**	**33013.87**	**53765.63**	**118204.26**
Western Region	State	21290.00	900.00	2849.82	0.00	25039.82	0.00	5446.50	602.23	6048.73	31088.55
	Private	31562.17	500.00	4676.00	0.00	36738.17	0.00	481.00	38203.07	38684.07	75422.24
	Central	21610.42	0.00	3280.67	0.00	24891.09	1840.00	1635.00	666.30	2301.30	29032.39
	Sub Total	**74462.59**	**1400.00**	**10806.49**	**0.00**	**86669.08**	**1840.00**	**7562.50**	**39471.60**	**47034.10**	**135543.18**
Southern Region	State	21392.50	0.00	791.98	159.96	22344.44	0.00	11827.48	623.08	12450.56	34795.00
	Private	13158.50	250.00	5340.24	273.70	19022.45	0.00	0.00	49117.94	49117.94	68140.39
	Central	12454.34	3390.00	359.58	0.00	16203.92	3320.00	0.00	541.90	541.90	20065.82
	Sub Total	**47005.34**	**3640.00**	**6491.80**	**433.66**	**57570.81**	**3320.00**	**11827.48**	**50282.92**	**62110.40**	**123001.21**
Eastern	State	6970.00	0.00	80.00	0.00	7050.00	0.00	3550.22	278.11	3828.33	10878.3

Region											3
	Private	5553.00	0.00	0.00	0.00	5553.00	0.00	209.00	1525.07	1734.07	7287.07
	Central	15176.70	0.00	0.00	0.00	15176.70	0.00	1005.20	10.00	1015.20	16191.90
	Sub Total	**27699.70**	**0.00**	**80.00**	**0.00**	**27779.70**	**0.00**	**4764.42**	**1813.18**	**6577.60**	**34357.30**
North Eastern Region	State	0.00	0.00	411.36	36.00	447.36	0.00	422.00	246.25	668.25	1115.60
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	263.56	263.56	263.56
	Central	610.20	0.00	1253.60	0.00	1863.80	0.00	1522.01	30.00	1552.01	3415.81
	Sub Total	**610.20**	**0.00**	**1664.96**	**36.00**	**2311.16**	**0.00**	**1944.01**	**539.81**	**2483.82**	**4794.97**
Islands	State	0.00	0.00	0.00	84.35	84.35	0.00	0.00	5.25	5.25	89.60
	Private	0.00	0.00	0.00	35.19	35.19	0.00	0.00	28.08	28.08	63.27
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10	5.10
	Sub Total	**0.00**	**0.00**	**0.00**	**119.54**	**119.54**	**0.00**	**0.00**	**38.43**	**38.43**	**157.97**
ALL INDIA	State	67537.50	1150.00	7012.06	280.31	75979.87	0.00	27254.45	2492.11	29746.56	105726.43
	Private	72598.00	1830.00	10574.24	308.89	85311.14	0.00	3931.00	121035.39	124966.39	210277.53
	Central	65100.00	3640.00	7237.91	0.00	75977.91	6780.00	15664.72	1632.30	17297.02	100054.93
	Total	**205235.50**	**6620.00**	**24824.21**	**589.20**	**237268.91**	**6780.00**	**46850.17**	**125159.81**	**172009.98**	**416058.89**
Figures at decimal may not tally due to rounding off											
Abbreviation:-	SHP=Small Hydro Project (≤ 25 MW), BP=Biomass Power, U&I=Urban & Industrial Waste Power, RES=Renewable Energy Sources										
Note : -	1. RES include SHP, BP, U&I, Solar and Wind Energy. Installed capacity in respect of RES (MNRE) as on 31.03.2023										
	(As per latest information available with MNRE)										
	***Break up of RES all India as on 31.03.2023 is given below (in MW) :**										
	Small Hydro Power	**Wind Power**	**Bio-Power**			**Solar Power**	**Total Capacity**				
			BM Power/Cogen.	**Waste to Energy**							
	4944.30	**42633.13**	**10248.01**	**554.03**		**66780.34**	**125159.81**				

A.	**Capacity Added during**		**March., 2023**		**800 MW**						
	1. Unit-3 (800 MW) of DAMODARAM SANJEEVAIAH TPS has been commissioned and added to state sector of Andhra Pradesh.										
B.	**Capacity Retired during**		**March., 2023**		**0 MW**						
C.	**Net Conv. Capacity Added during**		**March., 2023**	**A-B**	**800 MW**						
D.	**Net RES Capacity Added during**		**March., 2023**		**3046.75 MW**						
E.	**Net Capacity Added during**		**March., 2023**	**C+D**	**3846.75 MW**						
*	Off-grid RES Capacity has been included from July-2021 onwards										
	Sector wise breakup of RES capacity as shown is provisional.										
	Allocation from central sector stations has been updated till 31.01.2022.										
	Share of Railway (900 MW) from NABI NAGAR TPP (1000 MW) is included in central sector of Bihar.										
	Share from private sector generating stations has been updated as per latest information available.										

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN NORTHERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

									(As on 31.03.2023)		
State	**Ownership/ Sector**	**Mode wise breakup**									**Grand Total**
		Thermal					**Nuclear**	**Renewable**			
		Coal	**Lignite**	**Gas**	**Diesel**	**Total**		**Hydro**	**RES*(MNRE)**	**Total**	
Delhi	State	0.00	0.00	1800.40	0.00	1800.40	0.00	0.00	0.00	0.00	1800.40
	Private	878.22	0.00	108.00	0.00	986.22	0.00	0.00	302.26	302.26	1288.48
	Central	2771.28	0.00	207.01	0.00	2978.29	102.83	723.09	0.00	723.09	3804.21
	Sub-Total	**3649.50**	**0.00**	**2115.41**	**0.00**	**5764.91**	**102.83**	**723.09**	**302.26**	**1025.35**	**6893.09**
Haryana	State	2510.00	0.00	150.00	0.00	2660.00	0.00	200.00	69.30	269.30	2929.30
	Private	4561.78	0.00	0.00	0.00	4561.78	0.00	539.00	1287.79	1826.79	6388.57
	Central	1566.61	0.00	431.59	0.00	1998.20	100.94	1585.62	5.00	1590.62	3689.76
	Sub-Total	**8638.39**	**0.00**	**581.59**	**0.00**	**9219.98**	**100.94**	**2324.62**	**1362.09**	**3686.71**	**13007.63**
Himachal Pradesh	State	0.00	0.00	0.00	0.00	0.00	0.00	805.60	256.61	1062.21	1062.21
	Private	0.00	0.00	0.00	0.00	0.00	0.00	1219.40	810.79	2030.19	2030.19
	Central	144.67	0.00	0.00	0.00	144.67	28.95	1223.88	0.00	1223.88	1397.50
	Sub-Total	**144.67**	**0.00**	**0.00**	**0.00**	**144.67**	**28.95**	**3248.88**	**1067.40**	**4316.28**	**4489.90**
Jammu & Kashmir and Ladakh	State	0.00	0.00	175.00	0.00	175.00	0.00	1230.00	138.17	1368.17	1543.17
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	106.74	106.74	106.74
	Central	577.14	0.00	129.07	0.00	706.22	67.98	1091.88	0.00	1091.88	1866.08
	Sub-Total	**577.14**	**0.00**	**304.07**	**0.00**	**881.22**	**67.98**	**2321.88**	**244.91**	**2566.79**	**3515.99**
Punjab	State	1760.00	0.00	150.00	0.00	1910.00	0.00	1243.40	127.80	1371.20	3281.20
	Private	5014.00	0.00	0.00	0.00	5014.00	0.00	288.00	1737.83	2025.83	7039.83
	Central	1440.00	0.00	0.00	0.00	1440.00	196.81	2286.88	0.00	2286.88	3923.69
	Sub-Total	**8214.00**	**0.00**	**150.00**	**0.00**	**8364.00**	**196.81**	**3818.28**	**1865.63**	**5683.91**	**14244.72**
Rajasthan	State	7580.00	250.00	603.50	0.00	8433.50	0.00	433.00	23.85	456.85	8890.35
	Private	2957.00	1080.00	0.00	0.00	4037.00	0.00	104.00	22030.20	22134.20	26171.20
	Central	1210.56	250.00	171.13	0.00	1631.69	556.74	1404.93	344.00	1748.93	3937.36
	Sub-Total	**11747.56**	**1580.00**	**774.63**	**0.00**	**14102.19**	**556.74**	**1941.93**	**22398.05**	**24339.98**	**38998.91**
Uttar Pradesh	State	6035.00	0.00	0.00	0.00	6035.00	0.00	724.10	49.10	773.20	6808.20
	Private	8814.33	0.00	0.00	0.00	8814.33	0.00	842.40	4701.95	5544.35	14358.6

											8
	Central	5538.42	0.00	1029.51	0.00	6567.93	289.48	1857.52	30.00	1887.52	8744.93
	Sub-Total	**20387.75**	**0.00**	**1029.51**	**0.00**	**21417.26**	**289.48**	**3424.02**	**4781.05**	**8205.07**	**29911.81**
Uttarakhand	State	0.00	0.00	0.00	0.00	0.00	0.00	1372.15	72.37	1444.52	1444.52
	Private	99.00	0.00	450.00	0.00	549.00	0.00	248.20	861.42	1109.62	1658.62
	Central	523.80	0.00	69.66	0.00	593.46	31.24	475.54	0.00	475.54	1100.24
	Sub-Total	**622.80**	**0.00**	**519.66**	**0.00**	**1142.46**	**31.24**	**2095.89**	**933.79**	**3029.68**	**4203.38**
Chandigarh	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	58.69	58.69	58.69
	Central	44.83	0.00	15.03	0.00	59.86	8.01	101.71	0.00	101.71	169.57
	Sub-Total	**44.83**	**0.00**	**15.03**	**0.00**	**59.86**	**8.01**	**101.71**	**58.69**	**160.40**	**228.26**
Central - Unallocated		1431.03	0.00	291.05	0.00	1722.08	237.03	751.45	0.00	751.45	2710.57
Total (Northern Region)	State	17885.00	250.00	2878.90	0.00	21013.90	0.00	6008.25	737.20	6745.45	27759.35
	Private	22324.33	1080.00	558.00	0.00	23962.33	0.00	3241.00	31897.67	35138.67	59101.00
	Central	15248.34	250.00	2344.06	0.00	17842.40	1620.00	11502.51	379.00	11881.51	31343.91
	Grand Total	**55457.67**	**1580.00**	**5780.96**	**0.00**	**62818.63**	**1620.00**	**20751.76**	**33013.87**	**53765.63**	**118204.26**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN WESTERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

									(As on 31.03.2023)		
State	**Ownership/ Sector**	**Mode wise breakup**									**Grand Total**
		Thermal					**Nuclear**	**Renewable**			
		Coal	**Lignite**	**Gas**	**Diesel**	**Total**		**Hydro**	**RES*(MNRE)**	**Total**	
Goa	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05

	Private	0.00	0.00	48.00	0.00	48.00	0.00	0.00	26.83	26.83	74.83
	Central	492.29	0.00	19.67	0.00	511.96	26.00	2.00	0.00	2.00	539.96
	Sub-Total	**492.29**	**0.00**	**67.67**	**0.00**	**559.96**	**26.00**	**2.00**	**26.88**	**28.88**	**614.84**
Daman & Diu	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.01	41.01	41.01
	Central	164.74	0.00	43.34	0.00	208.08	7.00	0.00	0.00	0.00	215.08
	Sub-Total	**164.74**	**0.00**	**43.34**	**0.00**	**208.08**	**7.00**	**0.00**	**41.01**	**41.01**	**256.09**
Gujarat	State	4510.00	900.00	2177.82	0.00	7587.82	0.00	772.00	95.04	867.04	8454.86
	Private	7144.67	500.00	3985.00	0.00	11629.67	0.00	0.00	19097.51	19097.51	30727.18
	Central	5504.47	0.00	424.00	0.00	5928.47	559.00	0.00	243.30	243.30	6730.77
	Sub-Total	**17159.14**	**1400.00**	**6586.82**	**0.00**	**25145.96**	**559.00**	**772.00**	**19435.85**	**20207.85**	**45912.81**
Madhya Pradesh	State	5400.00	0.00	0.00	0.00	5400.00	0.00	1703.66	107.96	1811.62	7211.62
	Private	5694.00	0.00	75.00	0.00	5769.00	0.00	0.00	5497.12	5497.12	11266.12
	Central	4818.54	0.00	257.00	0.00	5075.54	273.00	1520.00	300.00	1820.00	7168.54
	Sub-Total	**15912.54**	**0.00**	**332.00**	**0.00**	**16244.54**	**273.00**	**3223.66**	**5905.08**	**9128.74**	**25646.28**
Chhattisgarh	State	1840.00	0.00	0.00	0.00	1840.00	0.00	120.00	11.05	131.05	1971.05
	Private	7667.50	0.00	0.00	0.00	7667.50	0.00	0.00	1288.77	1288.77	8956.27
	Central	2714.35	0.00	0.00	0.00	2714.35	48.00	113.00	0.00	113.00	2875.35
	Sub-Total	**12221.85**	**0.00**	**0.00**	**0.00**	**12221.85**	**48.00**	**233.00**	**1299.82**	**1532.82**	**13802.67**
Maharashtra	State	9540.00	0.00	672.00	0.00	10212.00	0.00	2850.84	388.13	3238.97	13450.97
	Private	10856.00	0.00	568.00	0.00	11424.00	0.00	481.00	12246.37	12727.37	24151.37
	Central	4858.24	0.00	2272.73	0.00	7130.97	690.00	0.00	123.00	123.00	7943.97
	Sub-Total	**25254.24**	**0.00**	**3512.73**	**0.00**	**28766.97**	**690.00**	**3331.84**	**12757.50**	**16089.34**	**45546.31**
Dadra & Nagar Naveli	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	200.00	0.00	0.00	0.00	200.00	0.00	0.00	5.46	5.46	205.46
	Central	222.30	0.00	66.34	0.00	288.64	9.00	0.00	0.00	0.00	297.64
	Sub-Total	**422.30**	**0.00**	**66.34**	**0.00**	**488.64**	**9.00**	**0.00**	**5.46**	**5.46**	**503.10**

Central - Unallocated		2835.49	0.00	197.59	0.00	3033.08	228.00	0.00	0.00	0.00	3261.08
Total (Western Region)	State	21290.00	900.00	2849.82	0.00	25039.82	0.00	5446.50	602.23	6048.73	31088.55
	Private	31562.17	500.00	4676.00	0.00	36738.17	0.00	481.00	38203.07	38684.07	75422.24
	Central	21610.42	0.00	3280.67	0.00	24891.09	1840.00	1635.00	666.30	2301.30	29032.39
	Grand Total	**74462.59**	**1400.00**	**10806.49**	**0.00**	**86669.08**	**1840.00**	**7562.50**	**39471.60**	**47034.10**	**135543.18**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN SOUTHERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.03.2023)

State	**Ownership/ Sector**	**Mode wise breakup**									**Grand Total**
		Thermal					**Nuclear**	**Renewable**			
		Coal	**Lignite**	**Gas**	**Diesel**	**Total**		**Hydro**	**RES*(MNRE)**	**Total**	
Andhra Pradesh	State	5810.00	0.00	235.40	0.00	6045.40	0.00	1673.60	57.38	1730.98	7776.38
	Private	3873.88	0.00	3831.32	36.80	7742.00	0.00	0.00	9052.80	9052.80	16794.81
	Central	1547.04	180.23	0.00	0.00	1727.27	127.27	0.00	250.00	250.00	2104.54
	Sub-Total	**11230.92**	**180.23**	**4066.72**	**36.80**	**15514.68**	**127.27**	**1673.60**	**9360.18**	**11033.78**	**26675.73**
Telangana	State	6242.50	0.00	0.00	0.00	6242.50	0.00	2479.93	41.22	2521.15	8763.65
	Private	1389.45	0.00	831.82	0.00	2221.27	0.00	0.00	5054.15	5054.15	7275.42
	Central	1806.85	61.30	0.00	0.00	1868.15	148.73	0.00	10.00	10.00	2026.88
	Sub-Total	**9438.80**	**61.30**	**831.82**	**0.00**	**10331.92**	**148.73**	**2479.93**	**5105.37**	**7585.30**	**18065.95**
Karnataka	State	5020.00	0.00	0.00	0.00	5020.00	0.00	3631.60	193.89	3825.49	8845.49
	Private	2050.00	0.00	0.00	25.20	2075.20	0.00	0.00	16525.35	16525.35	18600.55

	Central	2877.56	471.90	0.00	0.00	3349.46	698.00	0.00	0.00	0.00	4047.46
	Sub-Total	**9947.56**	**471.90**	**0.00**	**25.20**	**10444.66**	**698.00**	**3631.60**	**16719.23**	**20350.83**	**31493.49**
Kerala	State	0.00	0.00	0.00	159.96	159.96	0.00	1864.15	207.90	2072.05	2232.01
	Private	832.50	0.00	174.00	0.00	1006.50	0.00	0.00	835.05	835.05	1841.55
	Central	1226.50	314.20	359.58	0.00	1900.28	362.00	0.00	50.00	50.00	2312.28
	Sub-Total	**2059.00**	**314.20**	**533.58**	**159.96**	**3066.74**	**362.00**	**1864.15**	**1092.95**	**2957.10**	**6385.84**
Tamil Nadu	State	4320.00	0.00	524.08	0.00	4844.08	0.00	2178.20	122.70	2300.90	7144.98
	Private	5012.67	250.00	503.10	211.70	5977.47	0.00	0.00	17615.06	17615.06	23592.53
	Central	3429.59	1666.57	0.00	0.00	5096.16	1448.00	0.00	231.90	231.90	6776.06
	Sub-Total	**12762.26**	**1916.57**	**1027.18**	**211.70**	**15917.71**	**1448.00**	**2178.20**	**17969.66**	**20147.86**	**37513.57**
NLC	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Central	0.00	166.00	0.00	0.00	166.00	0.00	0.00	0.00	0.00	166.00
	Sub-Total	**0.00**	**166.00**	**0.00**	**0.00**	**166.00**	**0.00**	**0.00**	**0.00**	**0.00**	**166.00**
Puducherry	State	0.00	0.00	32.50	0.00	32.50	0.00	0.00	0.00	0.00	32.50
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.53	35.53	35.53
	Central	140.80	111.80	0.00	0.00	252.60	86.00	0.00	0.00	0.00	338.60
	Sub-Total	**140.80**	**111.80**	**32.50**	**0.00**	**285.10**	**86.00**	**0.00**	**35.53**	**35.53**	**406.63**
Central - Unallocated		1426.00	418.00	0.00	0.00	1844.00	450.00	0.00	0.00	0.00	2294.00
Total (Southern Region)	State	21392.50	0.00	791.98	159.96	22344.44	0.00	11827.48	623.08	12450.56	34795.00
	Private	13158.50	250.00	5340.24	273.70	19022.45	0.00	0.00	49117.94	49117.94	68140.39
	Central	12454.34	3390.00	359.58	0.00	16203.92	3320.00	0.00	541.90	541.90	20065.82
	Grand Total	**47005.34**	**3640.00**	**6491.80**	**433.66**	**57570.81**	**3320.00**	**11827.48**	**50282.92**	**62110.40**	**123001.21**
INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN											

EASTERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.03.2023)

State	Ownership/ Sector	Mode wise breakup									Grand Total
		Thermal					Nuclear	Renewable			
		Coal	Lignite	Gas	Diesel	Total		Hydro	RES*(MNRE)	Total	
Bihar	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.70	70.70	70.70
	Private	700.00	0.00	0.00	0.00	700.00	0.00	0.00	318.90	318.90	1018.90
	Central	6355.06	0.00	0.00	0.00	6355.06	0.00	110.00	0.00	110.00	6465.06
	Sub-Total	**7055.06**	**0.00**	**0.00**	**0.00**	**7055.06**	**0.00**	**110.00**	**389.60**	**499.60**	**7554.66**
Jharkhand	State	420.00	0.00	0.00	0.00	420.00	0.00	130.00	4.05	134.05	554.05
	Private	580.00	0.00	0.00	0.00	580.00	0.00	0.00	110.14	110.14	690.14
	Central	1361.25	0.00	0.00	0.00	1361.25	0.00	61.00	0.00	61.00	1422.25
	Sub-Total	**2361.25**	**0.00**	**0.00**	**0.00**	**2361.25**	**0.00**	**191.00**	**114.19**	**305.19**	**2666.44**
West Bengal	State	4810.00	0.00	80.00	0.00	4890.00	0.00	986.00	121.95	1107.95	5997.95
	Private	2437.00	0.00	0.00	0.00	2437.00	0.00	0.00	499.62	499.62	2936.62
	Central	1369.41	0.00	0.00	0.00	1369.41	0.00	410.00	0.00	410.00	1779.41
	Sub-Total	**8616.41**	**0.00**	**80.00**	**0.00**	**8696.41**	**0.00**	**1396.00**	**621.57**	**2017.57**	**10713.98**
DVC	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Private	150.00	0.00	0.00	0.00	150.00	0.00	0.00	0.00	0.00	150.00
	Central	2876.88	0.00	0.00	0.00	2876.88	0.00	186.20	0.00	186.20	3063.07
	Sub-Total	**3026.88**	**0.00**	**0.00**	**0.00**	**3026.88**	**0.00**	**186.20**	**0.00**	**186.20**	**3213.07**
Odisha	State	1740.00	0.00	0.00	0.00	1740.00	0.00	2074.22	26.30	2100.52	3840.52
	Private	1686.00	0.00	0.00	0.00	1686.00	0.00	0.00	591.72	591.72	2277.72
	Central	1563.85	0.00	0.00	0.00	1563.85	0.00	89.00	10.00	99.00	1662.85
	Sub-Total	**4989.85**	**0.00**	**0.00**	**0.00**	**4989.85**	**0.00**	**2163.22**	**628.02**	**2791.24**	**7781.09**
Sikkim	State	0.00	0.00	0.00	0.00	0.00	0.00	360.00	55.11	415.11	415.11
	Private	0.00	0.00	0.00	0.00	0.00	0.00	209.00	4.69	213.69	213.69
	Central	11.92	0.00	0.00	0.00	11.92	0.00	64.00	0.00	64.00	75.92
	Sub-Total	**11.92**	**0.00**	**0.00**	**0.00**	**11.92**	**0.00**	**633.00**	**59.80**	**692.80**	**704.72**

Central - Unallocated		1638.33	0.00	0.00	0.00	1638.33	0.00	85.01	0.00	85.01	1723.34
Total (Eastern Region)	State	6970.00	0.00	80.00	0.00	7050.00	0.00	3550.22	278.11	3828.33	10878.33
	Private	5553.00	0.00	0.00	0.00	5553.00	0.00	209.00	1525.07	1734.07	7287.07
	Central	15176.70	0.00	0.00	0.00	15176.70	0.00	1005.20	10.00	1015.20	16191.90
	Grand Total	**27699.70**	**0.00**	**80.00**	**0.00**	**27779.70**	**0.00**	**4764.42**	**1813.18**	**6577.60**	**34357.30**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN NORTH-EASTERN REGION

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

									(As on 31.03.2023)		
State	**Ownership/ Sector**	**Mode wise breakup**									**Grand Total**
		Thermal					**Nuclear**	**Renewable**			
		Coal	**Lignite**	**Gas**	**Diesel**	**Total**		**Hydro**	**RES*(MNRE)**	**Total**	
Assam	State	0.00	0.00	306.36	0.00	306.36	0.00	100.00	5.01	105.01	411.37
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	154.03	154.03	154.03
	Central	402.52	0.00	435.56	0.00	838.08	0.00	422.08	25.00	447.08	1285.16
	Sub-Total	**402.52**	**0.00**	**741.92**	**0.00**	**1144.44**	**0.00**	**522.08**	**184.04**	**706.12**	**1850.56**
Arunachal Pradesh	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	109.11	109.11	109.11
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.64	35.64	35.64
	Central	37.05	0.00	46.82	0.00	83.87	0.00	544.55	0.00	544.55	628.42
	Sub-Total	**37.05**	**0.00**	**46.82**	**0.00**	**83.87**	**0.00**	**544.55**	**144.75**	**689.30**	**773.17**
Meghalaya	State	0.00	0.00	0.00	0.00	0.00	0.00	322.00	32.53	354.53	354.53
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.95	17.95	17.95
	Central	0.00	0.00	109.69	0.00	109.69	0.00	95.38	0.00	95.38	205.07
	Sub-Total	**0.00**	**0.00**	**109.69**	**0.00**	**109.69**	**0.00**	**417.38**	**50.48**	**467.86**	**577.55**
Tripura	State	0.00	0.00	105.00	0.00	105.00	0.00	0.00	16.01	16.01	121.01
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.60	12.60	12.60

	Central	0.00	0.00	381.94	0.00	381.94	0.00	68.49	5.00	73.49	455.43
	Sub-Total	**0.00**	**0.00**	**486.94**	**0.00**	**486.94**	**0.00**	**68.49**	**33.61**	**102.10**	**589.04**
Manipur	State	0.00	0.00	0.00	36.00	36.00	0.00	0.00	5.45	5.45	41.45
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.28	12.28	12.28
	Central	15.68	0.00	81.58	0.00	97.26	0.00	87.24	0.00	87.24	184.50
	Sub-Total	**15.68**	**0.00**	**81.58**	**36.00**	**133.26**	**0.00**	**87.24**	**17.73**	**104.97**	**238.23**
Nagaland	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.67	32.67	32.67
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.04	3.04	3.04
	Central	32.10	0.00	73.93	0.00	106.03	0.00	66.33	0.00	66.33	172.36
	Sub-Total	**32.10**	**0.00**	**73.93**	**0.00**	**106.03**	**0.00**	**66.33**	**35.71**	**102.04**	**208.07**
Mizoram	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.47	45.47	45.47
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.02	28.02	28.02
	Central	10.35	0.00	60.46	0.00	70.81	0.00	97.94	0.00	97.94	168.75
	Sub-Total	**10.35**	**0.00**	**60.46**	**0.00**	**70.81**	**0.00**	**97.94**	**73.49**	**171.43**	**242.24**
Central - Unallocated		112.50	0.00	63.62	0.00	176.12	0.00	140.00	0.00	140.00	316.12
Total (North-Eastern Region)	State	0.00	0.00	411.36	36.00	447.36	0.00	422.00	246.25	668.25	1115.60
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	263.56	263.56	263.56
	Central	610.20	0.00	1253.60	0.00	1863.80	0.00	1522.01	30.00	1552.01	3415.81
	Grand Total	**610.20**	**0.00**	**1664.96**	**36.00**	**2311.16**	**0.00**	**1944.01**	**539.81**	**2483.82**	**4794.97**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN ISLANDS

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

									(As on 31.03.2023)		
State	**Ownership/ Sector**	**Mode wise breakup**									**Grand Total**
		Thermal					**Nuclear**	**Renewable**			
		Coal	**Lignite**	**Gas**	**Diesel**	**Total**		**Hydro**	**RES*(MNRE)**	**Total**	
Andaman & Nicobar	State	0.00	0.00	0.00	57.52	57.52	0.00	0.00	5.25	5.25	62.77
	Private	0.00	0.00	0.00	35.19	35.19	0.00	0.00	24.81	24.81	60.00

	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10	5.10
	Sub-Total	**0.00**	**0.00**	**0.00**	**92.71**	**92.71**	**0.00**	**0.00**	**35.16**	**35.16**	**127.87**
Lakshadweep	State	0.00	0.00	0.00	26.83	26.83	0.00	0.00	0.00	0.00	26.83
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.27	3.27	3.27
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sub-Total	**0.00**	**0.00**	**0.00**	**26.83**	**26.83**	**0.00**	**0.00**	**3.27**	**3.27**	**30.10**
Total (Islands)	State	0.00	0.00	0.00	84.35	84.35	0.00	0.00	5.25	5.25	89.60
	Private	0.00	0.00	0.00	35.19	35.19	0.00	0.00	28.08	28.08	63.27
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10	5.10
	Grand Total	**0.00**	**0.00**	**0.00**	**119.54**	**119.54**	**0.00**	**0.00**	**38.43**	**38.43**	**157.97**