सत्यमेव जयते

CEA
ANNUAL REPORT
2021-22

CENTRAL ELECTRICITY AUTHORITY
MINISTRY OF POWER
GOVERNMENT OF INDIA

THE AUTHORITY
(As on 31.03.2022)

Sh. B.K. Arya
Chairperson Incharge

Sh. G.V. Mahendar
Member (E&C)

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

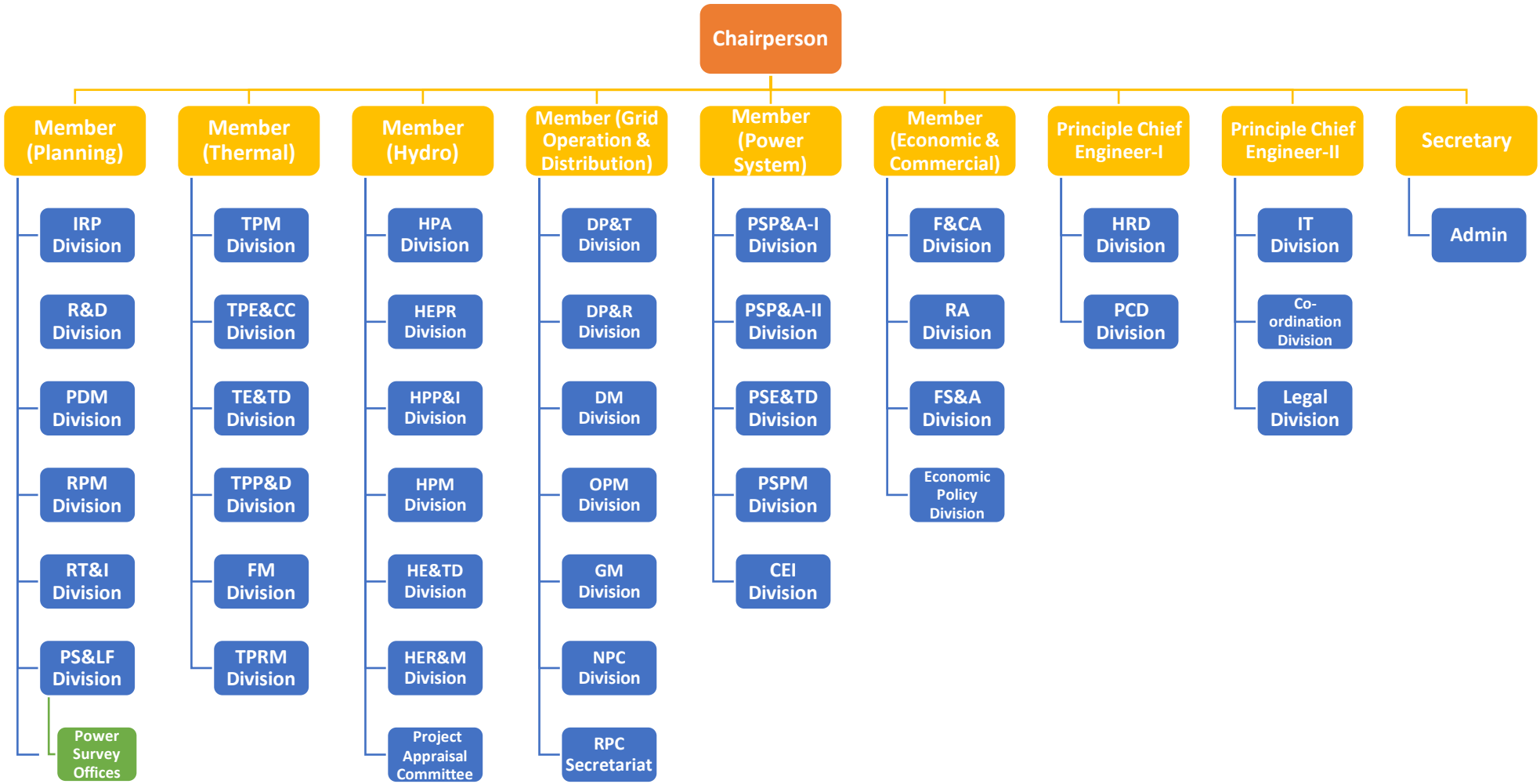
Sh. A. Balan
Member (Planning)

Sh. B.K. Arya
Member (Hydro)
Additional Charge

 **Sh. Goutam Roy** Member (Power System)	 Vacant Member(Thermal)

****

ORGANIZATION CHART OF CEA
(As on 31.03.2022)



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 2021-22 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 2021-22. 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 2021-22.

1. The role of distribution Network is very significant in respect of achieving the goal of 24x7 Power for All (PFA) as it is the back bone for providing connectivity to the end user.To bring reforms in much needed distribution system, Central Government has launched "Revamped Distribution Sector Scheme (RDSS) - A Reforms based and Results linked Scheme" on 20th July 2021. 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.

2. CEA also formulated The Electricity (Rights of Consumers) Rules, 2020, These Rules define various Key Performance Indicators for consumer empowerment across eight key dimensions. Implementation of these rules shall not only enhance consumer convenience but also prepare DISCOMs to manage the impact of situations such as the COVID-19 pandemic

3. Government of India had set a target of achieving 175 GW of Renewable Energy (RE) installed capacity by 2022 comprising of 100 GW of solar, 60 GW of wind, 10 GW of biomass and 5 GW of small hydro. , India has announced in CoP 26 summit at Glasgow to achieve 500 GW non-fossil energy capacity by 2030, to meet 50% of its energy requirements from renewable energy by 2030. However, increasing penetration of solar and wind power renewable sources having inherent variability and intermittency nature is expected to pose challenges of grid stability and security and many steps have been taken by CEA to address these challenges. CEA has also carried out various other activities to serve the power sector in different areas of power sector in the country, which are described in detail in this report.

I take this opportunity to express my deep appreciation for the committed efforts put in by the officers and staff of CEA in accomplishing the statutory functions, successfully for serving the nation. I hope that CEA will continue to work with the same zeal, devotion and co-operation for development of the power sector in the country.

B.K. Arya
Chairperson (Incharge), 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. It was established as a part-time body in the year 1951 and made a full- time body in the year 1975.

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 subserve 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

(1) 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 31.03.2022 was

749 as against the sanctioned strength of 1271 leaving 522 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 Strenth
Chairperson/Members	07	-	07	04		04
CPES GROUP-A	348	84	432	248	70	318
CPES GROUP-B	90	19	109	51	06	57
Non CPES Group						
Group-A	93	01	94	50	00	50
Group-B	221	36	257	85	05	90
Group-C	89	73	162	54	39	93
Group-C(MTS)	145	65	210	99	38	137
Total	993	278	1271	591	158	749

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	04	00	00
CPES GROUP-A	432	318	40	12.5%
CPES GROUP-B	109	57	05	8.7%
Non CPES Group				
Group-A	94	50	24	48%
Group-B	257	90	36	40%
Group-C	162	93	18	19.3%
Group-C(MTS)	210	137	19	13.8%
Total	1271	749	134	17.8%

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	04	03	00	01	00
CPES GROUP-A	432	318	56	24	56	02
CPES GROUP-B	109	57	08	02	09	03
Non CPES Group						
Group-A	94	50	12	05	01	00
Group-B	257	90	21	04	08	00
Group-C	162	93	17	07	24	01
Group-C(MTS)	210	137	34	04	36	12
Total	**1271**	**749**	151	46	135	18

1.4.4 Representation of Physically Handicapped employees

Group	Total employees as on 31.03.2022	Physically Challenged Employees				Percentage of Physically Challenged
		VH	HH	OH	Total	
Group A (CPES+NON-CPES)	372	00	03	04	07	1.88%
Group B	143	00	01	05	06	4.19%
Group C	89	01	00	02	03	3.37%
Group –C(MTS)	137	01	01	02	04	2.91%
Total	741	02	05	13	20	2.69%

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 11 Consultants were hired in CEA during the year 2021- 2022.

1.5 Annual Budget

1.5.1 Budget of CEA During the year 2021-22

Rs. In Crore

BUDGET OF CENTRAL ELECTRICITY AUTHORITY (CEA)			
Budget Estimate of CEA For Year 2021-22		**Revised Estimate of CEA of Year 2021-22**	
Salary	103.60	Salary	103.60
Non-Salary	27.06	Non-Salary	25.45
Total	**130.66**	**Total**	**129.05**
Allocation Of Budget Estimate 2021-22		**Allocation Of Revised Estimate 2021-22**	
Admn. Of Electricity Act	106.96	Admn. Of Electricity Act	105.74
Hydel Generation	3.46	Hydel Generation	3.45
Transmission & Distribution	20.24	Transmission & Distribution	19.84
Internation Cooperation	0.00	Internation Cooperation	0
Total	**130.66**	**Total**	**129.00**
Expenditure Status as on 31.03.2022			
Salary Head	96.75		
Non-Salary	16.95		
Expenditure as % of RE	88.11%		

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 CEA towards consultancy services rendered to various Departments/ Organisations during the year 2021-22 and outstanding of previous years is Rs. 3.89 Crore and payment received is Rs. 0.89 Crore.

1.6 Progressive use of Hindi in Official work of CEA

In pursuance of sub-rule 4 of rule 10 of the Official Language Rules, 1976 CEA was notified in the official Gazette of the Govt. of India and under the sub-rule 4 of rule 8, the officials having proficiency in Hindi were specified to do their entire officials works 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 - 22nd Jun, 2021
- 2nd meeting - 3rd Sep, 2021
- 3rd meeting - 24th Dec, 2021
- 4th meeting - 21st Mar, 2022

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

During the year all the work like noting, drafting, issuing office orders, letters etc. were done as per Section 3(3) of the Official Language Act in all Divisions/Sections.

ii. Efforts were also made to achieve target of Hindi Correspondence by all Divisions/Sections.

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

1.6.2 Letters sent in Hindi during the financial year 2021-22:

Quarterly percentage of Letters sent in Hindi during the year 2021-22 is as follows-

Quarter	Letters sent in Hindi (All Regions)	% of Hindi letters
1st	7215	94.5%
2nd	9472	95.9%
3rd	9074	91.1%
4th	Under Compilation	

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

i) Post Evidence List of Points on Rules/Regulations framed under the Electricity Act, 2003 and the Energy Conservation Act, 2001 as amended from time to time.
ii) Standing Committee on Power- Note on role and efficacy of central electricity authority in the balanced development of electricity sector.
iii) Annual and Quarterly RTI return forms.
iv) Tariff based Competitive-bidding Guidelines for Transmission Service.
v) Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2021
vi) Guidelines for Procurement and Utilization of Battery Energy Storage Systems as part of Generation, Transmission and Distribution assets, along with Ancillary Services.
vii) Annual report 2020-21
viii) Manual of Communication Planning in Power System Operation.
ix) Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations (Amendment), 2021

1.6.4 Hindi Pakhwada Celebration:

Hindi Pakhwada was organized in the Central Electricity Authority from 14/09/2021 to 28/09/2021 through G-meet adhering to COVID-19 safety guidelines. On 14.09.2021, Hindi Pakhwada was inaugurated by the Chairman, Central Electricity Authority. Many officers/ employees including all the Members, Secretary and Chief Engineers of CEA graced the occasion. Officers and employees of all Delhi based attached/subordinate offices of CEA also participated in this event. On this occasion, a workshop on *"Takneekee kaamkaaj me saral Hindi kaa adhikaadhik prayog kaise karen''* was also organized. For this workshop, Shri Dilip Kumar Nigam, DD (OL) was invited to share his views. 5 competitions, namely; Hindi Essay Writing, Hindi Noting and Drafting, Hindi Paragraph Writing (for MTS only), General Knowledge of Official Language Rules/Act and Hindi Language / Literature and Hindi Debate for Officers were organized through virtual mode. 116 officers and employees took part enthusiastically in these competitions.

Award distribution ceremony was held on 28/09/2021. In this ceremony, 15 winners were given cash prizes. In addition to it 9 personnel who have done maximum noting and drafting work originally in Hindi during 2020-21 were also rewarded with Cash Prize under the Annual Incentive Scheme. The Chairperson congratulated the officers/ employees who received awards/prize and appealed to other employees to do their maximum official work in Hindi. Apart from this, GM and RPM Division were awarded "Chal Vaijayanti".

A poem recital session was also conducted on the concluding day of Hindi Pakhwada 2021. Five Officers and employees of CEA recited their self composed poems. The Chairperson, CEA, all the Members, Secretary, Chief Engineers and Officers and staff of all the offices under CEA at Delhi joined through G-meet in this session.

1.6.5 Conducting Hindi Workshops:

This office is regularly conducting Hindi Workshops for implementation of Official Language Policy. In order to minimize the difficulties faced by CEA officers and employees working in Hindi and to increase use of Hindi in the office, a series of Hindi Workshops on regular basis were organized during the year. Four such workshops were organized through G-Meet till 31st March, 2022. Officers and employees, at large, actively participated in these workshops.

1.6.6 Participation in Rajbhasha Conferences:

Officers of this office attended 1st All India Rajbhasha Conference held at Varanasi on 13-14 Nov, 2021 and Regional Rajbhasha Conference held at Kanpur on 27 Nov, 2021.

1.7 Inspection by Parliamentary Committee on Official Language:

The 2nd sub-committee of Parliamentary Committee on Official Language headed by Mrs Rita Bahuguna Joshi, MP Lok Sabha, inspected its sub offices ERPC, Kolkata on 22.11.2021 and WRPC, Mumbai on 30.12.2021 to review the progress of use of Official language. Representatives of this office participated in these inspection meetings.

1.8 Welfare Activities in CEA

1.8.1 Welfare of SC /ST /OBC

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

1.8.2 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 includes Ms. Vibha Maurya, All India Democratic Women's Association as the independent member.

1.8.3 Recreation and Sports:

The employees of CEA are actively participating in the Sports & Cultural Tournaments/Competltions at All India Civil Services (A National Status), Inter-Mlnistry and Inter-CPSU levels every year regularly. For the year 2021-22, the following Sports Team/Individuals of CEA are participated in the AICS/ Inter-Ministry/ Inter-CPSU Tournaments and brlngs the laurels to CEA by winning the medals. The achievements of these Sports/Cultural Teams/Individuals are as under:

Badminton

Shri Ashwani Kumar, Section Off1cer(Welfare), CEA has been selected for All India Civil Services Badminton Tournament 2020-21 (A National Status) By Central Civil Services Cultural & Sports Board, DoPT, New Delhi, held at Tau Devi Lal Stadium, Indoor Hall, Panchkula,Haryana from 24.3.22 to 30.3.22.

Shri Ashwani Kumar, Section Officer (Welfare) has also won the Gold Medal in Veteran XD Doubles in Inter-Ministry Badminton Tournament 2021-22 held at AIIMS Gymkhana, New Delhi.

Carrom

The CEA Carrom Team/individuals has been participated in the Inter-CPSU Carrom Tournament 2021-22 organized by THDC India Ltd. held at Rishikesh from 08-11- 2021 to 12.11.2021 and won the following medals:

- Shri Sumeet Kumar, Dy. Director has won the Bronze Medal in Men Singles Event.
- Shri Sumeet Kumar, DD/S1oi Saurabh Partly Sarthi, AD-II won the Gold Medal in Men Doubles Event
- CEA Men Carrom Team has won the Winner's Trophy (Gold Medal) in Men Team Championship

Chess

The CEA Chess Team/individuals has been participated in the 25th" Inter-CPSU Chess Tournament 2021-22 organized by PFC under the aegis of PSCB, Ministry of Power at Vishwa Yuvak Kendra, New Delhi w.e.f. 27.04.22 to 29.04.22 and won the following medals:

- Shri Lalrinsanga, Director has won the Gold Medal in the 25th Inter-CPSU Chess Tournament 2021-22.
- CEA Chess Team has won the Silver Medal in Men Team Championship.

Volleyball

Shri Anish, LDC, (RPSO-N) presently posted at

APAR Section, CEA has been selected to represent the Central Secretariat Volleyball Team in the All India Civil Service Volleyball Tournament 2021-22 (A National Status) being organized by Govt. of NCT, Delhi at Sports Complex SU Block, Pitampura, New Delhi from 24.06.22 to 28.06.22.

1.9 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. Vigilance Awareness Week - 2021 was observed in Central Electricity Authority and its subordinate Offices from 26th October 2021 to 1st November 2021. The Vigilance Awareness Week was observed to highlight the theme " Independent India @ 75: Self Reliance with Integrity. स्वतंत्र भारत @ 75: सत्यनिष्ठा से आत्मनिर्भरता"
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 31.03.2022 no disciplinary case is pending in the Vigilance Division. Prescribed periodical returns were sent to Ministry of Power and Central Vigilance Commission in time.

1.10 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 on sale for general public.

1.11 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 01/04/2021 to 31/03/2022 is as below:
Total grievances received during the period: **89**
Total grievances disposed during the period: **88**

1.12 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. 799 applications were received during the year 2021-22 (i.e. up to 31.03.2022), under the Act and were disposed of by various CPIOs in CEA. Out of 799 applications, 86 applications were received in hard copy format while the remaining were received through RTI MIS portal. Further, 74 applicants filed appeal to the First Appellate Authority (FAA), 27 of which were received in hard copy format while remaining were received through RTI MIS portal. All 74 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 July, 2021 in CEA Head Quarter by National Power Training Institute (NPTI).

1.13 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 2021-22
9. Major Achievements in Power Sector
10. Annual Report of the MOP for 2021-22
11. Material for interview of Power Minister and Secretary (power) to various press media
12. Monitorable targets for the year 2021-22 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.

(B) During the year 2021-22 (till 07.04.2022) there were three Parliament Sessions and the Admitted version of Questions were dealt with as follows:

Sr.	Session	Starred	Un-starred
1.	Monsoon Session 2021	14	82
2.	Winter Session 2021	10	97
3.	Budget Session 2022	10	164

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

1.15 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 on the bilingual (English & Hindi) website of Central Electricity Authority (www.cea.nic.in) for global access. The CEA dynamic website has been designed and developed by the developer M/s Kreate Technologies Pvt. Ltd. as per CEA tender document no. CEA-CH-13-19/1/2018-IT Division dated 25-09-2019. The maintenance of website is also done by M/s Kreate Technologies Pvt. Ltd (up to 4 June 2022). The content of this website is updated on daily/monthly basis. A state of the art Data Center is running at Sewa Bhawan building for collecting and scrutinizing Load Forecasting data for economic scheduling.

1.15.1 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. The portal is accessible at https://npp.gov.in.

- NPP is a centralized system for Indian Power Sector which facilitates online data capture/input (daily, monthly, annually) from generation, transmission and distribution utilities in the country and disseminate Power Sector Information (operational, capacity, demand, supply, consumption, etc.) through various analysed reports, graphs, statistics for generation, transmission and distributional all

India, region, state level for central, state and private sector.

- The NPP Dashboard has been designed and developed to disseminate analysed information about the 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 system also facilitates various types of statutory reports required to be published regularly. The Links for all the Power Sector Apps launched by the Ministry like TARANG, UJALA, VIDYUTPRAVAH, MERIT ODE, UDAY, SAUBHAGYA, PRAAPTI, IPDS, RFMS and DDUGJY are available at NPP.

- 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 (IPDS), REC for Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY), other power sector utilities in government as well as private sector, Apex Bodies, other government organizations and public users. 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).

1.15.2 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 e-sign facility for ascertaining authentication & non-repudiation, integration of E-mail service with the application, role based work flow, tracking and searching facility, etc. Version up-gradation of e-File application in line with the Ministry of Power was conducted successfully on 19.01.2022. Now, any division of CEA can transfer the e-files directly to Ministry of Power through upgraded version of e-office.

1.15.3 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 center (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). CERT-Distribution is housed in CEA and CE (DP&T), CEA is the nodal officer. Chief Engineer (IT&CS), CEA has been nominated as the Chief Information Security Officer, Ministry of Power (CISO-MoP). CISO-MoP looks after overall activity of Cyber Security in Power Sector in coordination with MoP, CERT-In, NCIIPC, other Govt. agencies and six Sectoral CERTs. Nodal Officers of the sectoral CERTs works in co-ordination with CISO-MoP and also co-ordinate with their respective constituent Utilities for nomination of Utility level CISO and Alternate CISO, preparing and implementation of Utility specific Cyber Crisis Management Plan (C-CMP) and for early identification of their Critical Information Infrastructures (CIIs). As per the model Cyber Crisis Management Plan (CCMP) released by CERT-In, Sectoral CERTs have developed Sector specific Model CCMP and shared the same with their constituent Utilities. Following the Sector specific Model CCMP various Power Utilities have either developed

their Organizational CCMP or in process of development of the same.

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

Ministry of Information and Technology, Ministry of Power, NCIIPC and CERT-In are issuing regular guidelines & advisories regarding cyber security. The guidelines and advisories issued on Cyber Security from time to time are further being complied and implemented by Sectoral CERTs and CISOs on Power Utilities level. All Utilities of Power sectors has been directed by Ministry of Power to on board Cyber Swachhta Kendra (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.

Gearing up to combat the recent challenge of cyber-attacks, Ministry of Power had constituted a Committee to look into the issue of Power firms seeking to enter Indian Power Transmission Sector and related issues of cyber security. A scheme for identification of Trusted Sources and Trusted Vendors has been prepared and is under consideration of MoP. This will ensure cyber security during procurement of ICT based component/equipment/system for use in Power Supply System. Member (GO&D), CEA has been designated at the Designated Authority (DA) which will have a dedicated team of trusted officers working on collection and compilation and collating confidential information for which a "Trusted Vendor Cell" will be set up in IT Data Centre. The concept note for the scheme has already been approved by the Hon'ble Minister for Power. Deliberations to the effect are ongoing with various stakeholders and government agencies.

A committee was constituted to examine whether the presence of some of the equipment of foreign make in the transmission System is vulnerable particularly for the perspective of security of the grid. MoP had also constituted Group of Officers (GOO) to study contractual and related legal issues in Cyber Supply Chain Mechanism. CE (IT&CS), CEA as member Convenor prepared and presented the Reports of the Committees and Group of Officers. Actions on the accepted recommendationd are in progress like setting up National Cyber Testing Lab at CPRI Bengaluru. To implement the MoP order on Testing power system equipment for use in the Supply System and Networks in the country for cyber security, work on all associated activity like designating Testing labs, and Testing protocols to be followed, etc are being taken up on high priority.

CERT-In conducts regular training programs for network / system administrators and CISOs of all utilities of Power Sectors 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 Sectors. 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

A drafting Committee to frame the CEA Regulation on cyber security measures has been constituted by MoP and as an interim measure CEA has been directed to frame and issue guidelines on Cyber Security for Power Sector.

1.15.3.1 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 Guidelines came into effect from the date of issue by Central Electricity Authority, New Delhi. The Articles of Guidelines

mainly covers following issues pertaining to Cyber Security:

- Cyber Security Policy
- CISO appointment,
- CII identification,
- Electronic Security Perimeter,
- Cyber Security Requirement,
- Cyber Risk Assessment & Mitigation Plans,
- Phasing out of Legacy System,
- Cyber Security training,
- Cyber Supply Chain risk management,
- Cyber Security Incident Report and Response Plan,
- C-CMP,
- Sabotage Reporting
- Security and Testing of Cyber Assets,
- Cyber security Audit

1.15.3.2 CEA Cyber Security Regulations in Power Sector:

- CEA has been asked to prepare the draft Regulation on Cyber Security in Power Sector. The Regulation Drafting Committee under Chairmanship of CE (IT), CEA has been notified, having members from CERT-In, Sectoral CERTs, IIT-Kanpur, QCI, NCIIPC, CPRI and IEEMA. As an interim measure CEA has been asked to issue guideline under clause 3(x) of CEA (Technical Standard for connectivity to the Grid) (Amendment) Regulation 2019. CEA has issued Guidelines on Cyber Security issued by CEA on 7th October 2021.These Regulations are still in Drafting stage and will be finalised soon.

- These Regulation shall be applicable on the Responsible Entity as well as Equipment Integrators, Suppliers/Vendors, Service Providers, Software Designers engaged in the Indian Power Supply System. These Regulation, shall be read in conjunction with the provisions of IT Act 2000 and Amendments thereof and Cyber Security Audit mandated by CERT-In.

- Regulations shall cover cyber security requirement in both phases of active elements i.e. installation and construction phase as well as the maintenance phase. Risk through supply chain shall be addressed through regulation on cyber testing, testing protocol, and developing a system of trusted vendors for Intelligent & Communicable Equipments. A steering committee has been notified to develop protocols and lab at CPRI for testing power equipments from cyber security aspect. The labs at CPRI and other in Public, private as per Joint venture shall have to abide by the International Standard IEC 17025 shall be ensured in these regulations. As a testing protocol the test certificates submitted by the OEMs/Suppliers/Vendors shall also be considered for which provisions shall be made in these Regulations with the testing rights reserved with the buyer.

- In order to ensure the compliance of cyber security by the OEMs/Suppliers/Vendor, the bid documents shall have contractual clauses for which these regulations shall propose model contractual clauses. The legacy system being vulnerable as they don't have cyber security provisions, the regulation shall also cover modalities to either harden their cyber security or to phase out. Regulation also covers clauses regarding application to cloud service providers, requirement for Access Control, requirement of Personnel Risk Assessment Management etc.

- These Regulation shall be compatible with internationally followed standards like NERC CIP, IEC 20243, IEC 27001 & 27019, and shall cover cyber security based on IEC 62351 and IEC 62443 for IEC 61850 systems deployed in the Power Supply System.

1.15.3.3 Setting up of CSIRT-Power at CEA

• Presently Sectoral CERTs are discharging in addition to their duty of Sectoral CERT, other responsibilities assigned by their parent organization. They coordinate with their constituent utilities for implementing cyber security measures. However, with the expanding landscape of emerging cyber threats in the critical

sectors like Power, it is much desired to set up an institutional setup dedicated for cyber security of entire power sector of the country. Therefore, in the meeting held on 3rd August, 2021 on Peer-Review Assessment for Power Sector CERTs by CERT-In, chaired by Secretary, MoP it was decided to establish CSIRT centralized for entire power sector as one single source or point of contact for computer security incidents and cyber security issues, instead of having six sectoral CERTs. CSIRT-Power shall have a bird's eye view of all cyber threats looming over all sub-sectors of power sector and will be well equipped in terms of infrastructure as well as much needed manpower capability to respond timely and effectively to these cyber-threats.

• CSIRT-Power will function for all technical purposes as an extended arm with all legal mandate of Indian Computer Emergency Response Team (CERT-In), but will remain for all administrative purpose under the control of CEA. CSIRT-Power will be headquartered at NRPC building complex, Katwaria Sarai, New Delhi. The Empowered Committee on cyber security constituted by MoP will act as Governing Board for CSIRT-Power. It is a team that performs, coordinates and supports the response to security incidents. It's an organizational set up or a capability that provides services and support to its constituent utilities for preventing, detecting, handling, and responding to cyber security incidents, in accordance with its mission. Having a dedicated CSIRT at Sector level like for Power not only shall help to mitigate and prevent major incidents but would also help to protect Critical Information Infrastructures (CIIs) and deliver services effectively within the Power Sector.

• A security operations center (SOC) has been envisaged under CSIRT-Power which will function on 24x7x365 basis. It is the facility where network, applications, and endpoints of the constituent utilities shall be monitored and protected. Monitoring the network round the clock at SOC will help to flag any abnormalities or suspicious activities and to notify the constituent utilities immediately about the emerging threats, giving them time to prevent or mitigate threat.

• CSIRT-Power shall be headed by a Principle Chief Engineer (PCE) of CEA. Initially, CSIRT-Power shall constitute of at least 40 officers of rank of Assistant Engineers and above. Team at CSIRT-Power shall be constituting of 40% manpower having power sector domain expertise drawn from CPSUs like PGCIL, NTPC, NHPC etc., 40 % manpower will be drawn from CEA cadre, with officers having background of Computer Science or Information Technology or Electronics and Communication and remaining 20% of manpower shall be professionals having expertise in cutting edge technology in the field of IT & Cyber Security, hired on contractual basis from open market for a fixed term of five years. The expenditure of CSIRT-Power shall be funded from separate head of account to be created under the budget head of CEA. CSIRT-Power shall be funded from Consolidated Fund of India and shall be allocated annual budget of CEA on the demand raised by the Governing Board of CSIRT-Power.

• The Alerts and Advisories issued by CSIRT-Power are to be mandatorily complied by the concerned constituent utilities within the prescribed time. Responsibilities of CSIRT-Power will include:

a) Serve as a Point of Contact and responsible agency for responding to and prevention of cyber security incidents in the Power Sector.
b) Coordinate, share, collect, analyze and forecast upcoming cyber threats with specific focus on IT and OT part of critical information infrastructure and notified Protected System in Power Sector.
c) Create/develop Standard Operating Procedures (SOPs), security policies, best Practices for Incident Response activities in consultation with CERT-In.
d) Issue guidelines, advisories etc. after approval and in coordination with CERT- In.
e) Mandate to implement C-CMP for the IT/OT infrastructure in Power sector in coordination with and under supervision of CERT-In.
f) Collect and report all incidents to CERT-In and respective authorities/regulators as and when reported to CSIRT
g) Exchange knowledge and experiences with CERT-In and other state/sectoral CSIRTs.

h) Collaboration through CERT-In to resolve the specific security incidents which involve multiple states/sectors and external/International entities
i) Proactive measures to increase the cyber security awareness and improving the cyber security posture of the Power sector including audits, assessments and exercises.
j) Facilitate and promote research & development in relevant subject domain pertaining to cyber security in collaboration with Research Institutes and Academia.

1.15.4 Digitization of Approvals/ Clearances given by CEA:

As per the direction of Project Monitoring Group of Cabinet Secretariat, on-line application for the following approvals/clearances, given by Central Electricity Authority, have been implemented:
Online Application for Inspection of Electrical Installations
O Online Application for Inspection of Electrical Installations
O DPR Approval Process Monitoring System for Hydro Projects
O Prior approval of GoI for installation of overhead lines as per Section 68 of the Electricity Act 2003

This digitization of approvals/clearances is ensuring transparency and timely approval by CEA. This also facilitates developers to track the status of their application.

1.15.5 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 has been provided the login credentials separately. Internal informations of organization like presentations / forms / posting orders / leave orders/ internal circulars etc. will be shared through the portal to all the officers / staffs. CEA canteen, IT Stores and GS stores facilities has also been integrated with the intranet portal of CEA.

1.15.6. Use of Kavach Application for login into NIC email

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

1.15.7. Other Information Communication Technology (ICT) enabled activities

- All IT related items has been procured through GeM Portal and their payment is also being made via PFMS.
- All tenders have been uploaded on Central Public Procurement (CPP) Portal.
- Process of e-HRMS has been initiated.

1.16 Market Monitoring Cell

Ministry of Power in March,2019 had entrusted CEA with the task of monitoring the volume and price of electricity transacted on both the power exchanges of India i.e. IEX and PXIL.

Subsequently, the Regulatory Affairs Division of CEA started preparing 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 both the power exchanges in India in the Day Ahead Market (DAM), Green Day Ahead Market (GDAM), Term Ahead Market (TAM), Green TAM and Real Time Market (RTM), suggest modalities for deepening the electricity market, facilitate introduction of new products in the power exchanges, etc.

The activities performed by RA Division, CEA from **01.04.2021 to 31.03.2022** are mentioned below.

1. Carried out detailed analysis of electricity transacted in both the power exchanges in India (i.e. IEX and PXIL) for the months April, 2021 to March, 2022 and prepared the brief monthly Market Monitoring Reports for the months March, 2021 to February, 2022. Also prepared detailed Monthly Market Reports for the months of January, 2021 to January, 2022 are available on CEA's website.

The salient points from these reports are as under:

(i) The total volume of electricity transacted during the period April, 2021 to March, 2022 in both the power exchanges i.e. IEX & PXIL on delivery date basis was **101,860 MU**, which is 7.44 % of the total

energy supplied **1,369,818 MU** in the country during FY 2021-22.

(ii) The total volume of electricity transacted in both the power exchanges in Day Ahead Market, Term Ahead Market, Real Time Market, Green Term Ahead Market and Green Day Ahead Market during the period April, 2021 to March, 2022 were **65,186 MU, 10,018 MU, 19,908 MU, 5,828 MU and 920 MU**. The volume of electricity transacted in Day Ahead Market constituted about 64 % of total transacted volume of electricity in both the power exchanges during the months April, 2021 to March, 2022.

(iii) The monthly average Market Clearing Price in IEX in Day Ahead Market varied from minimum of **Rs 2.83/kWh** in the month of May, 2021 to maximum of **Rs 8.23/ kWh** in the month of March, 2022. Similarly, the monthly average Market Clearing Price in PXIL in Day Ahead Market varied from minimum of **Rs 3.02/ kWh** in June, 2021 to maximum of **Rs 7.17/ kWh** in the month of October, 2021, respectively.

CHAPTER-2

PLANNING FOR POWER DEVELOPMENT

2.1 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.

Draft National Electricity Plan (NEP) 2022-27 is under-preparation. This NEP will cover the review for the period 2017-22, detailed plan for the period 2022-27 and perspective plan for the period 2027-32.

2.1.2 Generation Planning Studies

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

i) Studies are being carried out for Preparation of 'National Electricity Plan 2022-27' for the country.

ii) Studies were carried out for preparation of 'Roadmap for Storage requirement for 2029-30'. Report was prepared and submitted.

iii) 'Expert committee on coal for year 2029-30'. Studies were carried out for coal requirement and capacity addition requirement of coal.

iv) Studies are being carried to work out the reliability indices i.e. Loss of Load Probability (LoLP) and Energy Not Served (ENS) for Resource Adequacy Guidelines.

v) Chief Engineer (IRP) has been requested to prepare a Power portfolio Management Plan

for BSES (BRPL &BYPL). Accordingly, studies are being carried out.

2.1.3 Generation Capacity addition during the Year 2020-21 and 2021-22

i) For the Year 2020-21, against a schedule of capacity addition of 11,197.15 MW, Capacity addition of 5,436.15 MW was achieved comprising of 510 MW Hydro, 4,926.15 MW Thermal, and 0 MW Nuclear.

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

2.1.4 Participation of CEA as Committee Member /Interaction Meets etc.

i) Collaboration with Danish Energy Agency (DEA) under 'INDO Danish energy partnership': CEA is jointly working with DEA in the field of energy planning, modelling and forecasting scenarios.

ii) Chief Engineer (IRP) is a member of the 'Expert Group constituted by NITI Aayog for comprehensive study on the future coal scenario in India till 2050'.

iii) Chief Engineer (IRP) is the convener of the committee constituted for 'Formulating a Trajectory of Storage requirement'.

iv) Director (IRP) is a member of the committee constituted for 'Viability of Hydro tariff and bundling of Hydro power with RE'.

v) Director (IRP) is the convener of the Committee to work out the reliability indices i.e. LoLP & ENS for Resource Adequacy Guidelines.

vi) Chief Engineer (IRP) is a member of the Expert coal committee for the year 2029-30.

2.1.5 Reports Published

i) First 'Indian Technology Catalogue' was prepared and published under the India Denmark Energy Partnership (INDEP) program. The

technology catalogue may aid in power sector planning, analysis and policy formulation by governments. The technology catalogue may therefore be used as a standardized database comprising of inputs from across the Indian power sector.

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 preliminary forecast has been prepared and final report is expected to come by the end of June 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-2021, 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-2021 also contains information about the Installed Capacity and generation of captive power plants of about 6090 Nos. General Review-2021 containing the data for the year 2019-20 was published in April 2021. General Review-2022 containing data for the year 2020-21 is under process of approval.

2.5.2 Growth of Electricity Sector in India

Publication titled "Growth of Electricity Sector in India from 1947-2021" was published in April, 2021 containing data for the year 2019-20 and provisional /estimated data for the year 2020-21 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 18006.24 MW have been retired from 10th Plan onwards. Out of which 701.50 MW during 10th Plan, 2398 MW during 11th Plan, 5082.44 MW during 12th Plan and 9284.3 MW after 12th 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 and 1604.5 MW during 2021-22) was retired.

During the year 2021-22, 20 Nos. of thermal generating units with aggregate capacity of 1604.5 MW have been retired.

The list of the generating units retired during the year 2021-22 is given below: -

Sl. No.	Name of Station/Plant	State	Unit No.	Retired (MW)	Retired on
1.	BOKARO `B` TPS	Jharkhand	3	210.00	01.04.2021
2.	TALCHER (OLD) TPS	Odisha	1,2,3,4,5,6	460.00	01.04.2021
3.	Koradi TPS	Maharashtra	7	210.00	02.09.2021
4.	Adamtilla CCPP	Assam	1,2,3	9.00	30.09.2021
5.	Baskhandi CCPP	Assam	1,2,3,4	15.50	30.09.2021
6.	MUZAFFARPUR TPS	Bihar	1,2	220.00	31.01.2022
7.	Bandel TPS	West Bengal	1	60.00	28.03.2022
8.	Kolaghat TPS	West Bengal	1,2	420.00	28.03.2022
	Total		**20**	**1604.5**	

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
10 th Plan	9	629.50	0	0.00	2	72.00	0	0.00	11	701.50

11 th Plan	**38**	2135.00	0	0.00	11	261.00	5	2.00	**54**	**2398.00**
12 th Plan	**49**	4721.50	0	0.00	7	205.00	9	155.94	**65**	**5082.44**
After 12th Plan	**83**	8455.38	11	740.00	19	301.00	10	327.92	**123**	**9824.30**
Total	**179**	**15941.38**	**11**	**740.00**	**39**	**839.00**	**24**	**485.86**	**253**	**18006.24**

Research & Development in Power Sector

2.7.1 R&D activities in Power Sector: -

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

The Government is promoting Research and Development (R&D) for the Indian Power Sector through Central Power Research Institute (CPRI) and various R&D schemes. The Government has recently approved the proposal for continuation of R&D schemes in the Power Sector to be implemented through CPRI with an outlay of Rs. 112 crore.

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

Technical Committees in specific fields of power, namely, Thermal Generation, Hydro Generation, Transmission and 'Grid, Distribution & Energy Conservation', have also been constituted to assist the SCRD in evaluating R&D proposals and monitoring of the R&D projects till successful completion. The committees have representation from Academia, Industry, Utilities and Policy making bodies.

Further, Research projects from eminent Institutions across India like IIT Kharagpur, IIT Kanpur, IIT Madras, IIT Bombay, NIT Meghalaya, NIT Silchar, CMET Thrissur, CPRI, 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.

Chairperson, CEA is the Chairman of the Standing Committee on Research & Development (SCRD). Currently, following are the "Research Schemes of Ministry of Power being implemented through CPRI" for the power sector facilitated by the CEA:

i) **National Perspective Plant (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 Human Resource Development 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.

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

A total of 42 projects under NPP, RSoP and IHRD Schemes with an outlay of Rs. 28.8035 crores were approved during the year 2021-22. These includes projects on some of the prority areas of research in Power Sector like Cybersecurity, Alternate Fuels (green Hydrogen), Nano-materials, Energy Storage etc. The projects have been initiated by the Project implementing organizations.

2.7.3 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 addition to above, inputs/comments on the following references received concerning research and innovation policy/programme were provided from time to time:

i) Empowered Technology Group (ETG) under the Chairmanship of Principal Scientific Adviser to Government of India regarding new technology proposals.
ii) Suggested various research projects for taking forward through Ministry of Power Project Development Cell (PDC) established under the aegis of Invest India.
iii) Quad Clean Energy Innovation Deployment.
iv) Technical Cooperation Program "Science and Technology Research Partnership for Sustainable Development (SATREPS)" for FY 2022 under the ODA Scheme of Government of Japan
v) Feasibility study for retrofitting of old Thermal Power plants in Tamil Nadu to run on Molten Salt Storage Technology.
vi) Non grid quick Electric Vehicle (EV) charger
vii) Technical Committee on Hydro Research.
viii) Technical Committee on Thermal Research.
ix) Technical Committee on Transmission Research.
x) Technical Committee on Grid, Distribution and Energy Conservation Research.
xi) Identification of new areas for Research and Development relevant to Power Sector.
xii) First Indian Technology Catalogue

2.7.4 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 needs to be developed through enhancing their technical knowledge and exposure to R&D activities.

A Memorandum of Understanding (MoU) was signed between Central Electricity Authority (CEA) and Indian Institute of Technology, Delhi (IITD) for development of Human Resources relevant to the need of Power Sector to further strengthen R&D initiatives in CEA through enhancing their technical knowledge and R&D exposure.

Under the obligation of MoU one CEA Chair Professorship has been instituted at IIT Delhi. Further, eight officers of CEA are currently pursuing part time M. Tech/MBA/Ph.D courses from IIT Delhi.

2.8 Standardization activities

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

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, 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 Shri Ashok Kumar Rajput, CE (R&D) under the aegis of Ministry of Power.

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

It has come to the notice that the representation from State Power Utilities in various Technical Committees of BIS concerning Electrical equipment is very few in number and only in very few Committees of BIS. In order to have participation of expert(s) from all segments of Power Sector (from Central/State/Private**)** nominations from the power sector organizations were sought and sent to the BIS for consideration to facilitate BIS in identification of new areas/ technologies and need for revision and up-dation of Indian Standards in respect of power sector and formulation/revisions of standards thereof.

CE(R&D) is representing CEA as a member in various BIS Sectional Committees viz. ETD 20, ETD 29, ETD 51, etc. Also, CE(R&D) is the Chairman of the ETD 32 of BIS. By default, in all the Committees where there is no representation from CEA, CE (R&D) participate in the proceedings.

Provided comments/inputs on the Review of IS 7752 (Part 1)-1975 on Guide for improvement of Power Factor in Consumers' Installations and other standards were sent to BIS.

Further, experts from CEA are contributing in formulation 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.

2.8.2 In addition to above, inputs/comments on the following references received concerning formulation/revision/updation of standards, Quality Control Orders (QCO) were provided from time to time:

i. Drafted 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. The draft QCO was submitted to the MoP for notification purpose.
ii. Extension of Quality Control Order in respect of Steel.
iii. BIS is in the process of developing the Strategic Roadmap of Electrotechnical Division Council (ETDC). Roadmap would reflect its vision of national standardization in its area of work and provide a broad standardization roadmap with a five year perspective. Chief Engineer (R&D), CEA has been designated as member of the working group to examine the comments received from various members of ETDC and develop the draft document on Strategic Roadmap for ETDC.
iv. The draft document on "Strategic Road Map of Electro Technical Division Council (ETDC)" was prepared by R&D Division.
v. Analysis of National Electrical Code document.
vi. Draft standards on Technical requirements for Solar Photovoltaic Grid Tie Inverters" and its various revisions prepared under the aegis of MNRE.
vii. Preparation of test methodology for Advanced Chemistry Cell (ACC) Batteries.
viii. References/issues related to Cyber Security and testing of imported equipment.

2.10 Formulation of CEA's Regulations related activities

i) Provided comments/inputs for the review of Central Electricity Authority (Grid Standards) Regulations, 2010.
ii) Comments/inputs on Central Electricity Authority (Safety Standards) Regulations,

2010 which is under review were provided.

iii) CE(R&D) has also been designated as a Member of the Standing Committee constituted in CEA for examination and finalization of Public comments on CEA Regulations.

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

With respect to Power Sector, Chief Engineer (R&D), CEA has been designated as the Nodal Officer from Ministry of Power in promoting manufacturing of goods and services in India related to Generation, Transmission and Distribution segments of the power sector under "Make in India" and "Aatma Nirbhar Bharat" initiatives of Government of India. Chief Engineer (R&D), CEA is acting as an interface between the Ministry of Power/Department for Promotion of Industry and Internal Trade (DPIIT) and the PSUs/Organizations/Autonomous Bodies under the administrative control of the Ministry of Power as well as the Industry Associations.

2.11.1 Major activities undertaken by CEA in relation to 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) Identification of items pertinent to generation, transmission and distribution segments of the Power sector, for giving purchase preference to local suppliers. The list of items is in respect of the goods, material, equipment etc. used in the power sector under the classification of "where sufficient local capacity and enough local competition" exists and where only Class-I local suppliers shall be eligible to bid in public procurements irrespective of purchase value of the goods, equipment and material.

ii) Preparation of general guidelines, which may be selectively adopted in an appropriate manner by the procuring entities in their tendering process to further encourage Make in India initiatives and promote manufacturing and production of goods and services in India.

iii) Formulation of make in India Order of Ministry of Power.

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

i) A scheme for setting up a manufacturing zone for power and renewable energy sector equipment/components/spares with a budgetary outlay of Rs 400 crore on pilot basis has been sanctioned by the Government of India with the objective to promote indigenisation through substitution of products presently being imported and prioritizing such products for domestic manufacturing in line with 'Make in India' and 'Aatma Nirbhar Bharat' Policy initiatives. The proposed funding of Rs 400 crore would be kept for supporting Common Infrastructure Facility (CIF) and Common Testing Facility (CTF) at the manufacturing Zones.

ii) The aforementioned scheme was drafted by the R&D Division of CEA in consultation with concerned Divisions of CEA and other stakeholders of the sector.

iii) Chief Engineer (R&D), CEA has been designated as one of the technical expert Member of the Project Management Agency (PMA) which shall be constituted under the scheme. The PMA shall be responsible for examination and appraisal of the proposals and making appropriate recommendations to the Scheme Steering Committee as well as motoring of the progress of manufacturing zone through periodical inspection.

iv) For the aforementioned scheme R&D Division, CEA with Chief Engineer (R&D) as a member of the "Committee on Indigenisation", in consultation with other stakeholders of the power sector including industry associations, has developed/updated a list of equipment being imported in different categories such as those with zero domestic capacity, with limited capacity, volume of import, source of import and tentative demands.

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

i) **A Production Linked Incentive (PLI) Scheme** for Transmission and Distribution (T&D) Goods & Services through Phased Manufacturing Programme (PMP) is being formulated by the R&D Division under the aegis of Ministry of Power. The PLI scheme proposes financial incentives to boost/ introduce domestic manufacturing/augment the manufacturing capabilities and attract large investment in the value chain wherever there are gaps.

ii) Chief Engineer (R&D), CEA has been designated by the MoP as a member of committee to identify the components / items related to Transmission & Distribution in power sector for which manufacturing capabilities in India can be increased under **Phased Manufacturing Programme** (PMP) by assessing their demand (domestic and export potential) in terms of expected value for the next 10 years. Chief Engineer (R&D) is also a member of the committee to identify the policy interventions which may be required to formulate the PMP, i.e. duty structure, minimum local content (MLC), Transfer of Technology (ToT), other facilitation, etc.

iii) 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 respectively and recommended for consideration of the same under PMP for Power Sector.

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

v) Formulation of concept note, draft Concept note on PLI of MoP, draft PLI Scheme, broad Guidelines for implementation of PLI, draft EFC Memo for PLI, etc. for promoting domestic manufacturing of identified items is in the process in the R&D Division.

vi) CEA/MoP is also encouraging 'Transfer of Technology' in respect of imported equipment/components so that in a fixed time frame the substitution of these imported equipment through indigenisation takes place.

vii) CEA/MoP is also enhancing 'Research and Development (R&D)' efforts in the electricity sector for enabling manufacturing of equipment/components used in establishment of Power Sector infrastructure.

2.11.4 Registration of bidders from countries sharing land border with India:

Keeping in view the defense of India and national security, Department of Expenditure (Ministry of Finance) 'DoE' issued Order (Public Procurement No.1) dated 23rd July 2020 prescribing the requirement of prior registration of bidders from countries sharing land border with India for participation in the public procurement. Pursuance to this Order a Registration Committee in DPIIT has been constituted for processing the applications as per the Standard Operating Procedure (SoP), in compliance of the DOE Order dated 23-07-2020.

MoP is the Nodal Ministry related to registration of bidders pertinent to power sector. Applications of various bidders from countries sharing land border with India received in DPIIT are being forwarded to CEA through MoP.

In this connection, 45 applications pertinent to power sector have been received in CEA so far (during the year 2021-22). CEA gathered inputs from concerned power sector stakeholders and carried out comprehensive analysis in order to ascertain the demand/supply scenario and necessity in respect of the goods/services/works for which registration is sought by the bidders. Inputs/recommendations on acceptance or rejection of such applications have been furnished

to MoP for conveying final decision in this regard to the DPIIT.

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

A committee under the chairmanship of Chairperson, CEA to examine the grievances in consultation with stakeholders and recommend appropriate actions to the Competent Authority in MOP. In this context, 31 grievances against non-compliance of Public Procurement (Preference to Make in India) Order were received in CEA through DPIIT during the financial year 2021-22. CEA gathered inputs from concerned power sector Public Sector Undertakings (PSUs), BHEL, Neyveli Lignite Corporation (NLC) Limited and other stakeholders/State Governments, Industry Associations and a comprehensive analysis w.r.t. each grievance was carried out. Inputs containing recommendations on such grievances were furnished to the MoP for conveying final decision in this regard to the DPIIT.

2.11.6 Scrutiny of tenders valued Rs 500 crores and above:

i) To check/verify for the compliance of provisions of PPP-MII Orders in public procurement a Committee under the chairmanship of Member (Planning), CEA has been constituted in CEA to scrutinize the tenders valued Rs 500 crores and above floated by PSUs/Subordinate Offices under the administrative control of Ministry of Power.
ii) Chief Engineer (R&D), CEA is the member convener of the Committee.
iii) A meeting with other Members of the Committee was conducted in this regard and based on the deliberations and inputs provided thereof the draft status report is under preparation for submission to the MoP after finalisation.

2.11.7 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 and to name a few are:

i) Inputs for proposed meeting between CEO, Schneider Electric and Hon'ble Prime Minister with respect to investments under MII initiatives.
ii) Note for Committee of Secretaries (CoS) w.r.t Meeting of Committee of Secretaries (CoS) on Amendments to "Public Procurement (Preference to Make in India) Order, 2017".
iii) Requirement of foreign certification KEMA (DNV) for Puwer System Development Fund (PSDF) funded Remote Terminal Units (RTUs) tender for supply, erection, commissioning, adaptation and integration of 171 numbers of Remote Terminal Units (RTUs) in Telangana State (TS) Transco.
iv) Concern raised by IEEMA on Testing power system equipment for use in the Supply System and Network in the country for Cyber Security.
v) Industry concerns on 8th June 2021 Order of MoP on Testing power system equipment for Cyber Security.
vi) Inadequate supply of Cold Rolled Grain Oriented (CRGO) material for transformer manufacturing.
vii) Aluminium Import substitution.
viii) Revised order of MoP regarding Public Procurement (Preference to Make in India) to provide for Purchase Preference (linked with local content) in respect of Power Sector.
ix) Various proposals related to procurement of different items/equipment not available locally as submitted by CPRI for seeking Approval of Competent Authority for Global Tender Enquiry were examined in accordance with specified procedure and furnished recommendations thereof to the MoP from time to time.
x) Provided inputs/comments on the Scheme for **'Made in India Label'**, a step towards building a robust, self-sustaining machinery to create brand value for Indian-made products and to encourage manufacturers to localize their manufacturing process in conformity with the vision of 'Aatma

Nirbhar Bharat Abhiyan'.

xi) Inputs were also provided for the meeting with statutory regulatory bodies to determine the mechanism to regulate 'Made in India' and ensure ease of access to quality testing and certification infrastructure for enterprises.

xii) Note on CRGO Electrical Steel-Need to manufacture in India was prepared.

xiii) Material for speech of Hon'ble Minister of Power and New & Renewable Energy on Make in India and Aatma Nirbhar Bharat Abhiyan prepared.

xiv) inputs on para 4.12.17 of the 239th Report of Department Related Parliamentary Standing Committee (DrPSC) of Ministry of Home affairs.

xv) Inputs for Vision 2047 document of MoP.

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

i) Provided comprehensive inputs for the revised consolidated "Charging Infrastructure for Electric Vehicles - Guidelines and Standards" issued by the Ministry of Power on 14.01.2022.

ii) Providing inputs and attending meetings regarding implementation of FAME - II scheme for setting up of EVCI in the country.

iii) CEA has been assigned the task of gathering information related to installation of Electric Vehicles Charging Stations in the country. As such, CEA was seeking this information from various Distribution companies/licensees in the country.

As per the information received in CEA as on August, 2021, a total of 660 number of Electric Vehicle Charging Stations have been installed under the jurisdiction of different discoms/licensees.

Further, as per the revised consolidated "Charging Infrastructure for Electric Vehicles - Guidelines and Standards" issued by the Ministry of Power on 14.01.2022 the Bureau of Energy Efficiency (BEE) shall create and maintain a national online database of all the Public Charging Stations.

iv) Provided comments on the Tata Power Company Limited (TPCL) reference wherein TPCL has requested support and intervention of MoP in reduction of GST rate on Electric Vehicle (EV) charging services to 5% from 18% at present.

2.13 National Electricity Plan (NEP) 2022-2027:

Various Sub-Committees on broad issues of power sector have been constituted under the 'Committee on National Electricity Plan' for preparation of National Electricity Plan for the next five years (2022-2027). The Sub-Committee on the subject **"Technological Advancement and Research and Development"** is headed by DG, CPRI. Chief Engineer (R&D) has been designated as the Member Secretary of the sub-committee.

The Sub Committee is to deliberate on the following topics as per the Terms of Reference of the Committee:

i) Review of existing R&D facilities & programmes in Power sector.

ii) Recommendation regarding science and technology programmes to be implemented during 2022-27, including identification, transfer and diffusion of technology in various areas of the power sector.

The Chapter of the NEP 2022-2027 on "Technological Advancement and Research & Development" was prepared in consultation with other Committee Members and final Chapter after the approval of Chairman of the Committee was submitted to the IRP Division of CEA for inclusion in the National Electricity Plan (2022-27).

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

Comments/inputs on references related to **Energy transition, net zero, carbon neutrality, RES** were furnished from time to time and some of these are mentioned below:

i) **Committee on "500 GW Non Fossil Capacity- New Avenues for Utilization of Generated Electricity"**

a. A Committee comprising members from CEA, representatives from Government(s) of Rajasthan, Gujarat, Uttar Pradesh and Organizations like PFC, CERC, IEEMA, FICCI and some private players was constituted by CEA under the Chairmanship of Chairperson (CEA) to explore various options, measures, policies, and required interventions for increased usage of electricity, by enhancing electricity consumption in various sectors.

b. CE(R&D), CEA is the Member Convener of the aforementioned Committee. Report of the Committee on "500 GW Non-Fossil Based Capacity Target - Avenues for Utilization of Generated Electricity" is under preparation.

ii) Representing CEA in the Sub-Group "RE Capacity Addition Planning constituted under the group for finalization of RPO trajectory beyond 2021-22.

iii) Report preparation on Technology promotion and innovations for the subgroup 3 constituted for formulating comprehensive policy framework and related matters for promotion of Energy Storage.

iv) Feasibility for use of Hydrogen fuel at RGCCPP, Kayamkulam, Kerala.

v) Optimal power generation models for Andaman & Nicobar Islands and Lakshadweep Islands.

vi) Draft Electricity (Promoting renewable energy through Green Energy Open Access) Rules, 2021.

vii) Draft Proposal for Amendments to Energy Conservation (EC) Act, 2001.

viii) VIP reference - Promotion of Bamboo area for Biomass pellets production for utilization of Power generation through co-firing in coal based TPP.

ix) Emerging Opportunities in India- Clean Energy Transition.

x) Sustainable Growth Pillar of the India-US Strategic Clean Energy Partnership

xi) Draft note of Waste of Energy (WtE) power projects.

xii) Final DIB Proposal of NPTI for establishing Training Facilities for New and Renewable Energy, SPF/ Solar/ Wind/Biomass/ Biogas.

xiii) Draft EFC -National Green Hydrogen Mission.

xiv) MNRE Draft Note for the Cabinet - Mandating Green Hydrogen Consumption Obligation in fertilizer production and petroleum refining

xv) Comments on the document "Harnessing Green Hydrogen" prepared by NITI Aayog.

xvi) EFC memo-Continuation of Waste to Energy programme namely "Energy from Urban, Industrial and Agricultural wastes/residues" for the period 2021-22 to 2025-26

xvii) EFC Note - Loan scheme on biomass supply chain management for the period 2021-22 to 2023-24.

xviii) EFC Note Memo regarding Infusion of equity of Rs 1,000 crore in Solar Energy Corporation of India Limited (SECI).

xix) Revised EFC of the Central Sector Scheme- 'Control of Pollution' for continuation of the scheme beyond 2021-Subsuming of National Clean Air Programme (NCAP) (a sub-component of the CSS-Control of Pollution) to National Mission for Clean Air (NMCA).

xx) Draft PIB Proposal in respect of Investment approval for development of 1000 MW grid connected solar PV Power Projects in IREDA's 5000 MW under CPSUs by SJVN Limited.

xxi) Draft PIB Proposal in respect of Investment approval for development of 1000 MW grid connected solar PV Power Projects in IREDA's 5000 MW under CPSUs by NHPC Limited.

xxii) Enhancement of equity by Coal India for diversifying their activities.

xxiii) Preliminary Project Report (PPR) uploaded by Department of Heavy Industry, Ministry of Heavy Industries and Public Enterprises, for Technical Assistance from GIZ to support the implementation of climate friendly e-mobility in India.

xxiv) PPR by West Bengal Power Development Company Limited (WBPDCL) on innovative 500 MW Floating Solar Power Plant in West Bengal, India.

xxv) PPR on Smart Power, Renewable Energy and Storage (India –UK Partnership Project of Technical Assistance on Smart Power).

2.15 References on International Cooperation on which comments/inputs were provided are as under:

i) **1st India-Central Asia Summit- provided inputs on the issues like** cooperation and Transfer of technology (TOT) programs **in the areas of advance and emerging technologies to be taken up during meeting**. It includes offshore wind technologies, green hydrogen production, recycling of solar panels & wind turbine blades, energy storage systems technologies, development of smart grids, optimization of tapping of RE sources, etc.

ii) Proposal to the Government of India ("GoI") by Copenhagen Infrastructure Partners (CIP) in relation to the Mannar Gulf Offshore Wind Project.

iii) Proposed policy on Energy Sector Strategy by Asian Infrastructure Investment Bank (AIIB).

iv) Inputs for improving Global Innovation Index report published by World Intellectual Property Organisation for the forthcoming report for 2022.

v) 1st India - Arab Cooperation Forum.

vi) PMO: India-Finland Virtual Summit.

vii) Indo French webinar focused on smart grid technologies and cybersecurity solutions.

viii) Global Commission on People Centered Clean Energy Transitions held on 24.06.2021.

ix) Possible Early Harvest of India-Canada Comprehensive Economic Partnership Agreement (CEPA).

x) Participation of Hon'ble Minister for Power and NRE in a virtual event with 27 EU Member States Ambassadors resident in New Delhi at 03:30 PM (IST) on 23.02.2022.

xi) Proposal for amendments to Minamata Mercury Convention for consideration in meeting of COP-4 to be held during first quarter of 2022.

xii) Energy Efficiency in South Asia Opportunities for Energy Sector Transformation.

xiii) FOC with Finland-Inter Ministerial Meeting.

xiv) Proposed India- Israel FTA.

xv) Inputs for India's Third National Communication to the UNFCCC.

xvi) GE collaboration with Government of India for Renewable Integration and Grid Firming for sustainable and reliable power.

xvii) TR: Embassy of France: Meeting request Minister Counsellor Mr. Gauthier with Additional Secretary, Mr. Dewangan.

xviii) 20th Session of India-Finland Joint Commission on Economic Cooperation (JCEC) to be held shortly – seeking Action Taken Reports (ATRs) on the Protocol of the 19th Session of the JCEC and new agenda points for discussions in the 20th JCEC.

xix) Vivekananda International Foundation (VIF) Task Force draft report on India's Energy Transition in a Carbon-Constrained World: The Role of Nuclear Power.

xx) CII engagement and proposal to strengthen economic cooperation under BIMSTEC

xxi) Proposals/requirements in the field of energy to SAARC Energy Centre (SEC) which is in the process of preparing its Programme of Activities for the year 2022.

xxii) Request for Ministry of Power Views & Comments on the Draft reports for Battery Storage project under World Bank Technical Assistance (TA).

xxiii) U.S. - India collaborative for smart distribution System with Storage (UI-ASSIST) side event to US-India Strategic Clean Energy Partnership (SCEP).

xxiv) Inputs on UK-India Energy Dialogue.

2.16 State Energy and Climate Index by NITI Aayog

India's State Energy & Climate Index- 2020: R&D Division provided the consolidated inputs for formulation of State Energy and Climate Index by NITI Aayog and the same have been acknowledged in respect of CE (R&D) Shri Ashok Kumar Rajput.

2.17 Other important references on which comments/inputs were provided are as under:

- Draft Master Plan for Delhi – 2041
- Draft Regional Plan- 2041 for NCR
- CPRI DIB or augmentation of existing test facilities & Establishment of new test facilities at various centers of CPRI
- EFC Note of Ministry of Science & Technology regarding continuation of the Umbrella Scheme "Innovation, Technology, Development and Deployment".
- EFC Proposal for Continuation of Central Sector Scheme of Ministry of Power beyond March, 2021 under Umbrella Scheme "Strengthening of Power System" comprising *(a) Establishment of Renewable Energy Management Centres (REMCs) (b) Continuation of National Smart Grid Mission (NSGM) in Power Sector for three years from April 2021 to March 2024.*
- SFC Memorandum for appraisal of R&D Schemes of Ministry of Power being implemented through CPRI
- Draft EFC Memo for "Additional Capital Infusion of Rs.1500 crore in IREDA".
- Enhancement of Limits of equity investment under Maharatna Scheme for setting up of 10 GW Integrated Solar Manufactuirng facility of Coal India Limited.
- Comments on approval of Qualification Packs prepared by PSSC.
- **Issues faced by Industrial Buildings Developers in Gujarat.**
- CEA (Cyber Security in Power Sector) Guidelines, 2021
- CEA (Cyber Security in Power Sector) Regulations, 2021
- Trusted Vendor System for procurement of ICT based products.
- Chinese Machine Vision (MV) and expanding Chinese CCTV footprints in India
- Cyber Security Model Contractual Clauses
- Handbook for EV Charging Implementation
- CPRI Road Map for 5 years- April 2021 to March 2026
- Issues raised by Association of Power Producers (APP)
- Inputs on Gati Shakti programme of Government of India.
- Supply issues of CRGO.
- Roll out of street infrastructure and small cells in 5G – To facilitate a standard approach for the proliferation of dense small cell infrastructure.
- PPRID-11575- Project proposal Meghalaya Power Sector Improvement Project (Phase-II) of Govt of Meghalaya by NDB.
- PPR from Govt. of Assam seeking funding from New Development Bank (NDB) for the establishment of Gas Based Energy Project.

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

- CE(R&D) has been nominated as a Member of the Standing Committee constituted for examination of Public comments on CEA Regulations.
- Chief Engineer (R&D) is representing power sector in the Inter-Ministerial Committee of Ministry of Mines, for the purpose of Aluminum import substitution.
- 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.
- Chief Engineer (R&D) and Chief Engineer (PSETD) have been nominated from CEA as a member of the Committee constitution by the MoP for creation of manufacturing hub for indigenization of power sector equipment – vide MoP Order dated 31.08.2020.
- Director (R&D) was nominated from CEA for the Monitoring Group constituted by the

MoP related to implementation of capital projects of CPRI.

- Director (R&D) is representing CEA in the Committee related to CPRI issues related to gaps in testing infrastructure of CPRI constituted by the MoP.
- Director (R&D) was nominated from CEA in the Committee constituted for review of projects under Uchhatar Avishkar Yojana (UAY), an initiative of Ministry of Human Resource Development to promote innovation.

2.19 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 01.04.2021), the coal stock available with the thermal power plants was 31.93 Million Tonnes (MT), which was sufficient to run these plants for an average of 17 days. However, as on 31st March 2022, the total coal stock available with the plants reduced to 27.23 Million Tonnes, which was sufficient to run these plants for an average of about 13 days.

2.19.1 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 including plants running on washery rejects are 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.

Further, in the event that availability by any power plant is less than the Normative Availability (as per prevailing regulatory norms of Central Electricity Regulatory Commission (CERC)/ State Electricity Regulatory Commission (SERC) - as applicable) due to less coal stock maintained by the plant, the penalty will be levied on defaulter Gencos/IPPs as per the revised norms.

Monitoring by Core Management Team

Ministry of Power constituted a Core Management Team (CMT) with members from MoP, Railways, CEA, CIL, NTPC, DVC and POSOCO to ensure close monitoring of coal stocks at thermal power plants (TPPs) and to take operational decisions to augment supply of sufficient quantity of coal to the

TPPs.

Monitoring by Subgrouop:
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.

2.19.2 Coal Scenario for the Power Sector during 2021-22

2.19.2.1 Estimation of coal requirement for the year 2021-22.

During 2021-22, based on generation target, the coal requirement was estimated to be about 723.2 MT. The break-up of coal requirement during 2021-22 is given as under:

(Figs. in MT)

Coal Requirement	**2021-22**
Domestic Coal based (DCB) Plants	677.9
Imported Coal based (ICB) Plants	45.3
Total Requirement	**723.2**

2.19.2.2 Coal Supply Position for the year 2021-22

For the year **2021-22**, the total receipt of coal was 694.6 MT. However, the coal consumption was about 697.3 MT during **2021-22**, which was met from the stock available with the plants. The details of coal receipt and consumption for year **2021-22** are given as under:

(Figures in MT)

A. Estimated Requirement (Domestic + Imported)	**723.2 (677.9+ 45.3)**
B**. Receipt**	
a. Domestic coal	667.6
b. Imported coal for blending	8.1
c. Imported coal for ICB plants	18.9
d. Total Import	27.0
e. Total Receipt (a+d)	**694.6**
C. Consumption	
a. DCB Plants	678.8
b. ICB Plants	18.5
c. Total	**697.3**

During the year **2021-22**, the receipt of domestic coal by the power plants was 667.6 MT as against 550.8 MT during 2020-21 resulting in increase of about 116.8 MT, whereas receipt of imported coal during the year **2021-22** was 27 MT as against 45.5 MT during previous year reducing by about 18.5 MT. Total coal consumption during **2021-22** was 697.3 MT as against 615.4 MT during last year. Plant-wise details of coal receipt and coal consumption during **2021-22** is enclosed at **Annexure-2A.**

2.19.2.3 Source-wise Receipt of coal during 2021-22

During the year 2021-22, source-wise break-up of coal receipt at the power stations is given below:

Source	**Actual Receipt (MT)**
CIL	501.5
SCCL	55.9
Captive Mines	71.0
E-Auction	39.3
Total Domestic Receipt	**667.6**
Total Import	**27.0**
Total Receipt	**694.6**

2.19.2.4 Import of coal during the year 2021-22

1. Power Utilities have been importing coal in view of their cost economics. During 2020-21, with the increased availability of domestic coal, Govt. of India advised the power plants to make best efforts to substitute imported coal used for blending with domestic coal. With the concerted efforts of all the stakeholders, viz. MoP, CEA, MoC, coal companies, power plants, etc., the coal imported for blending purpose has reduced by about 56% in 2020-21 as compared to 2019-20. CIL vide Notice no. 178 dated 06.05.2020 had informed the decision to offer coal to TPPs under import substitution considering sufficient availability of coal with CIL subsidiaries for power plants.

Subsequently, CIL vide letter dated 13.04.2021 informed the decision to continue supply of coal to power plants under import substitution mechanism for FY 2021-22 also.

Accordingly, CIL vide letter dated 23.04.2021 had offered about 17 MT domestic coal in lieu of import substitution to TPPs.

2. During 2021-22, the coal imported by the power plants for blending was 8.1 MT vis-à-vis 10.4 MT during previous year resulting in reduction of 2.3 MT (about 22%). In addition to above, power plants designed on imported coal have imported 18.9 MT coal during 2021-22 vis-à-vis 35.1 MT during last year resulting in reduction of 16.2 MT (about 46%). The total import by power plants has reduced by about 41% as compared to previous year.

3. However, 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 mainly due to heavy rains, the coal stock available with the TPPs depleted and, thus, coal companies prioritized coal supplies under FSA to their linked power plants and to plants having critical / supercritical coal stock.

4. Considering less coal stock in TPPs during 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.

2.19.2.5 Generation Loss

During the year, 2021-22 there was no loss of generation due to shortage of coal.

2.19.2.6 Specific Coal Consumption

During the year 2021-22, the Specific Coal Consumption (kg/kWh) of the power plants designed on domestic coal was 0.676 kg/kWh as compared to 0.667 kg/kWh in 2020-21. However, for the plants designed on imported coal, it was 0.466 kg/kWh as against 0.457 kg/kWh in 2020-21.

2.19.3 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 from empanelled 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.

2.19.4 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 Developments 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.

2.19.5 Gas Supply Position

CEA monitors 62 Nos. of gas based power stations with a total installed capacity of 23845 MW (As on 31st March 2022) 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 2021-22 was 15.29 MMSMMD only against allocation of 84.79 MMSCMD. The PLF achieved during 2021-22 was 17.2% only against PLF of 24.2% during previous year due to higher import of gas (RLNG). Plant-wise details of gas allocated and supplied/consumed during 2021-22 is enclosed at **Annexure-2B**.

The gas supply position in gas based power plants during 2021-22 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	17.2%
Gas Supplied	15.05	0.24	15.29	4.40	2.93	22.62	
% Gas Supplied w.r.t Gas Allotted	29%	1%	18%	59%	-	25%	

(MMSCMD: Million Metric Standard Cubic Meter per Day.)

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

The Government of India has set a target of achieving Renewable Energy Capacity of 175 GW by the year 2022. This includes 100 GW of Solar, 60 GW of Wind, 10 GW consisting of Biomass & Bagasse and 5 GW of Small Hydro. As on 31-03-2022, the total grid connected installed capacity of renewable energy sources is **109885.38** MW.

2.21 Share of Renewable Sources (Excluding Large Hydro) in Total Energy Generation:

Generation from Renewable Energy(RE) Sources and Conventional sources from the year 2014-15 to year 2021-22 and the percentage share of RE w.r.t total generation for the above period is given below:

Years	Non RES Generation (MU)	RES Generation (MU)	Total Generation (MU)	% of RE w.r.t. total generation
2014-15	1048672.90	61719.25	1110392.15	5.56
2015-16	1107822.28	65780.86	1173603.14	5.61
2016-17	1160140.90	81548.21	1241689.11	6.57
2017-18	1206306.20	101839.48	1308145.68	7.79
2018-19	1249340.00	126760.00	1376100.00	9.21

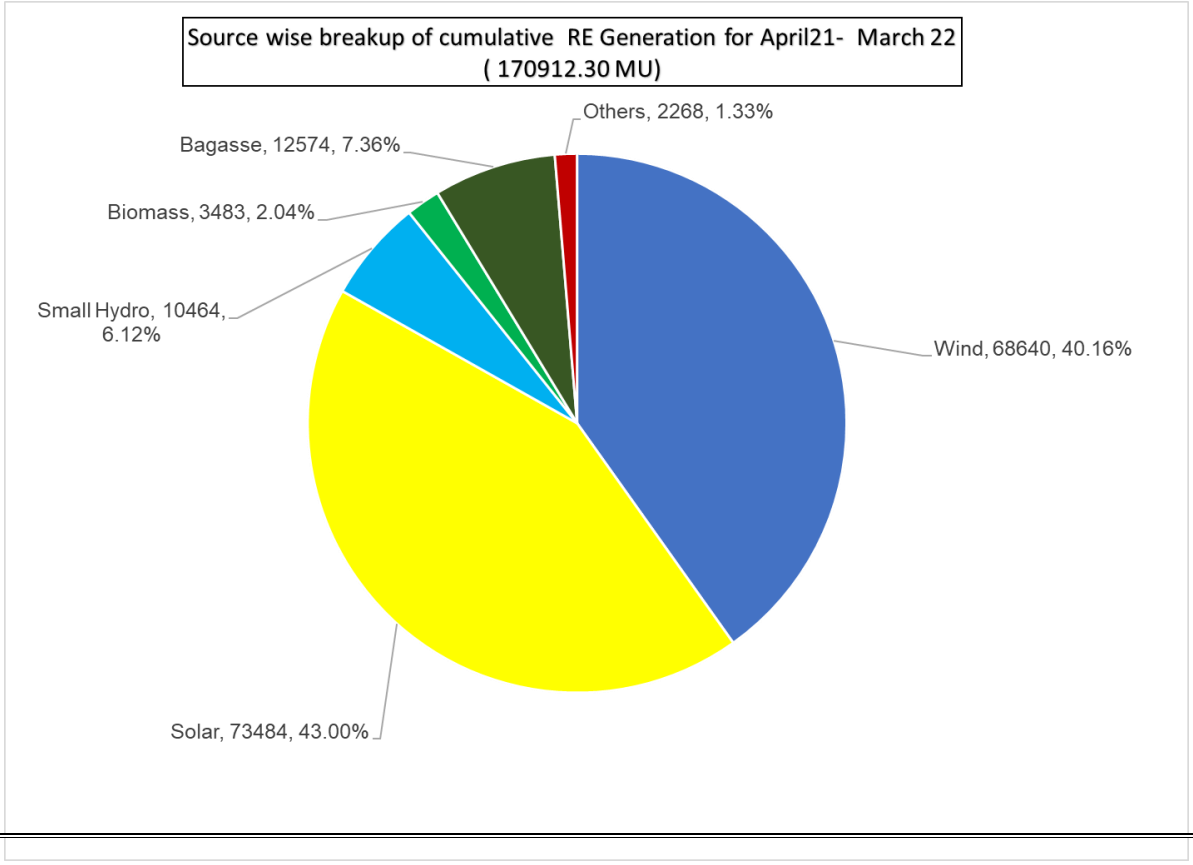
2019-20	1250783.91	138337.02	1389120.93	9.95
2020-21	1234607.64	147247.51	1381855.15	10.66
2021-22	1320947.07	170912.30	1491859.37	11.46

2.21.1 Renewable energy generation was about 11.46% of total energy generation in the country during 2021-22. The year wise Generation from renewable energy sources (RES) as well as its growth rates is given below:

Year	Generation from RES (BU)	Year-wise growth (%)
2014-15	61.72	--
2015-16	65.78	6.58
2016-17	81.55	23.97
2017-18	101.84	24.88
2018-19	126.76	24.47
2019-20	138.33	09.13
2020-21	147.25	06.44
2021-22	170.91	16.07

Renewable energy generation growth was about 16.07 % during year 2021-22 w.r.t year 2020-21.

2.21.2 The chart indicating Cumulative source-wise generation from RE sources for year 2021-22 is given below:



2.22 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 are cleaner, safer, environment friendly and more sustainable.

Accordingly, Government of India had set a target of achieving 175 GW of Renewable Energy (RE) installed capacity by 2022 comprising of 100 GW of solar, 60 GW of wind, 10 GW of biomass and 5 GW of small hydro. Subsequently, the renewable energy installed capacity target has been revised to 450 GW by 2030. Further, India has announced in CoP 26 summit at Glasgow to achieve 500 GW non-fossil energy capacity by 2030, to meet 50% of its energy requirements from renewable energy by 2030, to reduce the total projected carbon emissions by one billion tonnes from now onwards till 2030, reduce the carbon intensity of its economy by less than 45% by 2030 and to achieve the target of Net Zero by 2070. As per MOP OM No. 15/2/2016-H-I (Pt.) dated 8th March, 2019 the hydro power plants having a capacity above 25 MW have been declared as renewable sources of power. However, increasing penetration of solar and wind power renewable sources having inherent variability and intermittency nature is expected to pose challenges of grid stability and security and many steps have been taken by Government to address these challenges.

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, construction standards, regulations and guidelines for the smooth and rapid integration of RE in Indian Power Grid and to assist MoP, MNRE, States and other institutions on policy and regulatory matters. CEA is contributing 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. Related to these objectives, the following tasks were accomplished by RT&I Division, CEA during 2020-21:

2.22.1 Participation in Committees, Expert Groups, Task Force and Subgroups:

RT&I Division is part of various Committees, Expert groups, Task Force and Subgroups, in which CE (RT&I) represented either as a member or Chairman. RT&I Division has earnestly contributed in deliberation as well as report preparation for the same:

1. Expert Group constituted under the co-chairmanship of Additional Secretary MNRE and MoP to suggest the optimal power generation models for Andaman & Nicobar Islands and Lakshadweep.
2. CE (RT&I) was the Convener of RPO Subgroup on "RE Capacity addition" constituted under the chairmanship of Member Planning, CEA. RT&I Division had convened various meetings of this subgroup and prepared report of this group in discussion with the members of the subgroups.
3. Technology promotion and innovations for the subgroup 3 constituted for formulating comprehensive policy framework and related matters for promotion of Energy Storage.
4. Inter-departmental Committee to recommend the areas of Research & Development in Geothermal Energy.
5. Committee constituted on Low Carbon Technologies under NITI Aayog.

2.22.2 Formulation of Technical standards/ regulations in RE sector

The draft standards on "Technical requirements for Photovoltaic Grid Tie Inverters to be connected to the Utility Grid in India" were examined and comments were provided to the Ministry of New and Renewable Energy (MNRE) for the finalization of the above standard by Bureau of Indian Standards (BIS). It will be an inclusive standard covering efficiency, grid interactive and

environmental testing related aspects essential for complete performance testing of inverters for quality assurance.

2.22.3 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:

1. Indian Wind Turbine Manufacturing Association on the subject of Uniform Wheeling and Banking Policy - One Nation One Grid Implementation.
2. Coordinated with MoP/CERC on the representation received to review the treatment of WtE power projects with regard to Deviation Settlement Mechanism (DSM) and scheduling power from such projects.
3. MNRE's draft EFC on National Green Hydrogen Mission.
4. Discussion Paper on redesigning the Renewable Energy Certificate REC Mechanism.
5. Draft notification on Indian Wind Turbine Certification Scheme (IWTCS).
6. Draft Electricity (Promoting renewable energy through Green Energy Open Access) Rules, 2021.
7. Government of Kerala proposal received from Ministry of Power regarding Feasibility for use of Hydrogen fuel at Rajiv Gandhi Combined Cycle Power Plant (RGCCPP), Kayamkulam, Kerala.
8. Energy Policy Supporting Low-Carbon Transition in Asia and the Pacific.
9. MoEF&CC and MNRE initiative on Carbon Neutral Ladakh-Announcements 2020.

2.22.4 SFC/EFC/PIB/PPR/DIB related matters

RT&I Division has dealt with various SFC/EFC/PIB/PPR/DIB of MOP, MNRE etc for their technical prospect and provided its valuable inputs on the same; some of these are as following:

1. Draft PIB Memo for setting up of 100 MW (AC) Solar PV Project (160MWp DC capacity) along with 40MW/1120 MWh Battery Energy Storage System (BESS) at Chhattisgarh.
2. EFC Note of Ministry of Science & Technology regarding continuation of the Umbrella Scheme "Innovation, Technology, Development and Deployment".
3. SFC for Appraisal of the Projects for setting up solar PV capacity of 20 MWac/ 50 MWp with battery storage of 50 MWh at Phyang, Leh and 1 MW solar-wind hybrid plant with battery storage of 1 MWh at Nyoma under J&K Prime Minister Development Package (PMDP) – 2015.
4. MNRE's EFC Memo-Continuation of Waste to Energy programme namely "Energy from Urban, Industrial and Agricultural wastes/residues" for the period 2021-22 to 2025-26- A sub-scheme of MNRE's Umbrella Scheme "National Bioenergy Programme.
5. Draft PIB for setting up of 100 MW AC floating solar FSPV project in Getalsud reservoir, Ranchi, Jharkhand.
6. Preliminary Project Report -11660 from NITI Aayog Innovative 500 MW Floating Solar Power Plant in West Bengal, India.
7. EFC memo-Continuation of Waste to Energy programme namely "Energy from Urban, Industrial and Agricultural wastes/residues" for the period 2021-22 to 2025-26. - A sub-scheme of MNRE's Umbrella Scheme "National Bioenergy Programme".
8. Draft EFC Memo regarding infusion of equity of Rs. 1000 crore in Solar Energy Corporation of India Limited (SECI).
9. Draft PIB Proposal in respect of Investment approval for development of 1000 MW grid connected solar PV Power Projects in IREDA's 5000 MW under CPSUs by SJVN Limited.
10. Draft PIB Proposal in respect of Investment Approval for setting up of 1000 MW Grid connected Solar PV Power Projects under Central Public Sector Undertaking (CPSU) Scheme Phase-II (Government Producer Scheme}-tranche-III by NHPC Ltd. anywhere in India.

11. An EFC Proposal for Continuation of Central Sector Scheme of Ministry of Power beyond March, 2021 under Umbrella Scheme "Strengthening of Power System"- pertaining to development of REMC has been examined in this division and observations have been provided to MoP.

2.22.5 Evaluation of various Technologies for RE sector

The Renewable Technology and Integration (RT&I) Division has been entrusted with responsibility to assist in promotion of renewable sources of energy. In the same line this division has received and provided inputs on the following innovative proposals of RE technologies:

1. World Bank draft report on unlocking floating solar photovoltaic potential in India.
2. Draft document of G20 Energy Transition & Climate Sustainability Working Group Team, focused on the action-oriented deployment of offshore wind/ocean energy/floating Solar.

2.22.6 Establishment of Renewable Energy Management Centres (REMCs) in RE Rich States and other parts of the country

Ministry of Power in February, 2020 asked CEA to submit the third-Party evaluation report of 11 commissioned REMCs. An assessment has been made of the facilities installed under REMC projects vis-à-vis as envisaged in the Detailed Project Report (DPR) and utilization of various tools provided at REMCs for the management of RE generation. Based on the evaluation, the recommendations have been made towards further development of REMCs for better management of Renewable Energy Sources (RES). A report in this regard was submitted to MOP.

Moreover, EMC, South Andaman has been handed over in Feb, 2022 and REMC, Telengana is in final stage of its implementation.

Further, the proposal of the establishment of State Load Dispatch Centre (SLDC) cum REMC in Ladakh and other three REMCs are examined in CEA and inputs have been provided to MoP.

An EFC Proposal for Continuation of Central Sector Scheme of Ministry of Power beyond March, 2021 under Umbrella Scheme "Strengthening of Power System"- pertaining to development of REMC has been examined in this division and observations have been provided to MoP.

This Division is continuously coordinating with these REMCs and taking monthly report from them.

2.23 Advice on technological and engineering issue

CEA provided advice on technological and engineering issue to external agencies including Central and State Government. These are:

- Feasibility of the proposal from Government of Uttarakhand for the proposed project in the Energy Sector titled “Harnessing Renewable Energy for Sustainable Rural Development” as grant with external assistance from ADB and Preliminary Project Report regarding “enhancing the livelihood of Rural Community of Meghalaya through use of Renewable Energy Systems”.
- Preliminary Project Report regarding Solar Energy Projects for Women and Child Development (WCD) Institutions and Preliminary Project Report regarding Infrastructure support for Women and Child Development (WCD) Institutions were examined and provided views on techno-economic aspects of the projects.

- Some of the other studies examined and provided opinion are:

1. Department of Science and technology’s (DST’s) Note for the approval of Committee of Secretaries (CoS) on the concerted action plan on technological intervention to handle and utilize the waste in India.
2. Draft EFC Memo” for "National Programme on Solar PV Manufacturing, etc.
3. SFC proposal of Ministry of Environment, Forest and Climate Change (MoEF&CC) on Central Sector Scheme titled "Sustainable Management of Wastes and Hazardous Substances.

4. Guidelines related to latest technologies in the waste and waste water treatment by Ministry of Housing and Urban Affairs (MOHUA).

2.24 Monitoring and implementation of R&D Schemes in the field of renewables

Promoting R&D in renewable energy sector will help in building up of indigenous capability, bring technology advancement for existing and emerging technologies, cost reduction, enhanced reliability and increased efficiency in the renewable sector. RT&I Division is coordinating with CPRI and other stakeholders and shares its technical views and inputs on the R&D programme in the area of RE Sector.

2.25 Assistance in matters pertinent to international cooperation

With the establishment of International Solar Alliance (ISA), India has been positioned among the world leaders in the Renewable Energy (RE) sector and the ambitious target set for RE in the country can be fulfilled with cooperation among the countries.

To enhance the external cooperation, CEA has provided its opinion to Ministry of Power (MoP) and MNRE, MEA, MoEF&CC for transfer of technology, mobilizing investment, sharing experiences, regulatory and policy frameworks and best practices in RE sector through collaborative approach.

Some of the important external cooperation references in which CEA has provided its inputs/advice to MoP, MNRE, MEA, MoEF&CC are as under:

1. UN High-level Dialogue on Energy 2021 (India's role + Energy Compacts).
2. Clean Energy Demand Initiative (CEDI) –US.
3. Inter-Ministerial meeting to discuss the India - IEA Work Programme 2021-23.
4. Draft Report of Working Group 8 – "Working Group No.8 on Addressing UN SDG goals in key environment, safety and health areas for Indian ports and maritime bodies Formulation of plan".
5. Draft Cabinet Note from MoP on India's updated Nationally Determined Contribution Provided inputs on a reference from MoP on 5TH BIMSTEC Summit, Sri Lanka.
6. First India-Central Asia Summit hosted by India with Participation of Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan
7. Proposal for India Business Environment Enhancement for the Government of India by Japan Chamber of Commerce and Industry in India (JCCII) 2021.
8. First Arab – India's Cooperation Forum in the Field of Energy.
9. Joint Energy Transition Council (ETC) Working Group- Areas where Cooperation is required from France and Germany.
10. Indo-Australia Energy Dialogue.

2.26 Investment and R&D needs in RE Sector

Establishment of Solar, Wind and other sources of Renewable Power facilities require timely availability of funds. The facilities need to be developed based on proper survey and assessment for available resources potential with availability of adequate power evacuation and control system. The plans developed may either be off Grid (in remote areas) or grid connected as per the feasibility. The National Institute of Solar Energy (NISE) & the National Institute of Wind Energy (NIWE) are involved in undertaking Solar and Wind potential assessment. CEA is playing a pivotal role in rapid growth of Renewable Energy integration area.

Considering the large penetration of RE generation, development of efficient and economical Energy Storage mechanism is necessary for smooth integration of this RE capacity into the Grid. Government of India is also emphasizing on it. At present the mature Energy Storage technologies are Hydro Pump Storage (HPS) plants and Battery Energy Storage system (BESS). In regard of BESS, India is dependent on import for Lithium which is a key element for manufacturing of Lithium-ion Battery. Research and innovation on alternate material of Lithium which should be equally efficient and reliable as good as Lithium is required to be taken up.

Salvage/disposal (recycling, disposal) at the end of

life of batteries, solar PV panels, turbine blades and other products/ components in economical, sustainable and environmental-friendly manners will be a challenge for RE sector and also a matter of environmental concern. Therefore, research in the area of developing a sustainable disposal mechanism is the need of hour.

CHAPTER – 3

POWER SYSTEMS PLANNING AND DEVELOPMENT

3.1 Transmission Planning

All issues relating to planning and development of 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 central, state transmission utilities and generating companies. The 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 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 system from generation projects and to strengthen the transmission system in various regions. The Power System Planning & Appraisal Division, CEA, also works on planning and development of cross-border transmission links with neighbouring countries. They also provide technical and policy inputs to facilitates cross border trade of electricity.

In addition to this, Member (Power System) has been appointed as Designated Authority 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 neighbouring country 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.

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

A national grid in the country has been developed in phased manner. All the regional grids have been inter-connected synchronously to form One grid – One Nation – 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 (up to 31st Mar'2022) is 37,200 MW. As on 31.03.2022, inter-regional transmission capacity in the country is 112,250 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.

3.3 Regional Power Committee (Transmission Planning)

MoP vide letter dated 4th November, 2019, constituted five Regional Power Committees (Transmission Planning) [RPC(TPs)]. Following Meetings of RPC(TP) were held during 2021-22:

Northern Region:

- 4th meeting of Northern Regional Power Committee (Transmission Planning) [NRPC(TP)] was held on 05.10.2021 & 12.10.2021 through video conferencing.

Western Region:

- 3rd meeting of Western Regional Power Committee (Transmission Planning) [WRPC(TP)] was held on 14.06.2021 through video conferencing.

Southern Region:

- 3rd meeting of Southern Regional Power

Committee (Transmission Planning) [SRPC(TP)] was held on 24.08.2021 through video conferencing.

Eastern Region:

- The 04th meeting of Eastern Region Power Committee (Transmission Planning) (ERPCTP) was held on 23rd July, 2021.

North Eastern Region:

- 03rd meeting of North Eastern Region Power Committee (Transmission Planning) (NERPCTP) held on 19th July 2021.

The transmission systems firmed-up in these meetings are given in **Annexure–3B.**

3.3.1 Dissolution of RPC(TP)

The Five RPC-TPs constituted by the Ministry of Power vide Office Order No.15/3/2017-Trans, dated 04.11.2019 have been dissolved and regional level consultation for ISTS planning will be done in Regional Power Committees vide Ministry of Power Office Order dated 20.10.2021.

3.3.2 Reconstitution of NCT

MoP vide office order dated 28.10.2021 has revised the Terms of Reference of the NCT delegating powers for approval of ISTS system costing between 100 to 500 crores to NCT and for ISTS schemes costing upto Rs. 100 crores to Central Transmission Utility. Now ISTS schemes costing above Rs. 500 crores require approval of MoP

3.4 Private Sector Particiaption in Transmission Sector

3.4.1 Brief Introduction:

- Promotion of competition in the electricity industry in India is one of the key objectives of the Electricity Act, 2003. As per the provisions under Section 63 of the Electricity Act, 2003 and the Tariff Policy dated 6th January, 2006, Ministry of Power, issued "Guidelines for Encouraging Competition in Development of Transmission Projects" and Tariff Based Competitive Bidding Guidelines for Transmission Services". These guidelines aimed at laying down a transparent procedure for facilitating competition in the transmission sector through wide participation in providing transmission services and tariff determination through a process of tariff based competitive bidding

- As envisaged in the Guidelines, Ministry of Power had issued Standard Bidding Documents (SBDs), viz. Request for Qualification (RfQ), Request for Proposal (RfP), Transmission Service Agreement (TSA) and Share Purchase agreement (SPA). As provided in the Guidelines, Ministry of Power has appointed PFC Consulting Limited (PFCCL) and REC Transmission Projects Company Limited (RECTPCL) as the Bid Process Coordinators (BPC) for carrying out the bidding process. The guidelines and Standard Bidding Documents have been revised by MoP in August 2021, after consultation with the stakeholders

- Further, MoP in compliance with provisions laid down in Tariff Policy dated 6th January, 2006 issued an O.M 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 except some projects as identified by MoP which are to be implemented by CTU under compressed time schedule.

- 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".

- MoP constituted the Empowered Committee on Transmission (ECT) for identification of inter-state transmission projects to be developed through competitive bidding and to oversee the process of competitive bidding. MoP subsequently vide office order dated 4th November, 2019 dissolved the ECT and replaced it with National Committee on Transmission (NCT). The terms of reference of NCT interalia, included recommendation of ISTS scheme to MoP for approval and allocation of BPC. 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 100 to 500 crores to NCT and for ISTS schemes costing upto Rs. 100 crores to Central Transmission Utility. Now ISTS schemes costing above Rs. 500 crores require approval of MoP

- As far as Inter-State transmission system is concerned, till 31st March, 2022, sixty-four projects have been awarded through Tariff Based Competitive Bidding out of which thirty-eight projects have already been commissioned/ready for commissioning and twenty-two are under implementation by various Transmission Service Providers. Out of balance four projects, one project has been cancelled by CERC, in one project the TSP has requested for closure and construction of two projects could not start due to litigation. Apart from this, there are twenty-nine projects which are presently under bidding.

3.4.2 Status of the Transmission schemes notified through TBCB:

Projects awarded through TBCB	**64**
Projects commissioned so far	38
Projects under implementation	22
Stalled projects	04
Projects notified and are under bidding/bidding yet to start	**29**

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 given at **Annexure – 3C.**

3.4.3 Following meetings of the National Committee on Transmission (NCT) were held during 2021-22:

In the year 2021-22, four meeting of National Committee on Transmission has been held which is given below:

- 5th meeting of the National Committee on Transmission (NCT) was held on 25.08.2021 and 02.09.2021 through Video Conferencing.
- 6th meeting of the National Committee on Transmission (NCT) was held on 29.10.2021 through Video Conferencing.
- 7th meeting of the National Committee on Transmission (NCT) was held on 03.12.2021 through Video Conferencing
- 8th meeting of the National Committee on Transmission (NCT) was held on 25.03.2022 through Video Conferencing

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

3.5 Examination of Detailed Project Reports (DPRs) / Feasibility Reports (FRs) of Hydro Power Projects for processing of concurrence by CEA

DPRs/FRs of various Hydro Power Projects were examined for processing of concurrence by CEA. The details are given at **Annexure - 3E.**

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

DPRs/FRs of various Transmission Projects were examined for processing of concurrence by CEA. The details are given at **Annexure – 3F.**

3.7 Grant of prior approval of Government to transmission proposals under Section 68 of

Electricity Act, 2003 during 2021-22

The list of transmission proposals examined for approval of the Government of India under Section 68(1) of Electricity Act, 2003 are given at **Annexure -3G.**

3.8 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2021-22

The list of transmission proposals examined for approval of the Government of India under Section 164 of Electricity Act, 2003 are given at **Annexure -3 H**.

3.9 Cross-Border power exchange

3.9.1 India-Bangladesh Cross Border Interconnection & Power Trade

Bangladesh has been connected with both Eastern and North Eastern Region of India with power transfer capacity of 1160 MW from India to Bangladesh through 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 765kV 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 India-Bhutan Cross Border Interconnections & Power Trade

India and Bhutan have MoU on cooperation for 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 400kV, 220kV and 132kV lines.

Presently, about 2070 MW power from the existing hydro projects in Bhutan is being imported to India from Bhutan. The associated cross-border transmission system for evacuation and transfer of power from these HEPs is being operated in synchronism with the Indian Grid.

Punatsangchu-I (1200MW) & Punatsangchu-II (1020MW) HEPs are under construction and expected to be commissioned in 2024-25. Associated transmission line works have been completed for upcoming Punatsangchu-I (1200MW) & Punatsangchu-II (1020MW) HEPs.

3.9.3 India-Nepal Cross Border interconnection and Power Trade

- At present, about 1000 MW of power is being exported to Nepal through 11kV, 33kV, 132 kV voltage level transmission lines and Dhalkebar (Nepal) – Muzaffarpur (India) 400 kV D/C line.
- Further, 2nd High Capacity 400 kV Gorakhpur – New Butwal D/c (Quad) line is being taken up for implementation to facilitate increased transfer of power between the two countries.
- For evacuating power from Arun-3 (900MW) HEP in Nepal and other hydro projects in vicinity in future, Arun-3 HEP (Nepal) – Dhalkebar (Nepal) – Sitamarhi (India) 400 kV D/c (Quad) line is under consideration.

3.9.4 Indo-Myanmar Cross Border Interconnections & Power Trade

- India is providing about 2-3 MW of power (Since 5th April 2016) from Manipur (India) to Myanmar through 11 kV transmission line from Moreh in Manipur (India) to Tamu town in Myanmar.
- Further, a 500 MW HVDC interconnection between India (Imphal) and Myanmar (Tamu) is under discussion.
- Additionally, low voltage radial interconnection between India and Myanmar from Indian states (Arunachal Pradesh, Manipur, Mizoram and Nagaland) are under consideration.

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 for facilitating import/export of electricity between India and neighbouring countries.

- Procedure for approval and facilitating Import/Export (Cross Border) of Electricity by the Designated Authority were issued on 26.02.2021.
- Verification Mechanism for export of power from eligible fuel by generating stations under Import/Export (Cross Border) of Electricity-Guidelines2018 were issued by Ministry of Power on 5th March, 2021.

3.9.6 Approvals granted by Designated Authority for Import/Export (Cross Border) of Electricity during 2021-22.

Approvals granted by Designated Authority for Import/Export (Cross Border) of Electricity during 2021-22 are given at **Annexure – 3I**.

3.10 Miscellaneous works

3.10.1 Green Energy Corridor:

a) Transmission Works under Green Energy Corridors-I

The report on Green Energy Corridor has 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. 34141 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 17000 MVA substation capacity and 3200 ckm of transmission lines were planned and the same have been commissioned. Under InSTS around 22600 MVA substation capacity and 9700 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 during 2022-23.

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.

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

a) 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) Master plan prepared for evacuation of power from Hydro projects in Chandrabhaga River Basin

3.11 Consultancy services and Technical assistance/Advice to MoP/Various Power Utilities /CPRI/BIS etc.

Technical assistance/advice relating to transmission system in the Country provided from time to time to MoP/ Power Utilities/State Utilities/Other Ministries/ BIS/ CPRI etc.

3.12 Formulation/review of Regulations, Guidelines and audit.

a) Standard Specifications and Technical parameters of Transformers and Reactors (66 kV & above voltage class) was published.
b) Standard Technical Specification for Power Transformers for Solar Power Park pooling Station was published.
c) Guidelines for Model Quality Assurance Plan (MQAP) and Type Test validity for major equipment in power sector was published.
d) Report of Task Force on Cyclone Resilient Robust Electricity Transmission and Distribution (T&D) Infrastructure in Coastal Area was published.
e) Concept paper on Insulated Cross arm was published.
f) Input on draft chapter on "New Technologies in Transmission" for NEP 2022-27 was provided.
g) Report of Review Committee constituted to examine the design aspects and causes of frequent failure of EHV transmission towers and substation equipment of POWERGRID in and around Agra area was prepared.
h) Inputs on Standard Specification for Survey works to be done by BPCs for projects coming under TBCB projects was provided.
i) Input for revision of guidance document titled "Eco-Friendly Measures to Mitigate the Impacts of Linear Infrastructure on Wildlife" was provided.

3.13 Representation/ Nomination in the Committees/Task force

PSPA-II officers are represented in:

(i) Joint Steering Committee (JSC) for cooperation in power sector with Nepal, Bangladesh and Myanmar.
(ii) India Joint Working Group (JWG) for cooperation in power sector with Nepal, Bangladesh, Sri Lanka and Myanmar.
(iii) Joint Technical Team- Transmission (JTT-T) with Nepal, Bangladesh, Sri Lanka and Myanmar
(iv) Committee to finalise Rules on Transmission constituted by Ministry of Power
(v) Representation in BIMSTEC, SAARC, SASEC, BBIN group meetings.
(vi) Committee to study the reactive power compensation in the system.
(vii) Committee to examine the requirement of Synchronous Condensers in Indian Power System

PSETD officers are represented in:

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 Task force for review of Regulations of CEA.
c) 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.
d) 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.).
e) Chairman of Sub-committee 3 of Sectional Committee, ETD 37 for revision of various parts of IS 5613.
f) Member of Sub group for Techno- Economic appraisal of DPRs for system improvement under PSDF funding.

g) Chairman & Convener of Cost Committee for projects being awarded through Tariff Based Competitive Bidding (TBCB).
h) Member of Bid Evaluation Committee for projects being awarded through Tariff Based Competitive Bidding (TBCB).
i) Member of the committee for creation of manufacturing hub for indigenization of power sector equipment
j) Member of the committee constituted by MoP for independent verification of self-declarations and auditor's / accountant's certificates of Class-I/ Class-II local suppliers.
k) Member of Group of Officers constituted by Ministry of Power to look into the issues flagged by EPTA.
l) Chairman of the Committee constituted for preparation of Standard Technical Specification for steel Pole Type Structure.
m) Member of the Committee in CEA to suo moto scrutinize tenders floated for Public Procurement having value Rs. 500 crores.
n) Member of the Sub-Committee Nos.4, 7 & 8 for National Electricity Plan (NEP), 2022-27.

3.14 Analysis of causes of failure of transmission line towers & substation equipment.

(a) Transmission Line towers:

(i) As a part of activity of Standing Committee to assess the causes of failure of various Transmission Line Towers of 220kV and above voltage levels, CEA officers visited many failure sites and investigation was carried out.
(ii) Meeting of Standing Committee was held in January, 2022 to discuss failures of various transmission line towers reported to CEA during April, 2019 to December, 2021.

(b) Substation equipment failures:

(i) As a part of activity of Standing Committee to assess the causes of failure of various Substation Equipment of 220kV and above voltage levels, CEA officer visited failure sites and investigation was carried out.

3.15 Amendment of CEA Regulations / Miscellaneous Works

a) Amendments in Chapter IV Part A and chapter V Part A of the CEA (Technical Standards for construction of Electrical Plants and Electric lines) Regulations 2010 after scrutinizing public comments was submitted.
b) Examination of various proposals/DPRs submitted for grant under PSDF Funding.
c) Preparation of Specific Technical Requirements for transmission lines and sub-stations in Request for Proposal (RfP) documents of the projects to be awarded through TBCB.
d) Site of the locations of the towers of 400kV D/C Sambha-Amargarh line of M/s Indigrid affected due to Road excavation work of BRO was visited by CEA officers. Various meetings were held and remedial measures were suggested to protect the affected towers.
e) Reviewed and Vetted design of 133.33MVA, 220/132/11 KV single phase Auto-Transformer at Grid Station Gladni.
f) Input was provided on CPRI Road Map for 5 years- April 2021 to March 2026.
g) Input on DIB proposal of CPRI for augmentation of existing test facilities and establishment of new test facilities at various centers of CPRI
h) Examination of Proposal in respect of continuation of "R&D Schemes of Ministry of Power being implemented through CPRI"-(2021-22 to 2025-26).
i) Reply to various Parliament questions, RTI and WP(C) in (P) were provided.
j) Technical advice to transmission utilities regarding re-routing of transmission lines.
k) Examination of requirement of additional funds under PMRP-2004 scheme of J&K.
l) Technical assistance to committee constituted by Hon'ble Supreme court for assessing the feasibility of laying transmission lines underground in GIB potential area.
m) Examination of New Energy Sector Projects proposal of Bihar State Power Transmission Corporation Limited (BSPTCL) under Special Plan (BRGF)

3.16 Construction Monitoring of Transmission Projects

The monitoring of construction of transmission lines and sub-station (220 kV & 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 & 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 & order problem.

Total 19,255 ckm of Annual Target was set in respect of Transmission Lines in FY 2021-22. Voltage/Length wise details are as under:

Voltage level (kV)	765	400	220	**Total**
T/L length (Ckm)	5952	5114	8189	**19,255**

Total 14,895 ckm against Annual Target was achieved in respect of Transmission Lines in FY 2021-22. Voltage /Length wise details are as under:

Voltage level (kV)	765	400	220	**Total**
T/L length (Ckm)	4933	4068	5894	**14,895**

Thus overall achievement in respect of Transmission Lines for FY 2021-22 was 77.34%. Details of transmission lines commissioned /completed during FY 2021-22 (as on 31st March 2022) are given in **Annexure-3J.**

Similarly, total 81,545 MVA of Annual Target was set in respect of Sub-Station Transformation Capacity in FY 2021-22. Voltage/MVA wise details are as under:

Voltage level (kV)	±800 kV HVDC	±320 kV HVDC	765	400	220	**Total**
Sub-station Transformation Capacity (MVA)	0	0	35000	27545	19000	**81545**

Total 78,982 MVA against Annual Target was achieved in respect of Sub-Station Transformation Capacity in FY 2021-22. Voltage/MVA wise details are as under:

Voltage level (kV)	±800 kV HVDC	±320 kV HVDC	765	400	220	**Total**
Sub-station Transformation Capacity (MVA)	3000	1000	18500	31386	25096	**78982**

Thus overall achievement in respect of Sub-station Transformation Capacity in FY 2021-22 was 96.87%.

Details of substations commissioned / completed during FY 2021-22 (as on 31st March 2022) are given in **Annexure-3K.**

Voltage-wise/Sector-wise program vs achievement for the financial year 2021-22 in respect of transmission lines and sub Stations (220kV and above voltage level) are given in **Charts I to VII and VIII to XIV** respectively **(Annexure - 3L).**

A national grid in the country has been developed in phased manner. All the regional grids have been inter-connected synchronously to form One grid – One Nation – 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 (up to 31st Mar'2022) is 37,200 MW. As on 31.03.2022, inter-regional transmission capacity in the country is 112,250 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.

Total 14,895 Ckms of transmission line and 78,982 MVA of transformation capacity in substations (220kV and above voltage levels) have been added during the financial year 2021-22 resulting in all India transmission network of 4, 56,716 Ckms of transmission lines and 11, 04,450 MVA of the transformation capacity (220kV and above voltage level) as on 31st March 2022.

For the year FY 2022-23, Program for Transmission Lines and Transformation Capacity (Substations) is as under.

Annual Target for FY 2022-23:

Transmission line (Ckm)	21,098
Substation (MVA)	95,659

3.17 Inspection of Electrical Installation

The Chief Electrical Inspector and Electrical Inspectors appointed by the Central Government under section 162 of 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 by Central and State Electrical Inspectors in respect of installations within their respective jurisdictions as per the procedures provided in 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 officers of Chief Electrical Inspectorate Division and Electrical Inspectors and the officers from five Regional Inspectorial Organizations (RIOs) with Headquarters at New Delhi, Chennai, Shillong, Mumbai, Kolkata 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 energization of electrical installation

(c) Amendment of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 as required.

(d) Inquiry of fatal and non-fatal electrical accidents and remedial measures to be taken to avoid recurrence of such accidents in future.

(e) Collection of Statistics, Return & information relating to electrical accidents in Format-19 & 20 under furnishing of Statistics, Returns & Information regulations 2007.

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

(a) Authority meetings for discussion on public comments on draft Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2021 was held on 06.10.2021 and Authority in meeting held on 11-03-2022 approved the draft Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2022
for previous publication.

3.19 MAJOR ACHIEVEMENT IN TERMS OF INSPECTIONS DURING THE YEAR 2021-22 (Important installations inspected):

3.19.1 New Electrical Installations/ Apparatus under Regulation 43 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended): -

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

RIOs	NR	SR	WR	ER	NER
No. of Inspections	273	383	455	322	57

A. Substations:

The details of electrical apparatus inspected at different voltage levels during the year 2021-22 is as follow: -

Apparatus / **Voltage level**	**Transformers/ICT (MVA)**	**Reactors (MVAr)**	**Capacitors (MVAr)**	**Bays (no.)**	**Bus (no.)**	**Statcom (no.)**
765 kV	12945	7170	Nil	34	62	Nil
400 kV	14114	3835	Nil	97	120	3
220 kV	6035	75	Nil	65	106	Nil

132 kV	344	Nil	Nil	73	5	Nil
66 kV	51	Nil	Nil	27	1	Nil
33 kV	524.45	Nil	Nil	19	89	Nil
HVDC 800 kV	Nil	Nil	Nil	6	Nil	Nil

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

B) Generating Units: The region wise summary of inspections carried out is given below: -

RIOs	NR	SR	WR	ER	NER
No. of Inspections	9	18	Nil	5	1
Gen.Capacity (MW)	1493.15	15.7	Nil	641.6	25

Generating units inspected are given at **Annexure -3M.**

C) **Transmission Lines:** The region wise summary of inspections carried out is given below: -

RIOs kV	NR	SR	WR	ER	NER
765 kV	2357.5	1.88	Nil	169	Nil
400 kV	111.4	447.62	140	133	1027.6
220 kV	346.52	84.85	90	121	Nil
132 kV	Nil	Nil	Nil	5	179.25
110 kV	Nil	Nil	Nil	Nil	Nil
66 kV	Nil	Nil	40	Nil	Nil
33 kV	379.4	18.1	60	11	Nil
11 kV	Nil	Nil	Nil	**8**	Nil
800 kV HVDC	Nil	1.52	Nil	Nil	Nil

Details of lines inspected are given at **Annexure - 3M**.

Summary of transmission lines inspected at different voltage levels (Data given Circuit Km): -

RIOs	NR	SR	WR	ER	NER
No. of Inspections	36	10	33	45	15

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

D) Electrical installations of the following organisations were inspected during the year 2021-22:

PGCIL, SAIL, GAIL, IOCL, HPCL, BPCL, ONGC, AAI, NALCO, BALCO, NMDC, CGPL, CPWD, RCFL, BMCTPL, NEEPCO, BARC, AAI, DVC, BBMB, SPM Port Trust Kolkata, IIT, IISC, BCPL, Port Trust-JNPT, Mumbai Airport, AIIMS, KTL, DNHPDCL BARC, NBCC, SBI etc.

3.19.2 Inspections done for Renewables:

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

RIOs	NR	SR	WR	ER	NER
No. of Inspections	48	95	49	17	Nil

Summary of Generation capacity of Renewable Energy Sources inspected: -

RIOs	**NR**	**SR**	**WR**	**ER**	**NER**
Gen.Capacity (MW)	3821.94	477.12	348	11	Nil

3.19.3 Cinemas/Theatres installations inspected: -

Summary of Cinemas/Theatres installations inspected during the year 2021-22 is given below:

RIOs	NR	SR	WR	ER	NER
No. Of Inspections	Nil	23	1	Nil	Nil

3.20 Periodical Inspections (under Regulation 30 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010: -

Major installations inspected are given at **Annexure - 3N**

3.21 Inspections done in UTs: -

Details of inspections done in UTs during the year 2021-22 is given below: -

UTs	AN	DNH	DD	PDY
No. of Inspections	1	173	98	77

AN: Andman & Nicobar, DNH: Dadar & Nagar Haveli, DD: Daman & DIU, PDY: Puducherry.

3.22 Investigation of Electrical Accidents:

1. Fatal Electrical Accident happened at CPWD Project Site, Sarojni Nagar, New Delhi
2. Non-Fatal Electrical Fire Accident happened at house no. AB 98, Shahjahan road, New Delhi
3. Non-Fatal Electrical Fire Accident happened below the transmission line of M/S PHTL between tower location 292 and 293

3.23 Electrical safety Awareness Conferences:

1. Electrical Safety Awareness Program for officials of NTPC, Solapur was conducted on 25.03.2022.
2. Electrical Safety Awareness Program for officials of SEEPZ-SEZ was conducted on 21.03.2022.
3. Electrical Safety Awareness Online Program for officials of PGCILWR-2 was conducted on 21.01.2022.
4. Electrical Safety Awareness Online Program for officials of PGCIL WR-1 was conducted on 26.06.2021.
5. Electrical Safety Awareness Online Program for Officials of HPCL and BPCL was conducted on 28.02.2022.
6. Electrical Safety Awareness Online Program for officials of PGCIL was conducted on 24.02.2022.
7. Electrical Safety Awareness Online Program for Officials of HPCL Pampore was conducted on 23.03.2022.
8. Electrical Safety Awareness Program for officials of HPCL Budge was conducted on 01.07.2021
9. Electrical Safety Awareness Online Program for officials of BPCL was conducted on 23/11/2021.
10. Electrical Safety Awareness Online Program Program for officia ls of PGCIL ER-II was conducted on 11/02/2022.

3.24 Self-certifications approval issued by RIOs:-

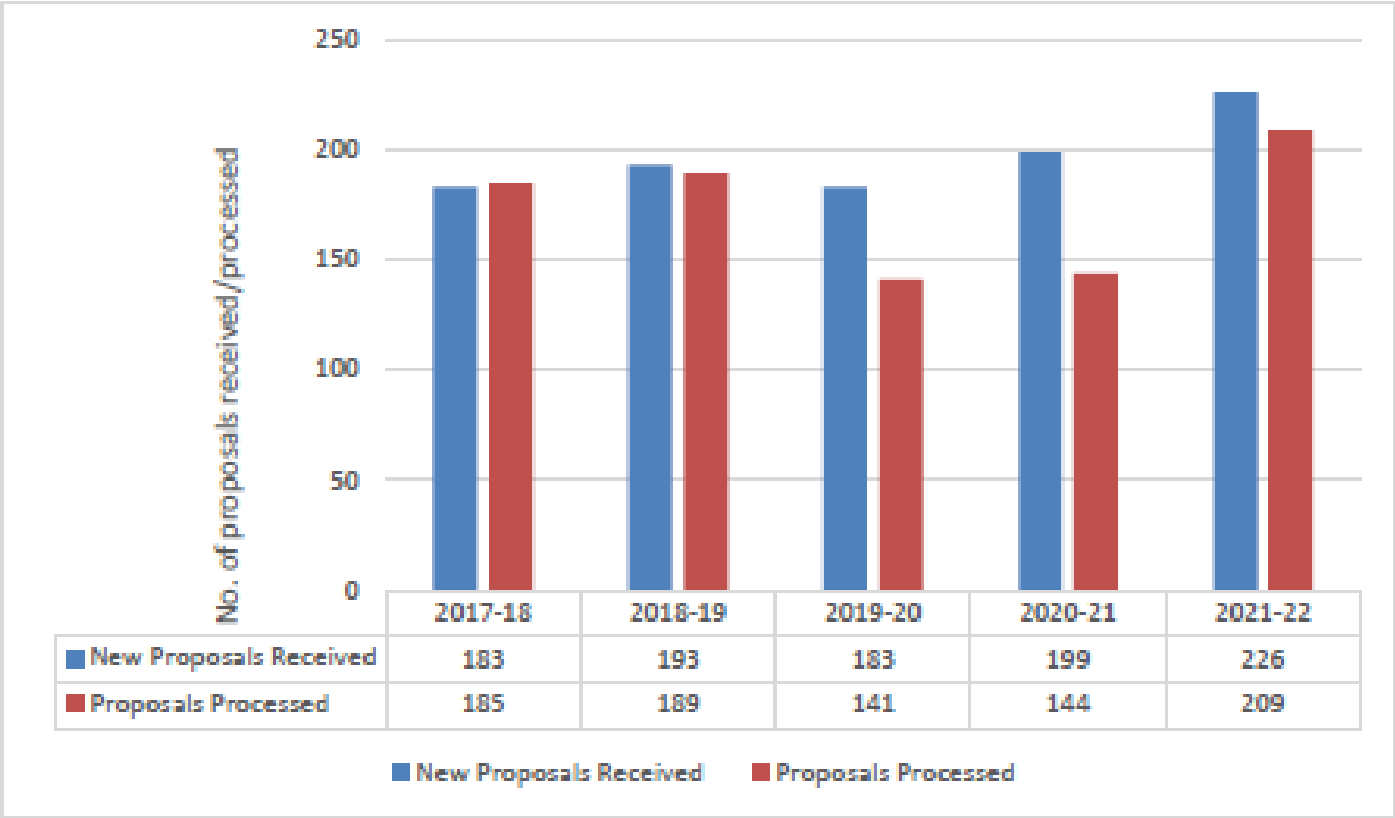
No. of self-certifications issued during the year 2021-22 is given below: -

RIOs	NR	SR	WR	ER	NER
No.	Nil	2	2	21	Nil

3.25 Power & Telecommunication Co-ordination Committee (PTCC)

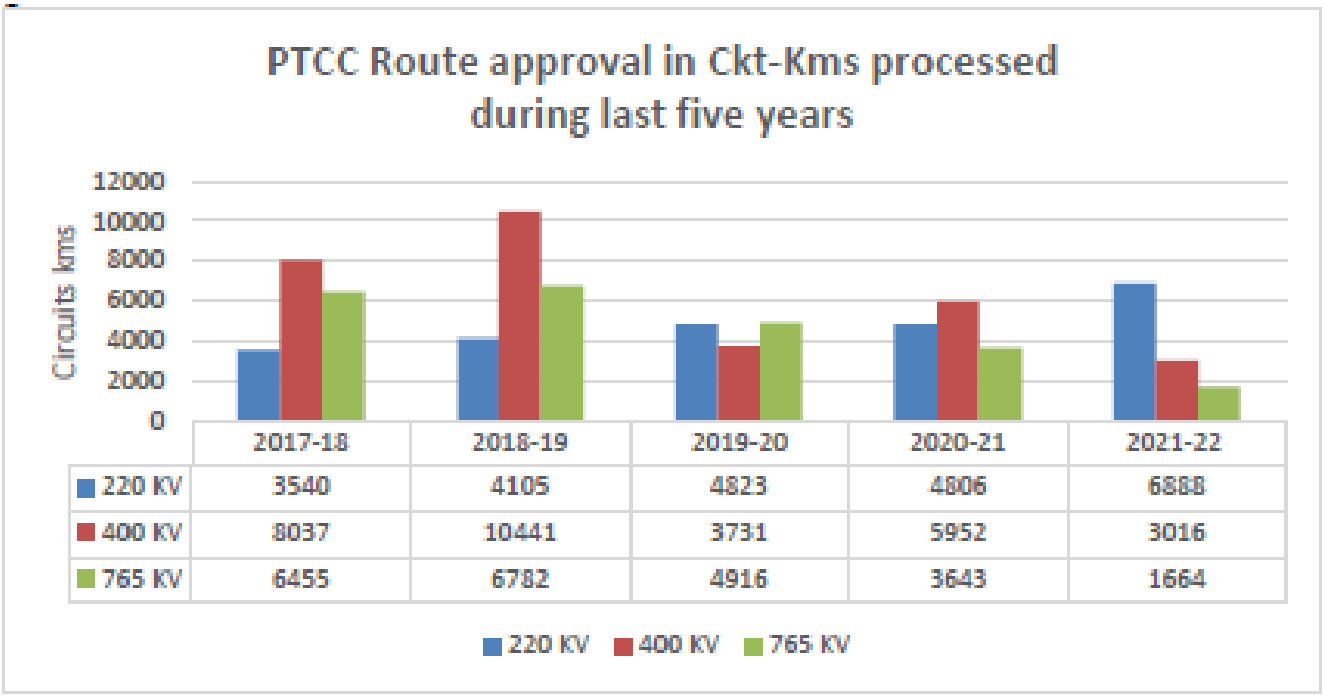
Section 160 of the Electricity Act, 2003 provides all reasonable precautions to be taken by the operator in laying down and placing his electric lines or electrical plant so as not to injuriously affect by induction, the working of telephonic and electric signaling lines. To ensure safe co-existence of Power & Telecommunication System, Central level Power and Telecommunication Coordination Committee (CLPTCC) was constituted.

During the year 2021-22, 226 nos. of new cases of EHV power lines (220 kV and above) were received and Induced Voltage Calculation for 209 nos. of cases have be en processed for PTCC route approval. A bar chart indicating the number of cases received/processed for PTCC route approval during the last five financial years are given below:



During the year 2021-22, Induced Voltage Calculation for about 6888 Circuit kilometers of 220 kV lines, 3016 Circuit kilometers of 400 kV lines and 1664 Circuit kilometers of 765 kV lines have been done. It is pertinent to mention that during 2021-22, 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 during the last five years is given below:



Power communication Development Division is continued 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.

3.26 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.

During the year 2021-22, recommendations regarding the frequency allocation for PLCC links of following transmission lines have been done: -

S. No.	Name of the transmission line
1	400 kV D/C Godda TPP to Indo- Bangladesh Border transmission line.
2	220 kV D/C Rongnichu to Rangpo transmission line.
3	400 kV D/C Pugalur (HVDC) S/S to Thiruvalam transmission line.
4	765 kV D/C Lakadia to Vadodara transmission line.

3.27 Manual of Communication Planning in Power System Operation

In order to ensure safe, secure, stable and reliable operation of the grid as well as economical and integrated operation of electricity system, Communication System plays a critical role. Accordingly, a need is felt to carry out the planning for 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 published which will help in efficient, coordinated and uniform planning of 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 has been approved by the authority on 31.03.2022.

3.28 Providing technical advice for Reliable Communication System in Power Sector

PCD Division provides technical advices related to Communication System in Power Sector and its upgradation. 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 2021-22, finalization of following RfPs has been done: -

S.No	Name of the Transmission System
1	Transmission System under "Eastern Region Strengthening Scheme –XXV (ERSS-XXV) & North Eastern Region Strengthening Scheme –XV (NERSS-XV)"
2	"Transmission system for evacuation of power from RE projects in Chhatarpur (1500 MW) SEZ in Madhya Pradesh"
3	"Transmission System for Evacuation of power from RE Projects in Osmanabad area (1 GW) in Maharashtra"
4	"Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh: Phase-I"
5	"Transmission System for evacuation of 1000 MW from Gadag SEZ under Phase-I"

3.29 Development of an indigenous Supervisory Control and Data Acquisition (SCADA) software for power system management

A Team was constituted by Ministry of Power, Government of India with representatives from Government of Andhra Pradesh, Government of Gujarat, Government of Maharashtra, CEA, PGCIL and POSOCO to examine the issue of indigenous development of SCADA software for power system management to support the *Aatmanirbhar Bharat* Campaign and submit the report. Member (Power System), CEA was the Chairman of the Team. The Term of Reference of the Team was to explore the possibilities of indigenous development of SCADA software for power system management and further help in development of such software. The Team deliberated on the issues with various Indian developers in the domain of development of SCADA software. Based on the inputs of the power utilities, Team Members and identified Indian vendors in the domain of SCADA/EMS/DMS systems and deliberations of the meetings, the report on *"possibilities of indigenous development of SCADA software for Power System Management"* was prepared and submitted to the Ministry of Power on 1st September, 2021.

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 Centres (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 trippings 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 Units (MUs) as well as in percentage and the Peak

Demand, Peak Met in Mega Watt (MW) and Demand not Met in Mega Watt (MW) as well as in percentage. The total Energy Requirement in the country during the year 2021-22 was 1,379,812 MUs as against 1,275,534 MUs during the previous year 2020-21, registering an increase of 8.2%. The total Energy Supplied in the country during the year 2021-22 was 1,374,024 MUs as against 1,270,663 MUs during the previous year 2020-21, registering an increase of 8.1%. The Energy not Supplied during the year 2021-22 was 5,787 MUs (0.4%) against 4,871 MUs (0.4%) during the previous the year 2020-21. The Peak Demand during the year 2021-22 was 203,014 MW as against 190,198 MW during the previous year 2020-21, registering an increase of 6.7%. The Peak Met during the year 2021-22 was 200,539 MW as against 189,395 MW during the previous year 2020-21, registering an increase of 5.9%. The Demand not Met during the year 2021-22 was 2,475 MW (1.2%) as against 802 MW (0.4%) during the previous year 2020-21.

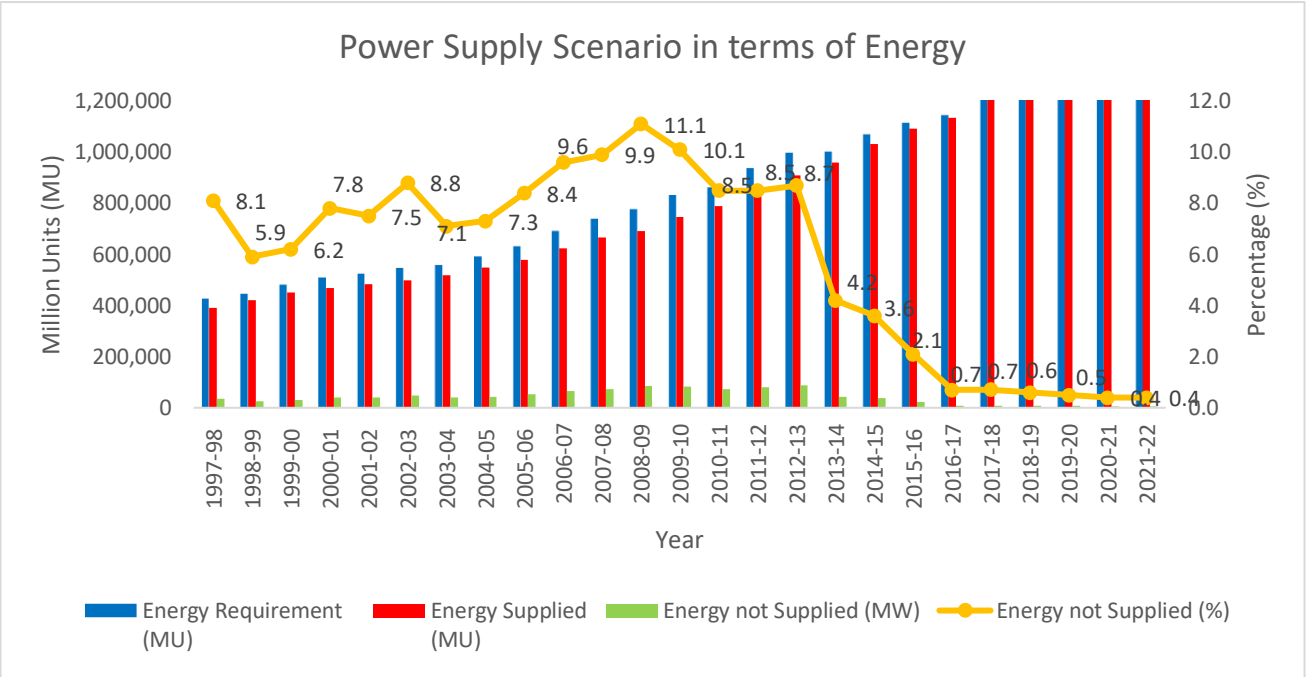
In the context of power supply, it may be mentioned that there is adequate availability of electricity in the country. The marginal gap between demand and supply of electricity is generally on account of factors other than inadequacy of power availability in the country e.g. constraints in distribution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

The power supply position since beginning of 9th Plan is as under:

ENERGY:

Year	Energy Requirement (MU)	Energy Supplied (MU)	Energy not Supplied	
			(MU)	(%)
1997-98	424,505	390,330	34,175	8.1
1998-99	446,584	420,235	26,349	5.9
1999-00	480,430	450,594	29,836	6.2
2000-01	507,216	467,400	39,816	7.8
2001-02	522,537	483,350	39,187	7.5
2002-03	545,983	497,890	48,093	8.8
2003-04	559,264	519,398	39,866	7.1
2004-05	591,373	548,115	43,258	7.3
2005-06	631,554	578,819	52,735	8.4
2006-07	690,587	624,495	66,092	9.6
2007-08	739,343	666,007	73,336	9.9
2008-09	777,039	691,038	86,001	11.1
2009-10	830,594	746,644	83,950	10.1
2010-11	861,591	788,355	73,236	8.5
2011-12	937,199	857,886	79,313	8.5
2012-13	995,557	908,652	86,905	8.7
2013-14	1,002,257	959,829	42,428	4.2
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

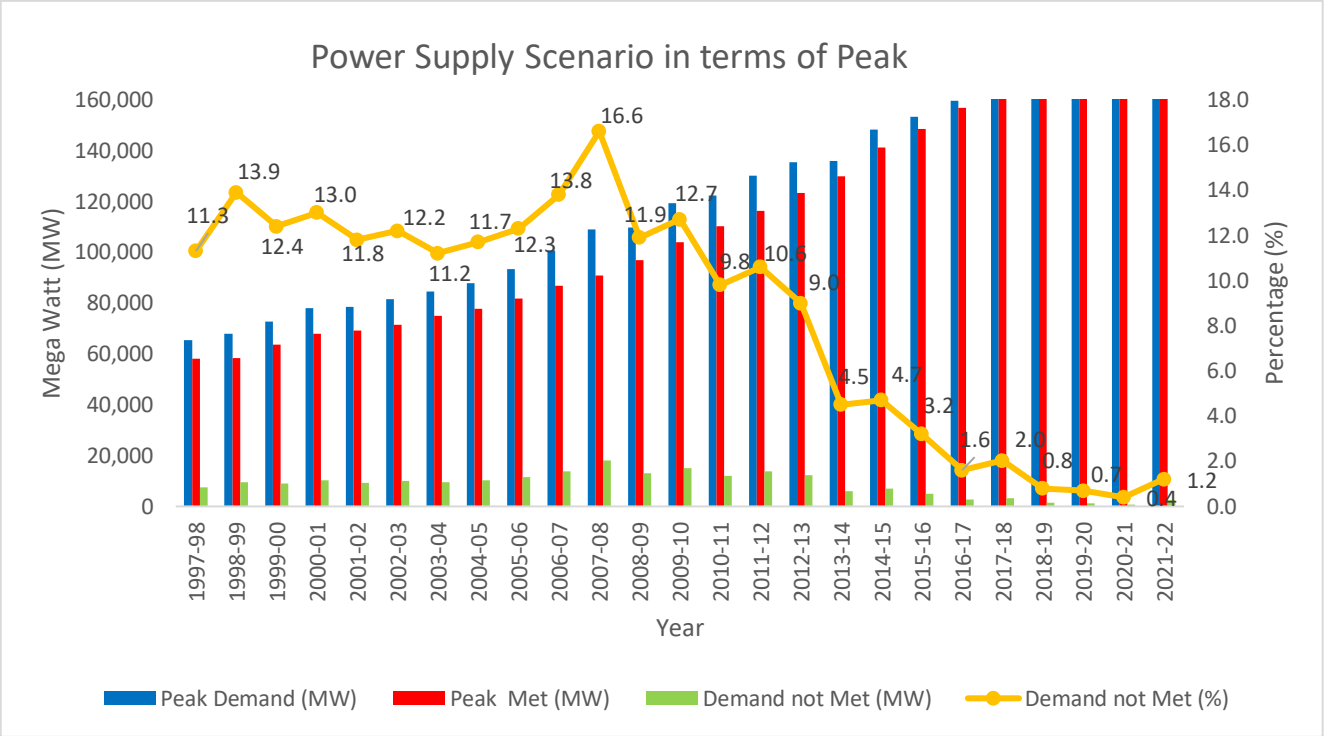
2018-19	1,274,595	1,267,526	7,070	0.6
2019-20	1,291,010	1,284,444	6,566	0.5
2020-21	1,275,534	1,270,663	4,871	0.4
2021-22	1,379,812	1,374,024	5,787	0.4



PEAK:

Year	Peak Demand (MW)	Peak Met (MW)	Demand not Met	
			(MW)	(%)
1997-98	65,435	58,042	7,393	11.3
1998-99	67,905	58,445	9,460	13.9
1999-00	72,669	63,691	8,978	12.4
2000-01	78,037	67,880	10,157	13.0
2001-02	78,441	69,189	9,252	11.8
2002-03	81,492	71,547	9,945	12.2
2003-04	84,574	75,066	9,508	11.2
2004-05	87,906	77,652	10,254	11.7
2005-06	93,255	81,792	11,463	12.3
2006-07	100,715	86,818	13,897	13.8
2007-08	108,866	90,793	18,073	16.6
2008-09	109,809	96,785	13,024	11.9
2009-10	119,166	104,009	15,157	12.7
2010-11	122,287	110,256	12,031	9.8
2011-12	130,006	116,191	13,815	10.6
2012-13	135,453	123,294	12,159	9.0
2013-14	135,918	129,815	6,103	4.5
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	183,804	182,533	1,271	0.7
2020-21	190,198	189,395	802	0.4
2021-22	203,014	200,539	2,475	1.2



The State/UT/Region-wise Power Supply Position in terms of Energy and Peak during the year 2021-22 is enclosed at **Annexure-4A.**

The details of the State/UT-wise allocation from Conventional Central Generating Stations in the country as on 31.03.2022, is enclosed at **Annexure-4B.**

4.3 System Operation in the Regions

4.3.1 Northern Region

The installed capacity in the Northern Region was 112,820.74 MW as on 31.03.2022 comprising of 63,498.27 MW thermal, 20,631.77 MW hydro, 1,620.00 MW nuclear and 27,070.70 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 1.0% in the Northern Region during the year 2021-22 as compared to the respective figure of 1.0% during the year 2020-21. Further, the Northern Region witnessed a gap of 0.5% between Peak Demand and Peak Met during the year 2021-22 as against the corresponding figure of 0.7% during the year 2020-21.

4.3.2 Western Region

The installed capacity in Western Region was 128,974.72 MW as on 31.03.2022 comprising of 85,922.76 MW thermal, 7,562.50 MW hydro, 1,840.00 MW nuclear and 33,649.46 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.1% in the Western Region during the year 2021-22. During the year 2020-21, there was negligible gap between Energy Requirement and Energy Supplied in the Western Region. Further, the Western Region witnessed a gap of 0.3% between Peak Demand and

Peak Met during the year 2021-22 as against the corresponding figure of 0.1% during the year 2020-21.

4.3.3 Southern Region

The installed capacity in Southern Region was 118,313.16 MW as on 31.03.2022 comprising of 56,264.99 MW thermal, 11,819.83 MW hydro, 3,320.00 MW nuclear and 46,908.34 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.1% in the Southern Region during the year 2021-22. During the year 2020-21, there was negligible gap between Energy Requirement and Energy Supplied in the Southern Region. Further, the Southern Region witnessed a gap of 2.2% between Peak Demand and Peak Met during the year 2021-22 while Southern Region was able to meet its Peak Demand completely during the year 2020-21.

4.3.4 Eastern Region

The installed capacity in Eastern Region was 34,366.42 MW as on 31.03.2022 comprising of 27,856.68 MW thermal, 4,764.42 MW hydro and 1,745.32 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.7% in the Eastern Region during the year 2021-22 as compared to the respective figure of 0.4% during the year 2020-21. Further, the Eastern Region witnessed a gap of 3.4% between Peak Demand and Peak Met during the year 2021-22 while Eastern Region was able to meet its Peak Demand completely during the year 2020-21.

4.3.5 North-Eastern Region

The installed capacity in North-Eastern Region was 4,943.52 MW as on 31.03.2022 comprising of 2,525.98 MW thermal, 1,944.00 MW hydro and 473.55 MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.3% in the North-Eastern Region during the year 2021-22 as compared to the respective figure of 2.5% during the year 2020-21. Further, the North-Eastern Region witnessed a gap of 1.9% between Peak Demand and Peak Met during the year 2021-22 as against the corresponding figure of 5.7% during the year 2020-21.

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 2020-21 and 2021-22, 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			
2020-21	5.28	77.92	16.80	50.00	50.39	49.57
2021-22	7.52	75.08	17.41	50.00	50.34	49.50

It may be seen from the above that the average grid frequency during the year 2021-22 was precisely at the nominal frequency level of 50 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 review of Defense mechanism (like Under Frequency Relay and rate of change of frequency relay based load shedding scheme and System Protection Scheme) have been taken up for to enhance grid security. 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 2021-22, two (02) meetings, 10th and 11th, of the National Power Committee were held on 09.04.2021 and 28.02.2022 respectively. In these meetings, the following important Agenda items were discussed:

- 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)
- Scheme for Protection Data Base Management System (PDMS) in RPCs
- Monitoring of Schemes Sanctioned Grant from PSDF
- National Energy Account (NEA)
- Power System Stabilisers (PSS) Tuning
- CEA (Cyber Security in Power Sector) Guidelines, 2021 from IT & CS Division
- Technical Minimum schedule support to ISGS plants of Eastern Region by availing URS power of surrendered beneficiaries
- Membership of Private Transmission licensee beyond a certain Threshold in RPCs
- Additional Suggestions for amendment in RPC resolution
- Membership of RPC forum

4.5.4 As per the decisions taken in 9th and 10th meetings of NPC, following three sub-committee/sub-group have been constituted. The work of sub-committee/sub-group are under progress:

(a) 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.

(b) 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.

(c) 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.

4.5.5 A Joint Committee comprising members from RPCs, CEA, and CTU/POWERGRID, POSOCO and NPC was constituted to finalise 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 four meetings (including one special meeting) of the Joint Committee were held on 05.02.2021, 14.04.2021, 16.07.2021and 10.11.2021. The final draft of TS has been prepared.

4.5.6 The twenty six (26) nos. exiting/under implementation Islanding Schemes (IS) in Indian Power system were reviewed by Hon'ble Cabinet Minister of Power and New & Renewable Energy and further by Secretary, Ministry of Power in the various meetings held during the FY 2021-22. Seventeen (17) nos. of new Islanding Scheme were proposed for implementation in the Indian Power System. Out of these, two (2) newly proposed Islanding Schemes (Visakhapatnam IS, Vijayawada IS) in Southern Region were implemented in FY 2021-22. Standard Operating Procedure for Islanding Scheme was also prepared and circulated to all RPCs for compliance.

In addition to above, it was decided that for real time monitoring of participating generators & critical loads, a separate display of Islanding Schemes on SCADA may be set up at LDCs/Sub SLDs and RLDCs. During FY 2021-22, SCADA visibility of 19 nos. of Islanding Schemes, out of 43 nos. of Islanding Schemes were made to have real time monitoring on SCADA.

4.6 Power System Development Fund (PSDF):

i) 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 31.03.2022 was ₹17827.40 Crores. Out of this, ₹1555.00 Crores have been transferred from during financial year 2021-22. After adding the ₹1159.1 Crores as interest and other credits, the total funds under PSDF up to 31.03.2022 was ₹18986.49 Crores. NLDC is the Nodal Agency for PSDF.

ii) During the FY 2021-22, following meetings related to the operation/implementation of PSDF were held:

a) Six (06) meetings of Techno-economic subgroup, headed by Chief Engineer NPC, CEA were held on 14.06.2021, 07.07.2021, 27.09.2021, 17.11.2021, 18.01.2022 & 16.03.2022. In these six meetings, total 44 projects (25 new projects and 19 old projects for which inputs were received from project entities) were examined. These projects were of various categories like, 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.

b) Six (06) meetings of Project Monitoring Group, headed by Member (GO&D) were held on 04.06.2021, 25.06.2021, 22.10.2021, 16.11.2021, 17.11.2021 & 4.03.2022 during FY2021-22. In these six meetings, 55 no. of Time Extension requests and 17 no. of Quantity Variation requests were discussed on case to case basis. Further, the progress of 69 projects
of Northern and Western Regions were also reviewed.

c) Two (02) meetings of the Appraisal Committee, headed by Chairperson, CEA, were held on 15.12.2021 & 20.01.2022. In these meetings, 8 no of projects were recommended to Monitoring Committee for sanction under PSDF.

d) One (01) meeting of the Monitoring Committee, headed by Secretary, Power was held on 27.01.2022. In this meeting, 7 no of projects were sanctioned for funding from PSDF.

e) One eighty one (181) nos. of projects for total grant amount of ₹12,392.73 Crores have been sanctioned since the operationalization of PSDF (till 31.03.2022). Out of 181 sanctioned projects, 14 projects with amount of ₹345.91 Crores have been De-sanctioned due to various reasons in the FY 2021-22.

f) The details of sanctioned grant under PSDF are as given below:

g) Out of ₹12046.82 Crores of sanctioned grant, a total amount of ₹ 8194.17 Crores (till 31.03.2022) had been disbursed by MoP for the implementation of the projects under PSDF since the launch of the scheme. ₹320.54 Crores was disbursed during the FY 2021-22

h) A total of 54 number of projects have been completed till 31.03.2022. Out of this, 23 projects were completed in the FY 2021-22

S. No	Project Entity	During FY 2021-22		Previous Years (Up to 31.03.2021)		Cumulative (Up to 31.03.2022)	
		No. of Projects	Sanctioned Grant (₹ crores)	No. of Projects	Sanctioned Grant (₹ crores)	No. of Projects	Sanctioned Grant (₹ crores)
1	State/UT	7	201.17	157	7493.63	164	7694.80
2	RPCs	-	-	9	115.61	9	115.61
3	BBMB	-	-	1	23.27	1	23.27
4	DVC	-	-	2	166.46	2	166.46
5	PGCIL	-	-	4	4159.56	4	4159.56
6	PGCIL/ RECTPCL	-	-	1	233.03	1	233.03
	Total	**7**	**201.17**	**174**	**12191.56**	**181**	**12392.73**
No. of De-sanctioned projects and Amount						**14**	**345.91**
Effective No. of Sanctioned projects and Amount						**167**	**12046.82**

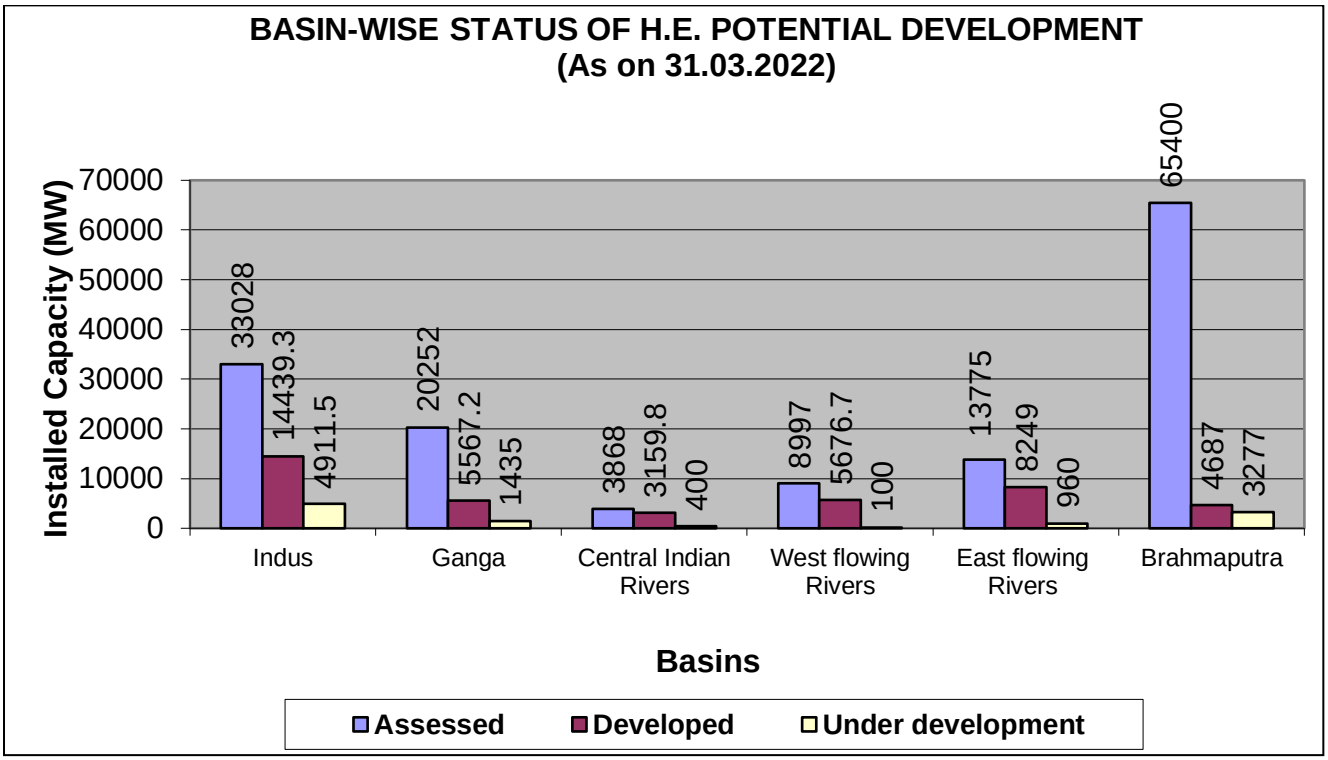
CHAPTER – 5

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 in 1987, have assessed the economically exploitable hydro power potential in terms of installed capacity as 148701 MW out of which 145320 MW of capacity is 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 31.03.2022, the hydroelectric schemes in operation account for only 28.75% (41778.9 MW) and those under execution for 7.63% (11083.5 MW) of the total potential in terms of installed capacity. Thus, the bulk of the potential (63.62%) remains to be developed.



In addition, 63 sites for development of Pumped Storage Schemes (PSS) with probable total installation of 96529.6 MW have been identified in the country. At present, 8 Nos. Pumped Storage Projects (above 25 MW) having total installed capacity of 4745.60 MW are in operation and 3 Pumped Storage project (1580 MW) are under construction.

5.2 50,000 MW Hydro-Electric initiative

Under the 50,000 MW Initiative, preparation of Preliminary Feasibility Reports (PFRs) for 162 hydro-electric projects spread over 16 states was taken up by CEA in the year 2003-04 as nodal agency with CPSUs/State agencies as Consultants. The role of CEA included 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 (47930 MW), DPRs in respect of 35 schemes (19360 MW) have already been prepared. Out of these 35 schemes, 2 schemes (300 MW) has been commissioned while 8 schemes

(2308 MW) are under construction in the country. A total of 14 schemes (6871 MW) have been concurred by CEA while 1 scheme (280 MW) are 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 6 schemes (2414 MW) are under Survey & Investigation (S&I) for preparation of DPRs while DPR in respect of remaining 127 schemes (28570 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 utilisation 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), CEA holds regular review meetings with the developers/contractors and monitoring divisions of CEA.

5.4 Hydro additions during 2020-21:

Hydro capacity addition of 510 MW was achieved against the targets of 606 MW for the year 2020-21. Project-wise details are given at **Annexure-5B**.

5.4.1 Hydro capacity additions during 2021-22: 393 MW Hydro capacity has been added against the targets of 613 MW for the year 2021-22. Project-wise details are given at **Annexure-5C**.

5.4.2 Hydro capacity programme during 2022-23 Hydro Capacity Addition Monitorable Targets planned for the Year 2022-23 is 1080 MW (810 MW in Central Sector, 220 MW in State Sector, and 50 MW in Private Sector.). Project-wise details are given at **Annexure-5D.**

5.5 Survey & Investigation 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, GSI and CSMRS with the project developer and guidance is provided to him for making a good quality DPR. During the year, consultation meetings were held for Demwe Upper St-I HEP in Arunachal Pradesh, Saundatti PSP in Karnataka, Sach Khas HEP in Himachal Pradesh, Kurukutti PSP, Karrivalasa PSP, Gandikota PSP, Owk PSP, Somasila PSP, Chitravati PSP, Yerrawarm PSP in Andhra Pradesh, MP 30 Gandhi Sagar PSP in Madhya Pradesh and Warasgaon PSP in Maharashtra.

DPRs of 12 nos. of HEPs with aggregate installed capacity of 5758 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 6 HEPs with aggregate installed capacity of 4472 MW have been concurred by CEA. DPR of Reoli Dugli Hydro Electric Project (458 MW) have been prepared and submitted to CEA during the period of 2021-22. In addition, a total of 32 HEPs including 18 Pumped Storage Schemes with aggregate capacity of 22565 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

• Rendering of Consultancy Services for Preparation/ Updation of Detailed Project Report of Kuri-Gongri HEP (2640 MW) in Bhutan and Baranium HEP (240 MW) in J&K.

• Power Potential Studies of Myntdu Leshka Stage-II (210 MW) HE Project in Meghalaya, Dulhasti Stage-II (260 MW) HE Project in Jammu & Kashmir, Teesta-IV (520 MW) HE Project in Sikkim, Uri-I Stage-II (240 MW) HE Project in Jammu & Kashmir, MP30 Gandhi Sagar PSP (1440 MW) in Madhya pradesh, Sach Khas (287 MW) HE Project in Himachal Pradesh, Anjaw (270 MW) HE Project in Arunachal Pradesh, Phina Singh Medium Irrigation Project (1.88 MW) in Himachal Pradesh, Reoli Dugli (456 MW) HE Project in Himachal Pradesh, Chitravathi PSP (500 MW) in Andhra Pradesh, Somasila PSP (900 MW) in Andhra Pradesh, Lower Arun (669 MW) HE project in Nepal and Owk PSP (800 MW) in Andhra Pradesh were carried out.

5.7 Studies & Other Activities Related to Hydro Power Planning

• Report of the committee to decide upon early warning system to be put in place in the hilly regions.

• 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 2019-20 to 2029-30.

• The trajectory for Hydro Purchase Obligation (HPO) was notified on 29.01.2021 and varies from 0.18% to 2.82% for the period of 2021-22 to 2029-30 respectively

• Guidelines for Budgetary Support to Cost of Enabling Infrastructure, i.e. roads/bridges notified on 28.09.2021

• Guidelines for Budgetary support for funding flood moderation component of hydropower projects notified on 28.09.2021

• Draft Cabinet Note for including the cost of transmission in Measures (Budgetary Support to Cost of Enabling Infrastructure) taken by MoP in March 2019.

• Draft EFC Memo for Equity support to North Eastern Region states

• First Draft of New Hydro Power Policy 2022 submitted to MoP.

• Draft report of the Committee to Fast Track the development of Hydro Projects.

• Report of the committee on issues related to development of Floating Solar Power in India is in the process of completion. The Report discusses the Challenges involved and suggests a way forward for facilitating development of floating solar PVs.

• 117th meeting of the permanent Indus commission held at Islamabad, Pakistan from 1st to 3rd march, 2022 was attended

• Power Potential Studies were examined/ carried out in connection with preparation of Draft reports for Basin wise reassessment of Hydro Electric Potential in Country

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:

• Consultancy Services for Preparation of Detailed Project Report of Kuri Gongri HEP (2640 MW) in Bhutan. In addition, proposal for additional funds of INR 12.923 Crore for carrying out additional investigations and studies are required for preparation of bankable DPR of Kuri Gongri HEP was examined.

• Matter relating to revision of tariff of Chukha

HEP in Bhutan.

• Internal meeting of Joint Team of Experts (JTE)-India side, JPO– SKSKI was attended.

5.9 Hydro Power Plants Performance & Operation Monitoring

• The report "Review of Performance of Hydro Power Stations" for the year 2020-21, in this regard, is in the process of completion. Performance of 720 units in 207 Hydro Stations with aggregate Installed Capacity of 46209.20 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 2022-23 in respect of all the HE Stations (above 25 MW) in the country were finalized as 150.67 BU in consultation with respective utilities including 61.37 BU in respect of CPSUs, 15.25 BU for private sector projects and 74.05 BU for state sector hydro projects. The overall programme for generation from hydro projects during 2022-23 is 150.67 BU.

• Midterm review of generation performance of hydroelectric stations of the country for the year 2021-22 was carried out in December 2021 after withdrawal of South-West monsoon by interaction with Power Utilities of Central Sector and the generation programme was reviewed for the remaining part of the year 2021-22. The total likely generation from hydro stations in 2021-22 would be about 146.50 BU against original programme of 149.54 BU.

• Visit to Khandong Hydro Power Station, NEEPCO in Assam was conducted as part of Expert Committee constituted to give a first-hand report of the accident occurred due to flooding incident in Khandong Stage-I (2X25MW=50 MW) and Khandong Stage-II (1X25MW=25MW) Power Houses of NEEPCO that took place on 26.03.2022 and also assess the extent of damages to the Power Stations

• 5.10 Hydel Generation Performance during year 2021-22

The region wise summary of Hydel Generation performance in the country is as follow:

Region	Generation (BU)		Deviation (+/-)
	Programme	Actual	(%)
Northern	75.68	73.85	-2.42
Western	16.04	13.70	-14.58
Southern	30.44	37.22	22.29
Eastern	20.54	20.47	-0.32
N-Eastern	6.84	6.37	-6.80
All India	**149.54**	**151.62**	**1.39**

Against programme of 149.54 BU, the actual energy generation during the year 2021-22 was 151.62 BU, which was 1.39 % more than the target.

5.11 RENOVATION & MODERNI- SATION (R&M) OF HYDRO ELECTRIC PROJECTS

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

Recognizing the benefits of R&M of hydroelectric 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 Period:

The R&M works at 104 (21 in Central and 83 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) with an aggregate installed capacity of 20611 MW have been completed by the end of the XII Plan and total benefit of 3636 MW through Life Extension, Uprating and Restoration has been accrued.

5.11.2 Programme and Achievements during the period 2017-22

The Renovation, Modernization, Uprating and Life Extension works at 22 Hydro Electric Plants (HEPs) with an aggregate capacity of 4847.8 MW was programmed for completion during 2017-22 with the break-up as 3729.60 MW through R&M at 12 HEPs, 433.2 MW through Life Extension at 7 HEPs and 685 MW through Life Extension & Uprating at 3 HEPs. The 3 HEPs where both Life Extension & Uprating were envisaged, the aggregate capacity of 685 MW after completion of R&M works would get uprated to 801.2 MW resulting in additional benefit of 116.2 MW. As such, the revised aggregate capacity of these 22 projects on completion of R&M works would be 4964 MW.

Out of these 22 schemes, fourteen (14) schemes with an aggregate installed capacity of about 2023.20 MW have been completed till March, 2022. The benefits accrued include 334.2 MW (6 schemes) through Life Extension and 171.2 MW (2 schemes) through LE & Uprating. The State-wise list of hydro R&M schemes completed as well as those which were programmed but could not be completed during 2017-22 is given at **Annexure-5E**. Accordingly, completion of eight (8) schemes with an aggregate installed capacity of 2824.60 MW has now been delayed and would get completed during 2022-23, and the details for same is also given at **Annexure-5E.**

5.11.3 Programme for the year 2021-22

For the year 2021-22, it was programmed to complete following 14 schemes having capacity under R&M of 3509.60 MW. On completion of these schemes, there was to be a benefit of 921.2 MW through Life Extension and 102.2 MW through Uprating.

5.11.4 Achievements during the year 2021-22

During the year 2021-22, Six (6) schemes with an aggregate installed capacity of about 685 MW have been completed till March, 2022. R&M works of Chenani (5x4.66 MW) & Ganderbal (1x4.5 MW) of J&KSPDC, Ukai (3x75 MW) of GSECL, Hirakud-I (2x37.5 MW) of OHPCL in State Sector and Dehar Power House Unit -3 (1x165 MW) of BBMB & Baira Siul (3x60 MW) of NHPC in Central Sector have been completed and have achieved of 282.2 MW through Life Extension and 12.2 MW through Uprating.

5.11.5 Programme during the period 2022-27

The Renovation, Modernization, Uprating and Life Extension works at 79 Hydro Electric Plants (HEPs) (including the eight schemes which could not be completed during the year 2021-22) with an aggregate capacity of 14074.40 MW is programmed for completion during 2022-27 with the break-up as 3884.95 MW through R&M at 16 HEPs, 8398.45 MW through Life Extension at 52 HEPs and 1791 MW through Life Extension and Uprating at 11 HEPs. The 11 HEPs where both Life Extension & Uprating are envisaged, the aggregate capacity of 1791 MW shall be uprated after completion of R&M works to 2017.5 MW resulting in additional benefit of 226.5 MW. As such, the revised aggregate capacity after RMU&LE works of these 79 projects will be 14300.90 MW. The State-wise list of hydro R&M schemes expected for completion during 2022-27 is given at **Annexure-5F**.

Programme for the year 2021-22

S.No.	Name of Scheme	Capacity under R&M (No. x MW)	Agency
1.	Chenani,	5x4.66	J&KSPDC
2.	Ganderbal, (Unit-3)	1x4.5	J&KSPDC
3.	Dehar Power House (Unit-3),	1x165	BBMB
4.	Baira Siul,	3x60	NHPC
5.	Ukai,	3x75	GSECL
6.	Hirakud-I	2x37.5	OHPCL
7.	Bhakra RB	5x157	BBMB
8.	Bhakra LB	5x108	BBMB
9.	Mukerian St.I, St.II, St.III & St.IV	3x15, 3x15, 3x19.5 & 3x19.5	PSPCL
10.	Shanan HEP	1x50 + 4x15	PSPCL
11.	Obra	3x33	UPJVNL
12.	Kadana PSS	4x60	GSECL
13.	Nagarjuna Sagar Ph-II works	1x110+7x100.8	TSGENCO
14.	Munirabad Dam Power House	2x9 + 1x10	KPCL
Total (14 Schemes)		**3509.60 MW**	

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	829.08 [123.40(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	1115.97	549.40 [58 (U)+ 476.40 (LE)+15(Res.)]

6	Total	21	83	104	20611.50	3137.58	3635.51 [571.40 (U)+ 2362.65 (LE)+ 701.46 (Res.)]

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

II Hydro R&M Schemes during 2017-22

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	7	15	22	4847.8	1983.44	1234.4 [1118.2(LE) +116.2(U)]
2.	Completed	5	9	14	2023.2	809.92 (Actual Cost)	505.4 [479.2(LE) + 26.2(U)
3.	Programmed during 2017-22 but delayed and now Programmed during 2022-27	2	6	8	2824.6	839.50	729.0 [639(LE) +90(U)]

III Programme of R&M works during 2022-27

Sl. No.	Category	No. of Projects			Capacity covered under RMU&LE (MW)	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	10	69	79	14074.40	10415.95 [10189.45(LE)+ 226.5(U)]
2.	Under Implementation	5	27	32	7046.95	3377.5 [3198.0(LE)+ 179.5(U)]
3.	Under Tendering	1	8	9	956.75	968.75 [956.75LE)+ 12(U)]
4.	Under DPR Preparation/Finalisation/Approval	3	5	8	1630.2	1636.2 1630.2(LE)+ 6(U)]
5.	Under RLA Studies	1	29	30	4440.5	4433.5 [4404.5(LE)+ 29(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 2021-22:

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

Examination of Detailed Project Report (DPR) for Reconstruction, Renovation & Modernisation of 4x50 MW Kopili Power Station, NEEPCO.

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

5.12 Concurrence / Appraisal of Hydro Schemes:

During the year 2021-22 (till 31.03.2022), DPR of 4 HE Schemes with an installed capacity of

1976 MW has been concurred by CEA. Details are given as under:

S. No.	Name of Scheme/ State/ Executing Agency	Installed Capacity (MW)	Estimated Cost (₹ in crores)	Date of concurrence/ appraisal by CEA
1.	Wah Umiam Stage-III HEP (Erstwhile Mawphu HEP, Stage-II) in Meghalaya by NEEPCO Ltd.	2x42.5= 85	965.40 (Price at January, 2019 level)	26.07.2021
2.	Thana Plaun HEP in H.P. by M/s HPPCL.	3x50.33+ 2x20= 191	1530.13 (Price at September, 2019 level)	07.09.2021
3.	Dugar HEP in Himachal Pradesh by M/s. NHPC	4x103 +2x44= 500	4250.20 (cost at completion level)	22.03.22 ($)
4.	Pinnapuram PSP in Andhra Pradesh by M/s. GEPL	4x240+2x 120= 1200	6465.22 (Price at February, 2021 level)	22.03.22 ($)
	TOTAL	**1976**	**13210.95**	

Note:- ($): Date of Authority meeting for concurrence. Concurrence letter will be issued on submission of final DPR by the Developer.

CHAPTER-6

THERMAL POWER DEVELOPMENT

6.1 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) have 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 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 fund for UMPP is 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.

Initially following nine (9) numbers, Ultra Mega Power Projects (UMPPs) were proposed to be set up in different states:

i. Sasan UMPP in M.P- coal pithead
ii. Mundra UMPP in Gujarat- coastal
iii. Krishnapatnam UMPP in A.P.- coastal
iv. Tilaiya UMPP in Jharkhand- coal pithead
v. UMPP in Chhattisgarh- coal pithead
vi. Bedabahal UMPP in Odisha - coal pithead
vii. Cheyyur UMPP in Tamil Nadu- coastal
viii. Munge UMPP in Maharashtra- coastal
ix. Niddodi UMPP in Karnataka – coastal

In addition to nine UMPPs originally identified, request has come from some of the State Governments for installation of additional UMPPs in their states. These are given below:
i) First additional UMPPs in Odisha - Sakhigopal
ii) Second additional UMPPs in Odisha - Ghogarpalli
iii) Second UMPP in Gujarat – Gir Somnath
iv) Second UMPP in Jharkhand – Deoghar UMPP
v) Second UMPP in Tamil Nadu - Nagapattinam
vi) UMPP in Bihar – Banka UMPP
vii) UMPP in Uttar Pradesh - Etah
viii) 2nd UMPP in Andhra Pradesh - Nainapalli

Status of UMPPs

I. 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:

Sl.	Name of UMPP	Type	Date of Transfer	Levellised Tariff (in Rs. Per kWh)	Successful developer
1.	Mundra, Gujarat	Coastal	23.4.2007	2.264	Tata Power Ltd.
2.	Sasan, Madhya Pradesh	Pithead	07.08.2007	1.196	Reliance Power Ltd.
3.	Krishnapatnam, Andhra Pradesh	Coastal	29.01.2008	2.333	Reliance Power Ltd.
4.	Tilaiya, Jharkhand	Pithead	07.08.2009	1.77	Reliance Power Ltd.

II. UMPPs Operational:

Out of the above four awarded UMPPs; two UMPPs namely Mundra UMPP and Sasan UMPP are in operation. A brief detail of operational UMPPs are given as below:

a) **Mundra UMPP in Gujarat:** The project was handed over to the successful bidder M/s. Tata Power Company Ltd., on 23.04.2007 at an evaluated levelised tariff of Rs. 2.26367/kWh. Mundra UMPP was fully commissioned in 2013. The generation and PLF for last three years are as below:

Parameters	2019-20	2020-21	2021-22
Generation(MU)	26495.39	26208.53	9072.28
PLF(%)	74.74	74.80	24.77

b) **Sasan UMPP in Madhya Pradesh:** The project was handed over to the successful bidder i.e. M/s Reliance Power Ltd., on 07.08.2007 at the evaluated levelised tariff of Rs. 1.19616/ kWh. Sasan UMPP is fully commissioned. The generation and PLF for last three years are as below:

Parameters	2019-20	2020-21	2021-22
Generation(MU)	33340.92	33387.69	32673.17
PLF(%)	95.85	96.25	96.01

III. UMPPs on fast - track:

Two UMPPs are being fast-tracked for bidding. Various clearances have been taken. The bidding shall be initiated after the issuance of Standard Bidding Documents (SBDs). The status of these two UMPPs is as follows:-

a) Bedabahal UMPP in Odisha: The site for this UMPP is in village Bedabahal in Sundergarh district. RfQ and RfP issued in 2013 were withdrawn. Expert Committee was constituted under the Chairmanship of Shri Pratyush Sinha, former CVC to review the existing Bidding documents for UMPPs and to recommend the revised Standard Bidding Documents (SBDs) applicable to UMPPs/Case2. The SBDs are under finalization. Fresh bids would be issued after finalization of SBDs and allocation of coal blocks to the Infra Special Purpose Vehicle (SPV).

b) Tilaiya UMPP in Jharkhand: The project was handed over to M/s Reliance Power Ltd. (RPL) on 07.08.2009 at an evaluated levelised tariff of Rs. 1.770 per kWh. The developer, Jharkhand Integrated Power Ltd (JIPL), a subsidiary of RPL, has issued notice of termination of Power Purchase Agreement (PPA) on 28.04.2015 citing non-transfer of land to the developer by Jharkhand Government. Jharkhand Urja Vikas Nigam Ltd. vide letter dated 19.06.2018 informed that JIPL has been taken over by the procurers from RPL.

IV. UMPPs in Pipeline:

Two UMPPs are under various stages of development. Various clearances, coal block allocation, land allocation are being sought. The status of these two UMPPs is as follows:-

a. Banka UMPP in Bihar: A site at Kakwara in Banka Distt has been identified for setting up of UMPP in Bihar. Infrastructure Special Purpose Vehicle (SPV) namely Bihar Infra power Limited has been incorporated on 30.06.2015. Operating SPV namely Bihar Mega Power Limited (BMPL) has been incorporated on 09.07.2015.

b. Deoghar UMPP in Jharkhand: A site at Husainabad, Deoghar Distt has been identified for setting up of 2nd UMPP in Jharkhand. Operating SPV namely Deoghar Mega Power Ltd and Infrastructure SPV namely Deoghar Infra Limited has been incorporated on 26.4.2012 and 30.06.2015 respectively. However, due to resistance from the local public, Government of Jharkhand has proposed an alternate site at Mohanpur Anchal in Deoghar district. The approval of alternate site at Mohanpur, Deoghar is awaited from Govt. of Jharkhand.

However, MoP vide letter dated 12.11.2021 conveyed its decision to defer any action on formulation of UMPPs Bidding framework as of now as the country is making energy transition from fossil fuel to non-fossil fuel. Further, in QPRM held on 16.12.2021, PFC was advised to review the status of UMPPs and take necessary action for closure wherever required, in consultation with stakeholders.

V. UMPPs stalled due to various reasons:

a. Cheyuur UMPP in Tamil Nadu: The site at Cheyyur in Kanchipuram district in Tamil Nadu has been identified along with captive port at Panaiyur village. Cheyyur UMPP was originally envisaged to be setup on imported coal. However, recently Ministry of Power is examining the possibility of setting up Cheyyur UMPP on domestic coal instead of imported coal. Ministry of Coal has been requested to allocate suitable explored coal block. All the Procuring States have decided to opt out of Cheyyur UMPP. TANGEDCO vide email dated 18.08.2020 has

informed that TANGEDCO has recommended GoTN for closure of this project.

b. **Krishnapatnam UMPP in Andhra Pradesh:** The project was handed over to Reliance Power Ltd. on 29.01.2008 at the levelised tariff of Rs. 2.33/kWh. The developer has stopped work at site, citing new regulation of coal pricing in Indonesia. Lead Procurer has issued termination notice to the developer. Delhi High Court has issued judgment in the case on 15.01.2019 and has dismissed the appeal by Coastal Andhra Power Limited (CAPL) finding no merit in the appeal. MoP forwarded the RPL request for procurers meeting to finalize the modalities of transfer of CAPL from RPL to PFC consequent upon termination of PPA. PFC has requested the Transmission Corporation of Andhra Pradesh Limited that Andhra Pradesh (Lead Procurer) may like to convene all procurers meeting for Krishnapatnam UMPP for further course of action.

VI. UMPPs being considered for Closure:

MoP vide OM dated 26.07.2019 had informed the procurers of below mentioned Five UMPPs that the activities with respect to the said UMPPs are not progressing at all for a considerable time due to various reasons. Subsequently, MoP vide OM dated 08.04.2020 had again requested for the confirmation from the State Governments of the procuring States for closure of UMPP.

a. **Second UMPP in Odisha:** Site at Bijoypatna in Chandbali Tehsil of Bhadrak district has been identified

b. **Third UMPP in Odisha:** Site at Narla & Kasinga sub division of Kalahandi district has been identified.

c. **UMPP in UP:** A UMPP in Uttar Pradesh is also in consideration. Land has been tentatively identified at Etah district.

d. **Second UMPP in Gujarat:** A site in Gir Somnath Districthas been identified by Government of Gujarat to explore the possibilities for setting up of an UMPP.

e. **Second UMPP in Tamil Nadu:** Site near Nagapattinam was identified by Govt of Tamil Nadu which was found unsuitable by TANGEDCO Ltd. CEA has requested TANGENDCO to identify an alternative site for setting up second UMPP in Tamil Nadu.

VII. UMPPs closed:

Niddodi UMPP in Karnataka**,** Nainapalli second UMPP in Andhra Pradesh, UMPP in Chattisgarh and Munge UMPP in Maharashtra have been closed.

6.2 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 Section 73 (f) functions and duties of authority of Electricity Act, 2003 which inter-alia envisages "To Promote and Assist in Timely Completion of Various Schemes and Projects." 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.

As on 31.03.2022, Thermal capacity of 52165 MW is at various stages of under construction in the country. Out of which, there are 28 Thermal power projects comprising of 24365 MW which are held up due to various reasons such as financial issues, lack of PPA or FSA etc. The commissioning of these projects is uncertain.

6.2.1 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:

- Detailed schedules were drawn up 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.
- Review Meetings were held with various implementing agencies including suppliers to review the progress of work and finalizing the completion schedule of under construction thermal power projects.
- Thermal projects visit to assess the progress of various activities at site.

6.3 New Thermal Power Projects accorded Environmental Clearance

6.3.1 Power Projects accorded Environment Clearance

During the year 2020-21, Environment clearance has been granted to 03 nos. of thermal power project totaling to a capacity of 4800 MW, the list of such plants is given below.

And during the year 2021-22, Environment clearance has not been granted to any thermal power project .

Sl. No.	Name of the project	Date of Clearance	Environment Clearance Capacity (MW)
01	2x800 MW, Singrauli STPP, Stage III, District Sonbhadra, UP by NTPC	13.07.2020	1600
02	800 MW, coal based supercritical TPP, Tehsil Songadh, district Tapi, Gujarat by GSECL	13.10.2020	800
03	3x800 MW NLC Talabira Thermal Power Project (NTTPP) at in district jharsuguda and sambalpur, Odisha by NLC India Ltd.	02.02.2021	2400
	Total		**4800 MW**

6.3.2 Power Projects for which order placed

During the year 2020-21, orders for 660 MW thermal capacity was placed and for the year 2021-22, no new order is placed for any thermal power project.

Sl.	Project	Implementing Agency	Plant Configuration	Capacity (MW)	Main Plant (BTG)
01	Sagardighi Thermal Power Phase-III Expansion U#5	WBPDCL	660	660	M/S BHEL on 01.07.2020

6.4 Coal Block Allocation

There are 64 nos. of coal blocks allotted to Power Sector. Out of which 50 nos. of Coal Blocks (Central sector – 12 nos., State sector – 33 nos., Private Sector – 5 nos.) have been allotted to power sector as per Coal Mines (Special Provisions) (CMSP) Act 2015. Another 11 nos. of Coal Blocks (Central sector – 3 nos. and State sector- 8 nos.) have been allotted to power sector under Mines and Minerals (Regulation and Development) Act (1957) i.e. MMDR Act. 03 nos. of Coal Blocks [Central sector – 1 no. and Ultra Mega Power Project (UMPP) – 2 nos.) have been allotted to power sector under Coal Mines (Nationalization) Act, 1973.

Total nos. of coal blocks allotted to Central Sector is 16 nos., State Sector is 41 nos., Private sector is 05 nos and UMPP is 02 nos.

Out of these 64 Coal Blocks, production has been started from 26 Coal Blocks and likely start of production during 2022-23 is from 9 Blocks. 12 nos. coal blocks are likely to be surrendered. The quantity of coal produced in the FY 2021-22 is 82.17 MT. The expected coal production in the year 2022-23 is around 113.3 MT.

6.5 Linkage under SHAKTI Policy, 2017

Ministry of Coal in May 2017 has formulated a new policy for allocation of coal to 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 2021 is as under:

6.5.1 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: SLC (LT) has accorded coal Linkage to 24 nos. Thermal Power Projects totaling 26,000 MW under Central /State Sector category under SHAKTI policy.

6.5.2 Shakti Policy Para B (ii): -

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

Achievement: - Three rounds of bidding for coal linkage under Shakti B(ii) have been held so far. In first round of bidding, coal linkages were allocated to 10 nos. Thermal Power Projects having PPA. The installed capacity of these 10 nos. projects was 11,549 MW against which signed PPAs were available for 9,045 MW capacity. CIL has allotted coal to various developers totaling to 32.68 MTPA (G-13 grade equivalent).

In the second round of auction held under SHAKTI B (ii), coal linkages through auction process were awarded by CIL to 8 Nos. of Thermal Power Projects totaling to 1240 MW of installed capacity and having long-term PPA signed capacity of 877.4 MW. CIL has provisionally allotted coal linkages to these power projects totaling to 3.3355 MTPA (G13 grade equivalent).

In the third round of auction held under SHAKTI B(ii), coal linkages through auction process were awarded by CIL to 5 Nos. of Thermal Power Projects having installed capacity 5430 MW and PPA capacity of 1,054 MW. CIL provisionally allotted coal linkages to these power projects totaling to 3.4659 MTPA (G-13 grade equivalent). 2 out of 5 bidders have signed FSA with the respective CIL subsidiaries.

In the fourth round of auction held under SHAKTI B(ii), coal linkages through auction process were awarded by CIL to 5 Nos. of Thermal Power Projects having installed capacity 4410 MW and PPA capacity of 3940.39 MW. CIL provisionally allotted coal linkages to these power projects totaling to 20.85 MTPA (G-13 grade equivalent).

6.5.3 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 company. 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.

Achievement: - First round of bidding for Coal linkages under SHAKTI B(iii) were awarded by CIL to 7 nos. of Thermal Power Projects without PPA having installed capacity of 5995 MW and non-PPA capacity of 3774.94 MW. CIL has allotted coal to various developers totaling to 7.15 MTPA (G-13 grade equivalent). Second round of auction under SHAKTI B(iii) is under process.

6.5.4 Shakti Policy Para B(iv):-

Policy: - In this clause coal linkage may be earmarked to the states for fresh PPAs, by predeclaring 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 mediumterm procurement of Power.

Achievement: - Under this clause, on the request of various states and recommendations of MoP, 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 power to be raised through tariff based competitive bidding.

6.5.5 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.

Achievement: -
Five rounds of quarterly auctions for coal linkage under SHAKTI B(viii)(a) have been held so far:

In the first round of auction for the quarter Apr-Jun 2020, 1.57 MT (G-13 grade equivalent) of coal was booked by 9 Nos. of Thermal Power Projects with 7320 MW of installed capacity and having 6061.88 MW of non-PPA capacity.

In the second round of auction for the quarter Jul-Sep 2020, 0.74 MT (G-13 grade equivalent) of coal was booked by 8 Nos. of Thermal Power Projects with 6190 MW of installed capacity and having 4001 MW of non-PPA capacity.

In the third round of auction for the quarter Oct-Dec 2020, 0.41 MT (G-13 grade equivalent) of coal was booked by 7 Nos. of Thermal Power Projects with 5340 MW of installed capacity and having 4223 MW of non-PPA capacity.

In the fourth round of auction held for the quarter Jan-Mar 2021, 0.66 MT (G-13 grade equivalent) of coal was booked by 7 Nos. of Thermal Power Projects with 4960 MW of installed capacity and having 3334.41 MW of non-PPA capacity.

In the fifth round of auction held for the quarter Apr-Jun 2021, 1.12 MT (G-13 grade equivalent) of coal was booked by 8 Nos. of Thermal Power Projects with 5330 MW of installed capacity and having 3620.1 MW of non-PPA capacity.
In the Sixth round of auction held for the quarter Jul-Sep 2021, 0.89 MT (G-13 grade equivalent) of coal was booked by 8 Nos. of Thermal Power Projects with 4800 MW of installed capacity and having 3869.8 MW of non-PPA capacity.
In the Seventh round of auction held for the quarter Oct-Dec 2021, 1.91 MT (G-13 grade equivalent) of coal was booked by 10 Nos. of Thermal Power Projects with 7470 MW of installed capacity and having 5807.9 MW of non-PPA capacity.
In the Eighth round of auction held for the quarter Jan-Mar 2022, 1.56 MT (G-13 grade equivalent) of coal was booked by 11 Nos. of Thermal Power Projects with 11640 MW of installed capacity and having 4764.9 MW of non-PPA capacity.

6.6 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, 32 nos. Thermal Projects totalling 38530 MW were granted Bridge Linkage so far.

6.7 Use of Treated Sewage Water by TPS under Tariff Policy-2016.

As per Tariff Policy, dated 28.01.2016, notified by

Government of India, the 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 Station totaling capacity of 8999.2 MW are utilizing 585 MLD of STP water i.e. Koradi TPS, Khaperkheda TPS & Nasik 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. While 02 nos. of Thermal Plants (3580 MW) have successfully placed the order of construction of the project (Tertiary Treatment Plant and Pipeline), STP water associated with these projects amounts to 90 MLD.

6.8 Clean Development Mechanism:

Central Electricity Authority (CEA), brings out a CO_2 Baseline Database for all grid connected Power Stations in the country on annual basis. The objective of this Database is to facilitate the consistent and accurate quantification of CO_2 emissions baseline to be used by CDM project developers in country. Version17.0 of Database for the year 2020-21 is available on CEA's website www.cea.nic.in.

6.8.1 Environment aspects of electricity generation:

CEA is collecting and compiling the monthly environmental data viz. stack emissions, Ambient Air Quality and Effluent Discharge for thermal power stations. The database for the 2020-21 has been compiled and being reviewed on Quarterly basis. Data base for the year 2021-22 is under compilation.

6.8.2 Performance Evaluation of Thermal Power Stations:

CEA is collecting and compiling the monthly performance data viz. Station Heat Rate, Auxiliary Power Consumption for thermal power stations. The database for the 2020-21 has been compiled and being reviewed on Annual basis. Data base for the year 2021-22 is under compilation.

6.8.3 National Energy Conservation Awards 2021:

Ministry of Power had undertaken a scheme to encourage, motivate as well as give recognition through National Energy Conservation Awards to industrial units and other establishments, who have taken 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 celebrated as National Energy Conservation Day throughout the country. Chief Engineer (TPE&CC), CEA is a member of Technical Sub-Committee to assist the Award Committee in the finalization of awards. During the year 2020-21 proposals received from four industrial sectors viz. Cement, Tyres, Discom and Iron sector were evaluated by CEA. The awards to the best performing industrial units in all the sectors covered during 2020-21 were given on 14th December, 2021 in New Delhi.

6.8.4 Phasing Plan for Implementation of New Environment Norms:

New Environmental norms have been issued by Ministry of Environment, Forest and Climate Change (MoEF&CC) in December 2015 and amended in June,2018 & October,2020 for Thermal Power Stations making norms for Particulate Matter (PM), SO2, NOx, Mercury and water consumption.

6.9 THERMAL CAPACITY ADDITION PROGRAME

6.9.1 Thermal capacity addition target during 2020-21

The Thermal capacity addition target for the year

2019-20 was 10296.15 MW against which a capacity of 6765 MW was achieved. This includes 6720 MW capacity which was achieved from the target and 45 MW additional capacity achieved. Sector-wise details of target and achievement during the year 2019-20 are as follows:

Sector	Target	Achievement
Central	5790	4080
State	4276.15	846.15
Private	525	0
Total	**10591.15**	**4926.15**

The details of target/achievements for the year 2020-21 is enclosed at **Annexure 6A**.

6.9.2 Thermal Capacity Addition Program for the year 2021-22

The thermal capacity addition target for the year 2021-22 is 10285 MW against which a capacity of 4485 MW has been achieved up to 31.03.2022. Sector-wise details of target and achievement during the year 2021-22 are as follows:

SECTOR	THERMAL (MW)	
	Target	Achieved
CENTRAL	5400	2370
STATE	4360	1590
PRIVATE	525	525
TOTAL	**10285**	**4485**

The details of target/ achievements for the year 2021-22 is enclosed at **Annexure 6B**

6.10 Thermal Engineering & Technology Development (TE&TD)

Thermal Engineering & Technology Development (TE&TD) Division of 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: Technology evaluation and up-gradation for coal, lignite and natural gas based thermal power plants, providing expert technical advice on issues related to thermal power generation to Central/State power utilities, Electricity Regulatory Commissions and other power stakeholders, preparation of Standard Specifications/Standard Technical Documents etc. for thermal power stations, Preparation/review of CEA Regulations, safety requirements in thermal power generations, Investigation of Accidents/Failures related to thermal power stations and examining Research & Development (R&D) proposal related to thermal power sector**.**

6.10.1 Important Activities

The following important activities have been done/undertaken during the Year 2021-22 by TE&TD Division:

(a) Safety Audit of Thermal Power Plants: In compliance to the Hon'ble National Green Tribunal Order dated 22.12.2020, a Safety Audit Committee was constituted by Central electricity Authority in March, 2021 headed by Chief Engineer (TE&TD) with members from Ministry of Coal, Central Boiler Board (CBB), Director General Fire Safety (DGFS), Oil Industry Safety Directorate (OISD), NTPC Ltd., NLC India Limited (NLCIL) and Bharat Heavy Electrical Limited (BHEL). The Committee carried out safety audits of ten (10) nos. lignite based units and five (5) nos. coal based units in different parts of the country. The Safety Audit Reports of respective plants were sent for their compliance.
Based on safety audit of these power plants, a compiled safety audit report was prepared and submitted to MoP.

(b) Carbon Neutral power generation through biomass co-firing in thermal power plants: In order to address the issue of Air pollution due to farm stubble burning and to reduce the carbon footprints of thermal power plants, Ministry of Power decided to set up a 'National Mission on use of Biomass in coal based thermal power plants'. A Concept Note including modalities for the National Mission was submitted by this Division to MoP in April 2021 and subsequently, MoP in July 2021 has established a National Mission on Use of Biomass in Thermal Power Plants, namely SAMARTH (Sustainable Agrarian Mission on use of Agro Residue in Thermal Power Plants) to expedite the co-firing of Biomass in thermal power plants. SAMARTH is a 3-tier structure comprising of Steering Committee headed by Secretary (Power), Executive Committee headed by Member (Thermal), CEA and Mission Directorate currently headed by Executive Director, NTPC along with 5 Subgroups for specific works like "R&D on

Characteristics of Biomass", "R&D on Boiler design for biomass cofiring & safety aspects", "resolution of Supply chain & Business Development related issues", "selection of designated Labs and certification bodies for testing of Agro based biomass pellets & MSW pellets" and "Regulatory framework & Economics of biomass co-firing in coal based Thermal power plants". Deputy Directors of TE&TD Division are members of Subgroup-1 and Subgroup-2.

Ministry of Power in October, 2021 has issued policy to mandatorily co-fire the biomass pellets in the range of 5% to 7% in all coal based power plants depending upon their type of milling system.

(c) Committee to examine the request of power plants for their exemption /relaxation from mandatory co-firing of biomass: Ministry of Power in November 2021 have constituted a 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 to examine the request of power plants for their exemption / relaxation from mandatory co-firing of biomass. The Committee has now 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.

(d) Committee to carry out research in utilization of agro residue in thermal power plants including increasing the percentage of co-firing of biomass pellets with coal: A Committee was constituted under the chairmanship of Chief Engineer (TE&TD), CEA with members from CPRI, NTPC, BHEL, PSPCL, HPGCL & Tata Power in November, 2020 to carry out research in utilization of agro residue in thermal power plants including increasing the percentage of co-firing of biomass pellets with coal. The Committee, in consultation with members and other stakeholders, finalized and submitted its report to Ministry of Power in August, 2021, identifying the areas of research to be undertaken related to Biomass co-firing.

(e) Task Force for feasibility and acceptability for usage of Gypsum as a byproduct of Installation of Flue Gas Desulphurization (FGD) in Thermal Power Plants: Ministry of Power in June, 2021 constituted a Task Force under the Chairmanship of Member (Thermal), CEA for feasibility and acceptability for usage of Gypsum as a byproduct of Installation of Flue Gas Desulphurization (FGD) in Thermal Power Plants. The Task Force was comprising members from CEA, NTPC, DVC, CPRI, NCCBM, CPCB, BIS, CMA, IIT Bombay. The terms of reference of the Task Force was to recommend standards for usage of FGD Gypsum having acceptability to various end users, regulators and also evaluate hazardous nature of FGD gypsum. Task Force submitted its report to Ministry of Power in December, 2021.

(f) **Comprehensive Review of "Central Electricity Authority (Technical Standard for construction of Electrical plants and Electrical lines) Regulations, 2010":** A comprehensive review of Regulations entitled "Central Electricity Authority (Technical Standard for construction of Electrical plants and Electrical lines) Regulations, 2010" was undertaken incorporating the amendments and discussion in Authority Meetings. The Notification of the above regulations are in the approval stage.

(g) **Amendment to CEA Regulations "Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011":** Comprehensive review of CEA Regulations entitled "Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011" has been carried out and the amendment of the same is under process of approval.

(h) **Preparation of CEA regulations on flexible operation of Thermal Power Plants (TPPs) for supporting the RE integration into the grid:** Chairperson, CEA in February, 2022 approved a Committee under Chief Engineer (TE&TD) with members from TPR&M and GM Division for preparation of CEA regulations on flexible operation of Thermal Power Plants (TPPs) for supporting the RE integration into the grid. The same is under process of preparation.

(i) **National Electricity Plan (2022-27) Sub-Committee 7:** Under Section 3(4) of the Electricity Act, preparation of the National Electricity Plan (NEP) is a statutory responsibility entrusted to CEA. For preparing National Electricity Plan (2022-27), ten Subcommittees have been constituted on issues ranging from Demand Projection, Fuel & Fund Requirement, Infra

Requirement, R&D etc. in CEA. Chief Engineer (TE&TD) is Member Secretary of the subcommittee – 7 constituted under the chairmanship of CMD, NTPC for providing "Key Inputs for Power sector" which focusses on material and infrastructure requirement of the power sector. To accomplish this task, representatives from MoP&NG, Ministry of Railways, Ministry of Steel, Ministry of Road, Transport and Highway, Ministry of Shipping, MNRE, CPRl, PFC, BHEL, NHPC, CII, Private Equipment Manufacturer, etc. have been opted as members of the Subcommittee. Report of the above Sub-Committee 7 was submitted to Nodal Division of CEA in January 2022.

(j) **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. The Committee is responsible for evaluation of various research proposals/projects under the schemes of CPRI. The 8th, 9th and 10th meeting of the Committee were held in variou s phases during the year 2021-22. The projects reviewed were mainly on Biomass co-firing, Bio-processing of coal industrial effluent, LP turbine blade, Thermoelectric Power Generator, Carbon Capture & sequestration (CCS), Performance Improvement of Steam Generator, Plasma torch for efficient disposal of municipal solid waste, Syngas, Flexible Phase Change Materials etc.

(k) **Model Quality Assurance Plan:** A model document on quality assurance plan for engineering and procurement of the equipment in thermal power generation has been prepared and circulated to the stakeholders by this Division. This will facilitate stakeholders in formulation of the documents / contracts appropriately at their end.

6.11 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 fir 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:

6.12 Achievements of R&M & LE Projects during 2017-22 upto 31-03-2022:

Life Extension works on 4 thermal generating units with aggregate capacity of 820 MW and R&M works on 2 thermal generating units with aggregate capacity of 67 MW were completed during 2017-22 upto 31-03-2022.Details of achievements is furnished below:

	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		210	GSECL	State	27-11-2017
R&M	Kathalguri CCGT	3	--	33.5	NEEPCO	Central	20-07-2018
	Kathalguri CCGT	6	--	33.5	NEEPCO	Central	31-03-2018
Sub Total		**34 (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. 2019-22							
LE	---	--	--	--	--	--	--
R&M	---	--	--	--	--	--	--
4. 2020-21							
LE	---	--	--	--	--	--	--
R&M	---	--	--	--	--	--	--

Total LE	**04 (820)**	**State**	**04(unit)**	**820**
		Centre	--	--
Total R&M	**02 (67)**	**State**	--	--
		Centre	**02(unit)**	**67**
Grand Total			**06(units)**	**887.00**

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)

6.13 Monitoring of R&M Projects:

The progress of R&M and LE works being implemented at Thermal Power units are monitored by carrying out site visits, 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.

6.14 Thermal units under shutdown for R&M/ LE Works

The following unit is under shut down for R&M and Life Extension works.

S.No.	**Name of Project**	**Utility**	**State**	**Unit No.**	**Capacity (MW)**
1	Obra TPS	UPRVUNL	U.P.	13	200

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. The timelines for implementation of FGD for Categories A, B and C are Dec-22, Dec-23 and Dec-24 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	66550	750	0	220	10500	0	0	0	3110	3730	46900	1340
2	State	66976.5	1075	2360	210	10456.5	420	15260	5120	12645	15110	4320	0
3	Private	76003	3999	2525	0	4522	3080	6155	4800	15790	10322	17860	6950
	Total	209529.5	5824	4885	430	25478.5	3500	21415	9920	31545	29162	69080	8290

General Summary (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	167	4	0	2	19	0	0	0	10	17	110	5
2	State	219	7	9	1	39	2	53	21	43	32	12	0
3	Private	210	39	11	0	18	10	15	9	37	24	32	15
	Total	596	50	20	3	76	12	68	30	90	73	154	20

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 .

Test Results of DSTPS, Andal of DVC-

Test Date	**28/03/2022 – 31/03/2022**
Unit No	**1**
Unit Capacity	**500MW**

Test	**Target**	**Achieved**
Minimum Load Test (38%)	**190MW**	**174MW (34%) (1.5Hrs)**
Ramp Upward Direction		**2%+**
Ramp Downward Direction		**2%+**

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.

KPI Targets vis-à-vis Achievement as on 31.03.2022

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	Modifica-tions 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 %(Upto 31.03. 2022)			Achieve-ment

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 FY21, group participants have undergone the CCT Training Programme from 27th Oct. 2021 to 29th Oct., 2021.

Under Indo-Japan Cooperation, a one-day Workshop (Virtual) on "Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" has been organized jointly by CEA and JCOAL on 12th Nov, 2021.

6.19 Fly Ash Generation at Coal/Lignite based Thermal Power Stations & its Utilization

6.19.1 Monitoring by CEA

Central Electricity Authority has been monitoring fly ash generation and its utilization at coal/ lignite based thermal power stations in the country since 1996. Data on fly ash generation and utilization is obtained from thermal power stations on half yearly and yearly basis. The said data is analyzed and reports bringing out the status of fly ash generation as well as its utilization are prepared. The Reports are forwarded to Ministry of Power and Ministry of Environment, Forest & Climate Change. The said report is now also being uploaded on website of CEA for bringing the information in public domain.

6.19.2 MoEF & CC Notification on Fly Ash Utilization

To address the problem of pollution caused by fly ash and to reduce the requirement of land for disposal of fly ash, MoEF&CC issued notification dated 14th September, 1999 on fly ash utilization and subsequently issued amendments to the said notification on 27th August, 2003, 3rd November, 2009 and 25th January, 2016. The 3rd November, 2009 notification had stipulated targets for utilization of the fly ash, so as to achieve 100% utilization by all thermal power stations in a phased manner - existing thermal power units within five

years and those commissioned after 3rd November, 2009 within four years.

However, the goal of 100% fly ash utilization could not be achieved within the stipulated timeline. In view of the same, further notification in January, 2016 has followed.

The MoEF&CC Notification of 25th January, 2016, emphasizing towards the efforts in the direction of enhancing gainful utilization of fly ash, stipulates mandatory uploading on TPSs website fly ash availability during the current month including stock in ash pond.; increase in mandatory jurisdiction of area of application from 100 km to 300 km; cost of transportation of fly ash to be borne entirely by TPS up to 100 km and equally shared between user and TPS for more than 100 km and up to 300 km; and mandatory use of fly ash based products in all Government schemes or programmes e.g. Pradhan Mantri Gramin Sadak Yojana, Mahatma Gandhi National Rural Employment Guarantee Act, 2005, Swachh Bharat Abhiyan, etc.

As per the latest MoEF&CC Notification of 31st December, 2021, Thermal Power Plant may charge for ash cost and transportation as per mutually agreed terms, in case Thermal Power Plant is able to dispose the ash through other means and those agencies make a request for it and the provisions of ash free of cost and free transportation shall be applicable, if Thermal Power Plant serves a notice on the construction agencies for the same.

Every coal or lignite based thermal power plant shall be responsible to utilize 100 percent ash (fly ash and bottom ash) generated during that year, however, in no case shall utilization fail below 80 percent in any year, and the thermal power plant shall achieve average ash utilization of 100 percent in a three years cycle.

6.19.3 Fly Ash as a Resource Material

Traditionally, ash (Fly ash and bottom ash) generated at coal/lignite based thermal power stations has been disposed off in ash ponds as waste material. Ash has now been recognized as a 'resource material' and 'useful commodity' capable of being utilized in most of the civil construction activities in an eco-friendly manner. Fly ash has pozzolanic properties and has large number of applications in various construction activities.

6.19.4 Important Areas of Ash Utilization

The important areas in which ash is being presently utilized are as under:

- In manufacturing of Portland Pozzolana cement;
- As a part replacement of cement in concrete;
- In making fly ash based building products like bricks, blocks, tiles, road blocks, Kerb Stones etc.;
- In the construction of roads, flyovers, embankments, ash dykes etc.;
- In construction of Roller Compacted Concrete Dams in Hydropower Sector;
- In reclamation of low lying areas and raising of ground level;
- Backfilling/ stowing of mines;
- In agriculture and waste-land development.

6.19.5 Status of Ash Generation & Utilization for the Year 2020-21

The report for the Year **2020-21** bringing out the status of fly ash generation and its utilization including status of compliance of MoEF&CC's notification has been uploaded in CEA website *http://www.cea.nic.in/tcd.html.*

(A) Brief Summary

As per data received from coal/lignite based thermal power stations for the Year **2020-21**, the present status of fly ash generation & utilization is given in the table below:

Description	Year 2020-21
Nos. of Thermal Power Stations from which data was received	**202**
Installed capacity (MW)	**209990.50**
Coal consumed (Million tons)	**686.34**
Fly Ash Generation (Million tons)	**232.56**
Fly Ash Utilization (Million tons)	**214.91**
Percentage Utilization	**92.41**
Percentage Average Ash Content (%)	**33.88**

It may be seen from above that 92.41 % of total ash produced at Coal/Lignite based thermal power stations has been gainfully utilized in various construction activities and other modes of utilization during 2020-21. This is on higher side from the previous year i.e. 2019-20.

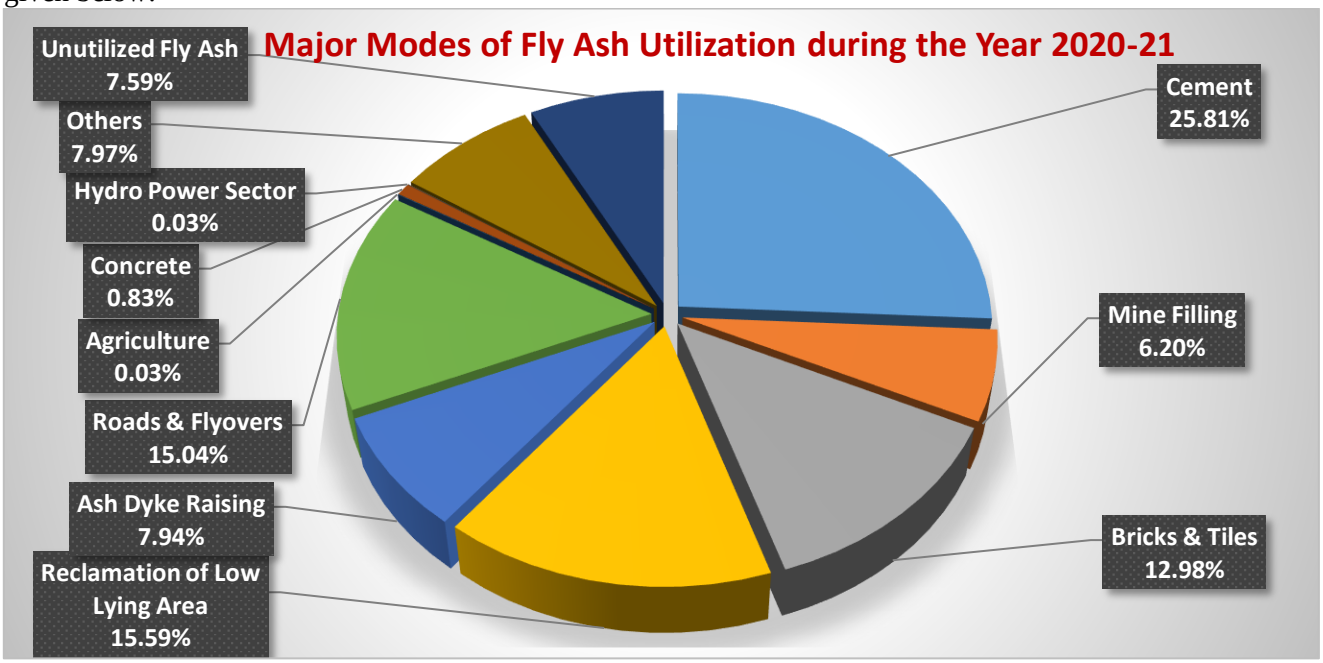
(B) Modes of Ash Utilization during year 2020-21

The major modes in which ash was utilized during the year 2020-21 is given in table below:

MAJOR MODES OF FLY ASH UTILIZATION DURING THE YEAR 2020-21

Sl. No.	Mode of utilization	Quantity and Percentage of Fly ash utilization in the Year 2020-21	
		Quantity (Million-ton)	Percentage (%)
(1)	(2)	(3)	(4)
1	Cement	60.0229	25.81
2	Mine filling	14.4187	6.20
3	Bricks & Tiles	30.1832	12.98
4	Reclamation of low lying area	36.2463	15.59
5	Ash Dyke Raising	18.4722	7.94
6	Roads & flyovers	34.9851	15.04
7	Agriculture	0.0773	0.03
8	Concrete	1.9189	0.83
9	Hydro Power Sector	0.0611	0.03
10	Others	18.5267	7.97
11	**Total Fly Ash utilization**	**214.9125**	**92.41**
12	Unutilized Fly Ash	17.6469	7.59
13	**Total Fly Ash Generation**	**232.5595**	**100.00**

The utilization of fly ash in various modes in percentage during 2020-21 in the form of a pie-diagram is given below:

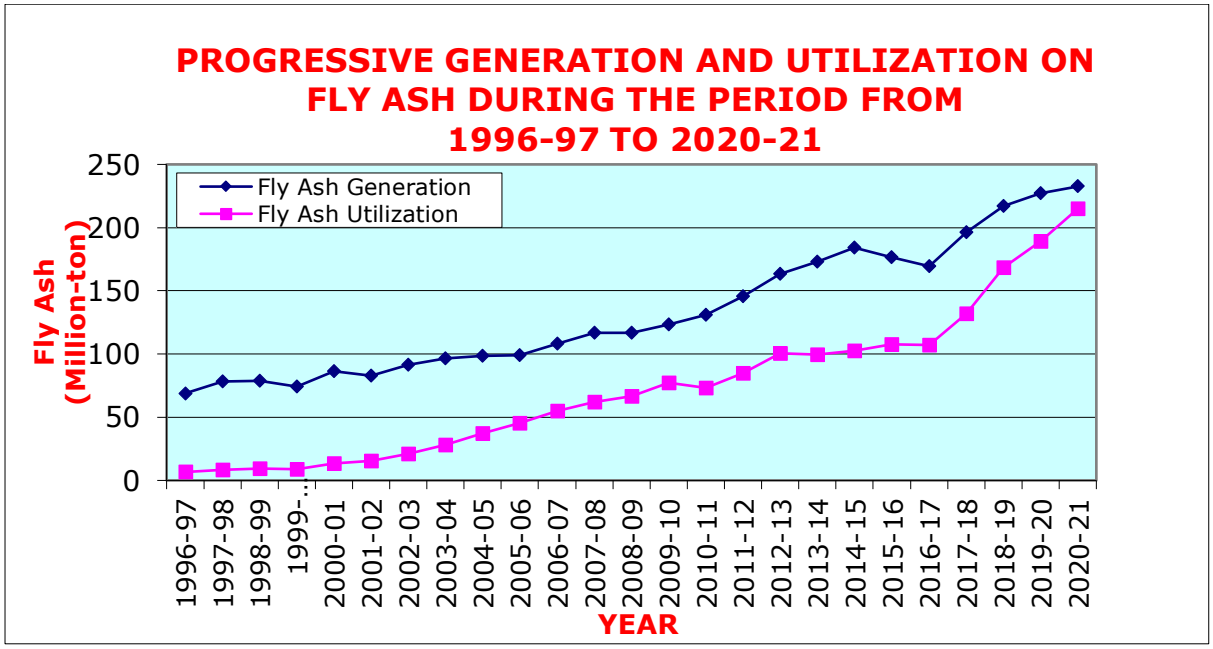


During the Year 2020-21, the maximum utilization of fly ash to the extent of 25.81 % of total fly ash generated was in the Cement sector, followed by 15.59 % in Reclamation of Low lying area, 15.04 % in Roads & Flyovers, 12.98 % in Bricks & Tiles, 7.94 % in Ash Dyke Raising, 6.20 % in Mine Filling, 0.83 % in Concrete, 0.03 % in Agriculture, 0.03 % in Hydro Power Sector, 7.97 % in Others and 7.59 % remained as unutilized fly ash.

6.19.6 Progressive Fly Ash Generation & Utilization during the Period from 1996-97 to 2020-21

The fly ash utilization has increased from 6.64 million tonnes in 1996-97 to a level of 214.91 million tonnes in 2020-21. A graph showing about progressive trend in fly ash generation and its utilization for the period from 1996-97 to 2020-21 is given below:

PROGRESSIVE GENERATION AND UTILIZATION ONFLY ASH DURING THE PERIOD FROM 1996-97 TO 2020-21



It may be seen from above graph that utilization of fly ash in terms of quantity has been increasing over the years except that there was a dip in fly ash utilization during 2010-11, which has picked up during 2011-12. During 2012-13 to 2016-17, there has been slight variation in utilization. However, it picked up again in the year 2017-18, 2018-19, 2019-20 & 2020-21 at a much better pace.

6.19.7 Conclusions on Fly Ash Utilization

i. The fly ash generation during 2020-21 is 232.56 million tonne due to a combustion of 686.34 million tonne Coal / Lignite. During 2019-20, 226.95 million tonne of fly ash was generated due to combustion of 680.84 million-ton Coal / Lignite. However, the fly ash utilization during 2019-20 and 2020-21 are 189.01 million-ton and 214.91 million-ton respectively. It is seen that the absolute quantity of fly ash utilization has increased as compared to last year and similarly the percentage utilization of fly ash has also increased.

ii. The highest level of fly ash utilization of about 92.41 % is achieved during the year 2020-21. It would require a lot of efforts to achieve the target of 100% utilization of fly ash. The stipulations of notification of 2009 and the subsequent amendments should be effectively implemented. About 7.59 % un-utilized fly ash was dumped at the various Thermal Power Stations in the country during 2020-21.

6.19.8 Web based Monitoring System and A Mobile Application for Utilization of Fly Ash

Annual Fly ash utilization has remained 92.41 % of the fly ash generated and therefore, it has become a matter of concern because of its environmental effect. Besides, progressive accumulation may lead to a situation when ash pond may not be in a position to accommodate fly ash further.

Due to the importance of utilization of fly ash & slag for reducing the burden on the environment, NITI AAYOG convened several meetings on policy framework on utilization of fly ash and slag. In a meeting held on 17.03.2017, it was decided by NITI AAYOG that an online repository of the fly ash generated by thermal power plants indicating the following parameters should be launched by Ministry of Power by 15th April, 2017:

- Cumulative amount of fly ash available in the ash ponds as on 31.3.2017
- Quantum of fly ash generated for the respective month (Ex. For the month of April 2017)
- Number of ash ponds available and their approved capacity in metric tonne
- Cumulative stock of fly ash available in the ponds for the month as on 30th April 2017
- Total quantum of fly ash disposed to the consuming industries, which is located within the vicinity of 100 Kms., 101-300 Kms., etc. along with the details of the consumers. In this detail, it should also be indicated whether the transportation was paid by the thermal power or not. Similarly, it should also indicate whether fly ash has been given free or it has been charged. If it has been charged then the rate should also be indicated for each consumer
- Balance stock of fly ash available in the ash ponds for the month ending April,2017

Accordingly, a web-based monitoring system and a mobile application (ASH TRACK) was developed by CEA in collaboration with M/s NTPC Limited. Login ID and password have been issued to those Power Utilities / Thermal Power Stations who had approached CEA for uploading the monthly data of fly ash generation and its utilization.

6.19.9 Recommendation of Niti Aayog constituted Expert Committee

NITI Aayog vide O.M. No. 25(11)/2014-Minerals dated 12.06.2018 has constituted an Expert Committee under the chairmanship of Joint Secretary, MoEF&CC and represented by various concerned Ministries for developing a focus strategy for best utilization of fly ash to manufacture end products.

Expert Committee held two meetings on 5th September and 1st October, 2018 and finalized its recommendations. An inter-ministrial consultation meeting was also held on 21st January, 2018 under the chairmanship of Secretary, MoEF&CC to review the recommendations of the Expert Committee for effective utilization of fly ash, wherein the recommendations of the Committee were accepted.

The expert Committee had recommended following recommendations for implementation by all Thermal Power Plants for effective utilization of fly ash:

i. Tender/auction for sale of fly ash should be done by TPPs initially for end user/industry and not

for traders. If fly ash is not taken by the end user/industry, then it could be given to traders. TPPs should also consider entering into longer term contracts with end users.

ii. TPPs may explore the possibility that once a tender for utilization of fly ash is allotted to a company, any unit/plant of the same company should be allowed to purchase and utilize the fly ash and TPPs can also directly raised the invoice to such Unit/Plant.

iii. Creation of fly ash parks/hubs on public-private-partnership mode. Such parks will act as facilities for enabling quality control of fly ash made products, generate employment and act as models which will promote use of innovative fly ash products which can be replicated at other locations.

iv. TPPs should give incentive to entities which can (through R&D) come up with fly ash products with ash content of at least 75% and established sustainable application of those fly ash products in the industry. The incentive could be given from the money available with the TPPs from auctioning of fly ash.

v. Ministry of Power should come up with awards/incentives for TPPs that innovate new methodology in fly ash disposal keeping all the environment and pollution norms in consideration.

6.19.10 Action taken report on recommendation of the Expert Committee for effective utilization of fly ash

1. All Thermal Power Stations were requested to provide revised implementation status on above recommendation of the Expert Committee for effective utilization of fly ash by TCD Division, CEA. In response, the summary as well as the detailed responses received from TPSs/utilities along with a list of defaulters was forwarded to MoP.

2. A draft awards/incentives scheme for TPPs that innovate new methodology in fly ash disposal keeping all the environment and pollution norms in Consideration sent to Ministry of Power by TCD Division, CEA.

6.19.11 Task Force constituted to review and recommend a list of abandoned mines/quarries in the country for mine backfilling purpose

1. Ministry of Power vide OM dated 14-03-2019 re-constituted a Task Force to identify, review and recommend the list of mines for ash back-filling. It has representatives from CEA, MoEF & CC, Ministry of Mines, CIL, CIMFR (Dhanbad), CMPDIL, DGMS (Dhanbad), CPCB & NTPC.

2. 9th Meeting of Task force held on 24.06.2021 through MS teams. During the meeting, 32 numbers of abandoned mines have been identified for backfilling purpose which are to be notified by CPCB now.

6.20 PERFORMANCE AWARDS IN POWER SECTOR

6.20.1 Comprehensive Award Scheme for Power Sector

An award scheme was introduced by the Ministry of Power in 1983 for recognizing the meritorious performance of thermal power stations. The scheme was modified over the years in view of evolving requirements. In 2004-05, Comprehensive Award Scheme was introduced by the Ministry of Power covering various facets of power sector with the objective of developing a spirit of competitiveness among the generating stations in thermal, hydro & nuclear generation, transmission & distribution utilities in operation & maintenance and early completion of thermal, hydro & transmission projects. Further, to promote, encourage and recognize the efforts of rural distribution franchisees, an award was introduced in 2007-08. Similarly, to promote the environment protection measures, a category of award was introduced in 2008-09, for the best performing coal/lignite- based thermal power station for environment management.

The award scheme for the year 2014-15 envisaged a total of 38 awards in 10 categories and in the year 2015-16, 40 awards were envisaged in the same 10 categories.

For the year 2016-17, the number of awards was increased to 43 distributed in 11 categories including additional 3 awards by bifurcation of a category i.e Rf- 1(Award Scheme for Performance of Distribution Companies) into Rf-1 (Award

Scheme for Performance of Govt. Owned Distribution Companies) and Rf-2 (Award Scheme for Performance of Private Distribution Companies). Further, same numbers of awards were envisaged for the year 2017-18.

Further, as per suggestions made by MHA in 2020 regarding rationalization of Meritorious Performance Awards, the number of awards has been reduced to 11 in seven categories. The details of the proposed awards are as follows:

S. No.	Name of concerned Division	Name of Scheme	No. of awards
1	HP&I Division	Performance of Hydro Power Station (Hy-1)	3
2	HPM Division	Early completion of Hydro Power Projects (Hy-2)	2
3	GM Division	Transmission System Availability (Tr-1)	2
4	OPM Division	Performance award for Nuclear Power Stations (Nu-1)	1
5	DM Division	Performance award for Distribution Companies/ Franchisees (Rf-1, Rf-2, Rf-3)	3
Total No. of Awards			**11**

The above proposal was communicated to MoP vide letter dated 09.08.2021, which is yet to be approved by MoP.

CHAPTER-7

DISTRIBUTION SCHEMES AND INITIATIVES

7.1 Preparation and Monitoring of 24 X7-Power for All (PFA) Documents:

Government of India had taken up a joint initiative during 2014 to 2017 with all States/UTs and prepared States/UTs specific documents for providing 24x7 power supply to all households/homes, industrial & commercial consumers and adequate supply of power to agricultural consumers as per State policy. This initiative aimed at ensuring uninterrupted supply of quality power to existing consumers and providing access to electricity to all unconnected consumers by 2019 in a phased manner. The identified action plans are under implementation by the respective states and UTs from their own schemes and central Govt schemes.

The status of some of the parameter covered under the action plan related to distribution are as below:

1. **Village Electrification:** As per the present status of all the states, all the inhabited un-electrified census (2011) villages including villages in remote/interior areas stood electrified as on 28th April, 2018.

2. **Household Electrification:** Government of India launched Pradhan Mantri Sahaj Bijli Har Ghar Yojana–Saubhagya on 11th October,2017 to achieve universal household electrification (providing electricity connections to all household in rural and all poor households in urban areas across the country) by March 2019. Under the scheme, as reported by the States and UTs as on 31.03.2021, a total of 2.817 crore all the willing and un-electrified households (HHs) have been electrified since the launch of Saubhagya, thereby, 100% electrification of all the willing un-electrified households have been achieved.

   Since HHs electrification is dynamic process, further, under DDUGJY (New) 4,40,893 nos. of additional HHs have been electrified as on 15.03.2022. Accordingly, a total of 2.86 crore households have been electrified have been electrified under ongoing schemes of Govt of India.

3. **Distribution network**: The role of distribution Network is very significant in respect of achieving the goal of 24x7 Power for All (PFA) as it is the back bone for providing connectivity to the end user. The main scope for distribution network includes implementation of distribution network requirement (new, strengthening). This would also include augmentation of the existing network to cater to un-electrified areas. To address some of the challenges faced like theft of power, and quality and reliable power in distribution , an effort has been made by the utilities in strengthening and augmentation of system, feeder separation, metering of unmetered connections, smart meter installation, installation of capacitor banks to improve the voltage profile and reduce line losses Smart metering, DT and Feeder metering etc. under the sanctioned components of DDUGJY, IPDS and Saubhagya schemes which are given in details in the paragraphs below.

7.2 Award Scheme for Meritorious performance of Distribution Companies and Rural Distribution Franchisees.

Govt. of India has instituted award schemes for various segments of the Power Sector from the year 2004-05 onwards. The existing scheme for Award in Distribution sector was reviewed during 2016-17 to incorporate the various features of ongoing schemes of Govt. of India, and also introduced separate award for Govt Discoms and Private Discoms (by splitting one Combined category of Discoms existing earlier) to promote more competition among the Distribution companies. This REVISED Awards schemes in distribution has been implemented from 2016-17 and onwards. While, the component of Award scheme in Distribution for Rural Distribution Franchise-RDFs (which is also being instituted from the year 2007-08 onwards having performance parameters

different from those of Discoms and limited to their area of performance) has been retained unchanged.

CEA based on this revised Award scheme has been recommending the best performing Private Discoms, Public Discoms and RDFs among the participating Discoms for Award since 2016-17 to Ministry of Power. The Award for the three consideration years (2014-15 to 2016-17) are yet to be decided by Ministry of Power. Further, these awards have been restricted and restructured with the guidelines of Ministry of Home affairs and accordingly, based on the revised Scheme, the proposal for participation along with the required data for evaluation for the consideration years 2018-19, 2019-20 and 2020-21 has been requested by CEA in February,2022 and the proposals are being received.

7.3 Revamped Distribution Sector Scheme (RDSS)

Central Government has launched "Revamped Distribution Sector Scheme - A Reforms based and Results linked Scheme" on 20th July 2021. 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 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) would be provided financial support for upgradation of the Distribution Infrastructure, Distribution Automation, IT intervention and implementation of SCADA/DMS & Smart Metering system for the Network as well as prepaid smart metering systems for consumers. The duration of the scheme is 5 Years (2021-22 to 2025-26).

Scheme envisages Installation of 25 crore prepaid smart meters for all consumers along with associated AMI, communicable meters for DTs & Feeders, ICT including Artificial Intelligence (AI), Machine Learning (ML) etc. based solutions for DISCOMs. 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 and Blockchain Technology would be leveraged to analyse 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. Gross Budgetary Support (GBS) under the Scheme would be used for development of applications related to the use of advanced ICT like Artificial Intelligence, Machine Learning and Blockchain Technology in the Distribution Sector and also for promoting development of Start-Ups in the Electricity Distribution Sector across the country.

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 incentivised 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. The Monitoring Committee will frame and approve 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 will also approve 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 will also be competent to 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.

Chairperson, CEA is the member of the Monitoring Committee and DP&T Division, CEA is providing technical inputs to the Monitoring Committee.

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. DP&T Division has been associated with the Nodal Agencies for framing of RFPs and SBDs for Smart Metering infrastructure and SCADA projects.
The matter regarding utilization of funds from RDSS for subsidization of upstream infrastructure for installation of EV charging infrastructure as action points decided during the review meeting of the Sectorial Group of Secretaries (SGoS-3) (Resources) was also examined by DP&T Division and comments were furnished to MoP.

7.4 Development of Smart Grid in the Country

(i) National Smart Grid Mission:

National Smart Grid Mission (NSGM) was established in 2015 to plan and monitor the implementation of policies and programmes related to Smart Grid in India. National Smart Grid Mission envisages transformation of last mile connectivity ecosystems i.e. distribution through advanced metering infrastructure, micro grids, distributed generation, outage management, power quality improvement, peak load management and EV charging infrastructure etc. The mission encourages DISCOMs for self-sustenance of Smart Grid interventions by adopting innovative financing models. This year has seen widespread acceptance of AMI deployment on opex model amongst utility, funding agency and Smart Grid Implementation Agencies. NSGM is also the Nodal point for international collaboration with International Smart Grid Action Network (ISGAN) activities for Indian side.

NSGM has a three-tier structure i.e. Governing Council, headed by the Hon'ble Minister of Power at first level, Empowered Committee, headed by the Secretary (Power) & supported by Technical Committee headed by the Chairperson, CEA at second level and NSGM Project Monitoring Unit (NPMU) at third level.

DP&T Division is the nodal division in CEA dealing with development of smart grid in distribution sector in the country and assisting the Technical Committee of NSGM in technical examination of Smart Grid Projects, benchmarking of cost of Smart Meter, development of standards etc.

To assist the MoP for the smart meter roll out in the country, various CEA committees have submitted reports to MoP viz. Report on Development and implementation of Smart Grid in the Country, Report on Smart Meter Rollout Plan with various financial models in the Country including OPEX model,Report on use of Cloud Services in Smart Metering Projects under Govt. funded Schemes, Report on continuation of National Smart Grid Mission beyond March 2020. NSGM in consultation with stakeholders (CEA, MoP, EESL and Industry) had prepared Model Standard Bidding Documents for appointment of Advanced Metering Infrastructure Service Provider (AMISP) on design-build-finance-own-operate-transfer (DBFOOT) basis. These documents enable the DISCOMs to take up smart metering projects on operational expenditure (OPEX) model.

The EFC Memo on continuation of NSGM from April, 2021 to March, 2026 was examined and recommendations were furnished to MoP.

Task Force for recommendation of roadmap for introducing Smart Grid Technologies in Distribution Sector:

Pursuant to the directions of the Hon'ble Minister for Power & NRE to review the present status and activities of Smart Grid Knowledge Centre (SGKC) set up by PGCIL, a Task Force was constituted under CMP, REC Ltd to prepare a strategic roadmap, including identifying the needs for standardization of various equipment and for acceleration of Smart Grids in the Distribution Sector. DP&T Division has been associated with the Task Force and prepared a draft roll out plan for the Task Force.

(ii) **Status of Smart Meter Installation in the Country:**

Schemes/Utilities	Sanctioned Smart Meters	Installed Smart Meters
DDUGJY	39,200	38,400
IPDS	13,20,822	8,10,257
NSGM	7,23,433	1,36,520
PMDP	1,15,500	55,782
SG Pilot	1,56,533	1,56,533
Utility Owned	88,94,263	29,94,435
Grand Total	**1,12,49,751**	**41,91,927**

7.5 Research & Development Projects in the Distribution Sector

CE(DP&R) is a member of a Technical Committee consisting of Members from IIT, CEA,
BEE, MNRE, CPRI etc for Review of the ongoing R & D projects and approval of new R&D Projects under IHRD(in house R&D proposals of CPRI), RSOP(Research Scheme on Power for R&D projects less than Rs 50 lakhs) and NPP(National Perspective Plan for R&D Projects more than 50 lakhs) in the Grid, Distribution & Energy Conservation Research area. The Committee meets every 3-4 months for reviewing the Projects and assessing the progress of on-going projects. Meets are organised by CPRI. CPRI also disburses the funds to approved Projects on behalf of MoP.
NaMPET-III: CE(DP&R) is a part of the Sub-Committee for evaluation of project proposals in Application Oriented Research, Development and Deployment categories under NaMPETIII(National Mission on Power Electronics Technology Phase-III) in area of New Research proposals based on Power Electronics with special consideration to the fact that the

proposal should have some industry partner so that ultimately the project becomes field deployable.
Last meeting of the sub-committee was held in December, 2020.

7.6 Integrated Power Development Scheme (IPDS):

In order to facilitate 24x7 quality and reliable power, Integrated Power Development Scheme (IPDS) was launched by MoP on 3rd December 2014 with the following scope of components in Urban Areas:

(i) Strengthening of sub-transmission and distribution networks;
(ii) Metering of distribution transformers / feeders / consumers;
(iii) IT enablement of distribution sector and strengthening of distribution network for completion of the targets laid down under erstwhile Restructured Accelerated Power Development & Reforms Programme (R-APDRP) for 12th and 13th Plans.

The components at (i) and (ii) above have an estimated outlay of Rs. 32,612 crore including a budgetary support of Rs. 25,354 crores from Government of India during the entire implementation period.

The component at (iii) above is a component of R-APDRP, which was approved by Govt. of India for continuation in 12th and 13th Plans amounting to Rs. 44,011 crore including a budgetary support of Rs. 22,727 Crores has been subsumed in this scheme This outlay has been carried forward to the new scheme of IPDS in addition to the outlay indicated above.
The scheme of R-APDRP programme is to facilitate State Power Utilities to reduce the level of AT&C losses to 15%, and has two major components: **Part–A(IT enablement and SCADA)** includes projects for establishment of Information Technology based energy accounting and audit system leading to finalization of verifiable base line AT&C loss levels in the project areas, and **Part-B** (**network strengthening)** for strengthening of distribution networks. The total outlay for the programme is Rs 51,577 crore, out of which the major outlay is Rs. 10,000 Crores for **Part-A** and Rs. 40,000 Crores for **Part-B** of the scheme.

PFC Ltd. is the nodal agency for implementation of this scheme and as a member of Monitoring committee of this scheme, CEA has been attending meeting of monitoring committee at MOP and providing requisite inputs and technical support for implementation. The scheme is closed on 31.03.2022.

7.7 ASSOCIATION WITH THE CENTRAL TEAM CONSTITUTED BY MHA FOR ON-THE-SPOT ASSESSMENT OF DAMAGE CAUSED BY NATURAL DISASTERS IN VARIOUS STATES

As a nodal division for matters related to disaster management, DP&R division nominated officers from this divisions as well as other divisions of CEA to be part of the Central Team constituted by Ministry of Home Affairs/Ministry of Agriculture for on the-spot assessment of Damages caused to Power Sector by natural calamities in the States of Andhra Pradesh, Assam, Gujarat, Himachal Pradesh, Uttarakhand, Maharashtra, Karnataka, Goa, Tamil Nadu, Pudducherry, Odisha, Sikkim and West Bengal. Based on the assessment made by the concerned officers, the recommendations of the Central Team for various States as regards the damages pertaining to Power Sector were finalized.

7.8 Amendment in CEA Regulations

DP&R Division took up the work regarding review of the following Regulations of CEA during this period:

- **4th Amendment of Central Electricity Authority (Installation & Operation of Meters) Regulations, 2006**

  The 4th Amendment to the Central electricity Authority (Installation & Operation of Meters) Regulations, 2006 was notified in Gazette on 28th February, 2022.

- **2nd Amendment of Central Electricity Authority (Technical Standards for construction of Electrical plants and Electric lines) Regulations, 2010**

Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2021" was discussed in the Authority Meeting held on 28.06.21. After further discussion during the Authority meeting held on 9.11.2021, the document has been sent for pre-publication on 30.12.2021. Post which, a Standing Committee comprising of officers at the level of Chief Engineer was formed to examine and finalize the public comments, before placing the same to authority on 22.03.2022. The 1st Meeting of the Standing Committee for examination of Public Comments on the "draft Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2021" was held under the chairmanship of CE(TE&TD) on 29.03.2022.

7.9 Work regarding Power Quality

A Panel was constituted under the convenorship of Chief Engineer (DP&R, CEA) by ETD 01 Sectional Committee of Bureau of Indian Standards for developing an Indian Standard on 'Power Quality Measurement and Monitoring methods'. ETD 01 in its meeting held on September 16, 2021, finalized the Draft Standard. The panel submitted the Draft Standard to BIS. The Draft Standard on 'Power Quality Measurement and Monitoring methods' as submitted by the panel, was kept under wide circulation for one month by BIS. Since no comments were received on the document it was decided that the same shall be published by BIS. However, it is yet to be published.

7.10 Work regarding Low Voltage Direct Current (LVDC)

A Panel was constituted under the convenorship of Chief Engineer(DP&R), CEA by ETD 50 Sectional Committee of Bureau of Indian Standards working in the area of LVDC for developing an Installation Standard for medium power applications in line with 48V ELVDC standard and IEC TS 61200-102 draft standard. The Panel has held five meetings in this regard. The last meeting of the panel was held on 21st January 2022. The draft is under discussion.

7.11 Development of an Online Platform for Monitoring Electricity (Rights of Consumers) Rules, 2020

The Electricity (Rights of Consumers) Rules, 2020 were formulated by the DP&R Division, which were notified in the Gazette of India dated 31.12.2020 by the Ministry of Power. The Rules define various Key Performance Indicators for consumer empowerment across eight key dimensions. Implementation of these rules shall not only enhance consumer convenience but also prepare DISCOMs to manage the impact of situations such as the COVID-19 pandemic. Amendments to the Electricity (Rights of Consumer) Rules 2020 were issued in June 2021.

Further to that, an online platform is being developed by DP &R Division, CEA in association with KPMG, for reporting and monitoring progress regarding the implementation of the provisions of the Electricity (Rights of Consumers) Rules, 2020 under the ADB-Technical Assistance Program. Some of the Key Performance Indicators include Data related to Issuance of a new connection, Metering, Billing and Payment, Reliability of supply, Consumer as Prosumer, Grievance Redressal, Compensation mechanism, Mobile Application features, etc. This online portal shall be shortly launched at all India level covering all Discoms and Regulatory Commissions.

7.12 Uniformity in Supply Voltage

It was observed in the Committee meetings of ETD 01 of BIS that the ambiguity regarding Declared Supply Voltage (230/400 V or 240/415 V) is profound and decided that these shall be discussed with CEA. In this regard, a Working Group was constituted by the BIS Committee to study and identify the changes and subsequent course of action for IS 12360 which defines the standard voltage levels. Adoption of 230/400V as Declared Supply Voltage at All India Level has been recommended to BIS during the last meeting held on 13.01.2022.

7.13 Public Procurement (Make in India)

Public Procurement (Make in India) order was notified to promote manufacturing and production of goods and services in India with a view to enhance income and employment. All procuring entities shall abide by the aforesaid order in respect

to the procurement in the Power Distribution Sector.

In order to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network in the country, Order dated 02.07.2020 mandated that any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of lndia. Further, an Order dated 23.07.2020 was also issued regarding measures for contributing towards 'Atmanirbhar Bharat' and 'Make in India' through phased indigenization in Power Sector.

7.14 Works related to Union Territories (UTs)

A&N Islands:

- Technical clearance accorded to proposal for installation of 4 way Ring Main Unit for New Airport Terminal of Airport Authority of India, VSI Airport at Dairy Farm, Port Blair, South Andaman.
- The proposal of EESL for implementation of a Gas Engine Based Trigeneration System at Rangat – Middle Andaman Region of A&N Islands, was examined and comments were furnished.
- JICA grant assistance project for "improvement of Power supply in Port Blair, A&N Islands through installation of 15 MWhr battery + 1 Building + 1 power system Stabilizer + 1 SCADA, was examined and comments were furnished.
- The report on Development of 450 MVA Gas Based Power Plant in Great Nicobar Island received from NITI Aayog, was examined and comments were furnished.

UT of Jammu & Kashmir:

- Technical clearance accorded to DPR for Meter Testing Labs at UT of Jammu & Kashmir Regions under PMDP.

UT of Ladakh:

- The Report of Standing Finance Committee for setting up solar PV capacity of 20 MWac/ 50 MWp with battery storage of 50 MWh at Phyang, Leh and 1 MW solar-wind hybrid plant with battery storage of 1 MWh at Nyoma under J&K Prime Minister Development Package (PMDP) – 2015, was examined and comments were furnished.
- A Report on baseline assessment of Energy requirement for Carbon Neutral Ladakh was prepared. CE(DP&T) is the convener of the Coordination Committee constituted by MOP under Chairmanship of Additional Secretary, MOP to identify the projects under Carbon Neutral Ladakh and to avoid overlapping of work being carried out by various agencies etc.
- Electrification of Changthang region: The DPR for electrification of Changthang region in UT of Ladakh through grid was received from MHA in MoP as a part of 308 DPRs for providing electricity connections to the BOPs and BIPs in the country. The DPR included the provision for electrification of 35 nos. of BOPs of ITBP along with electrification of 39 civil establishments/villages in border areas. The DPR of UT of Ladakh was examined by the Committee constituted by MoP and submitted its recommendation to MoP for further necessary action.

Subsequently, MHA requested that the project as approved by the Committee for Changthang region, Ladakh may be bifurcated into two parts - one part may include the works required for electrification of Border villages/un-electrified areas/civil establishment etc. and another part may include the works for electrification of ITBP posts.

UT of Ladakh submitted the revised bifurcated DPRs at an estimated cost of Rs. 797.99 crores. CEA technically examined both the DPRs for electrification of Changthang region and submitted its recommendation to MoP for further necessary action.

7.15 Works completed related to Ministry of DONER/NEC for North Eastern States: -

- EFC Memo- EEC Memo of M/o DONER for continuation of Central Sector scheme for the period from 2021-22 to 2025-26 was examined and comments furnished.

- **Sikkim** – (i) Technical clearance accorded to PPR (PPR ID: 11313) on Sikkim power sector development Project for system Augmentation, renovation, modernization and strengthening of Power Distribution network of Sikkim.

  (iii) DPR for Sikkim power sector development Project for system Augmentation, renovation, modernization and strengthening of Power Distribution network of Sikkim, was Examined and comments were furnished.

- **Mizoram** – (i) Technical clearance accorded to Project proposal submitted by Government of Mizoram under NESIDS – Construction of 2x10MVA, 33/11 KV Sub Station at Chite, Aizawl with associated linking lines.

  (ii) The project proposal submitted by Government of Mizoram under NESIDS-Construction of 33 KV S/C line on D/C Tower from Darlawn to Sakawrdai (35km) was examined and comments furnished.

- **Manipur** - Project proposal submitted by Government of Manipur under NESIDS for installation of solar street lamps, was examined and comments furnished.

- **Meghalaya** - Preliminary Project Report (PPRID-11575) regarding Meghalaya Power Sector Improvement Project (Phase II), was examined and comments furnished.

- **Nagaland** - Project proposals from M/o DoNER regarding Multi Disciplinary Committee Report for development of Eastern Nagaland, was examined and comments furnished.

7.16 Examination/Technical Clearance of Preliminary Project Report (PPRs)/Detail Project Reports (DPRs) under External Assistance from ADB/World Bank/ MDB etc.

- Technical clearance accorded to DPR for Distribution Reliability Improvement of the project titled "Tripura Power Generation Upgradation & Distribution Reliability Improvement" under external finance assistance from ADB was examined and comments furnished.

- Technical clearance accorded to DPR of Government of Himachal Pradesh for the project, "Himachal Hydropower and Renewable Power Sector Development Program" – Distribution Portion with external assistance from World Bank(USD 200 million) / IBRD.

- DPR for Smart Feeder manufacturing system in 2000 nos. of sub-station in GETCO under PSDF funding was examined and comments furnished.

- Reference from DEA – Revised scope of the project proposal reg Distribution System Strengthening by SCADA enablement of 33/11 kV Sub stations and AMI based Smart metering investments in Madhya Pradesh for funding from KfW, was examined and comments furnished.

- Detailed Project Report (DPR) on India-UK Partnership Project of Technical Assistance on Smart Power, was examined and comments furnished.

7.17 Examination of Distribution Scheme received from Ministry of External Affairs for providing Line of Credit to Foreign Countries: -

Technical clearance accorded for Appraisal Report for the Electrification of resettlement sites under the resettlement action plan-second phase (PAR2) of the Kandadji Dam and upgrading of the power distribution network project in the Dam Area, Republic of Niger.

7.18 Committee constituted by MoP for Examination of 256 DPRs of Border Out Posts (BOP)/Border Intelligence Post (BIP)/Collated Operating Base (COB) received from MHA

A committee was constituted by MoP under Chief Engineer DP&T, CEA with members from PFC/REC/PGCIL to examine the 308 nos. of Detailed Project Reports (DPRs) of Border Outposts (BOPs) and Border Intelligence Points (BIPs) for providing electricity connections to the BOPs and BIPs in the country. The committee examined the DPRs and the Report of the Committee was submitted to MOP.

7.19 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 this year and the reports of the Mock Test Exercise were sent to MOP, CPWD & NDMC.

7.20 Guidelines for Type Tests and Model Quality Assurance Plan (MQAP) for major equipment of Power sector

Central Electricity Authority (CEA) constituted a Committee under chairmanship of Member(GO&D) with members from CEA, Power Sector Utilities, Manufacturers etc. to standardize the duration of validity of Type Tests conducted on various E&M equipment and preparation of Model Quality Assurance Plan (MQAP) of major E&M equipment in the entire power sector. After detailed discussions amongst the Committee, sub-group members and inputs provided by the manufacturers/ vendors/ utilities, etc., Guidelines for Type Tests and Model Quality Assurance Plan (MQAP) for major equipment of Power sector were issued in March, 2022. DP&T Division prepared the Guidelines for Type Tests and Model Quality Assurance Plan (MQAP) for major equipment for Distribution Sector.

7.21 CERT-Distribution:

With the rapid implementation of IT enabled support and services in electricity distribution sector, the 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) under Chief Engineer (DP&T), CEA. CERT-D coordinates with all DISCOMs, NCIIPC, MoP, CISO-MoP and CERT-In for disseminating information and advisory to DISCOMs on cyber security issues received from NCIIPC, CERT-In & CISO-MoP. The following actions were taken by CERT-D during 2021-22: -

- The Cyber Crisis Management Plan (CCMP) for Distribution Sector was revised and circulated to all Distribution Utilities (DISCOMs) for adoption and preparing their own CCMP for implementation in their utilities. CCMP of 10 Discoms have been approved by CERT-In. CCMPs of other Discoms are under various stages of preparation and approval of CCMP.
- All 82 Major DISCOMs have nominated their Chief Information Security Officer (CISOs).
- 69 Major DISCOMs have on boarded Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre) being operated by the Indian Computer Emergency Response Team (CERT-In). Vulnerability of DISCOMs reported in every fortnightly Power Sector Situational Report of CSK, is taken up by CERT-D to concerned DISCOMs for closer/necessary action and closer reports are submitted to MoP/CERT-In.
- DISCOMs have been 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 in their respective organizations.
- The Advisories on vulnerability and threat assessment of SCADA System and CII Identification, Advisories on IT security auditing requirement of Government organization and critical sectors, Guidelines for setting up of CSIRT and Guidelines issued by NCIIPC for Mitigation of Cyber Security Threats in Power Sector were issued to all DISCOMs for their compliance. Template & guidelines issued by NCIIPC for identifying the Critical Information Infrastructure (CII) in Distribution sector was circulated to all DISCOMs.
  - Documents from NCIIPC regarding identification of CII of various Discoms were examined and comments furnished.
  - Furnished various inputs and status of cyber security measures for various meetings convened by MoP/CERT-In/NCIIPC/CISO-MoP on the Cyber Security issues.
  - 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.

7.22 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. with CE(DP&T) as its Member-Secretary. A draft Report of the Task Force was prepared by DP&T Division after obtaining inputs from various stakeholders regarding local content in Smart Meters and factory visits.

7.23 Task Force for 5G Small Cells

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. CE (DP&T) has been nominated as member of the Task Force from CEA to provide technical inputs regarding use of electric poles for installation of 5G cells.

7.24 Manual on Distribution Planning Criteria

Preparation of a Manual on Distribution Planning Criteria for helping the Discoms to plan their distribution system uniformly was taken up. The Finalized Manual has been submitted to MOP.

7.25 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. An online system called Distribution Assets Monitoring System(DAMS) is also being developed for collecting data of metering of feeders, DTs and Consumers.

7.26 National Feeder Monitoring system

A steering committee was constituted to under the chairmanship of Member(GO&D) to review the activities of execution of NFMS which is a part of National Power Portal. Three meetings have been held so far. In the last meeting, DP&T Division provided inputs regarding timelines of NFMS, cost incurred under various heads in NFMS, RFP for AMISPs for field solutions and cloud service providers.

7.27 Consultancy work

Consultancy work for Feasibility Study for conversion of existing Overhead Electrical Network to Underground Electrical Network in BSES Rajdhani Power Limited (BRPL) and BSES Yamuna Power Limited (BYPL) was carried out.

7.28 VIP/MoP References/Misc.

- Inputs provided on Draft Chapter on Power of "Draft Regional Plan, 2041" prepared by NCR Planning Board.
- Inputs provided on the Draft Regulations of BEE on Energy Audit (Accounting) in Electricity Distribution Companies (DISCOMs).
- Write up and data provided for visits of Hon'ble Minister of Power to North-Eastern States, Haryana, Goa etc.
- Furnished comments to PSETD - Technical report on applications for ratification of laying overhead transmission lines in GIB potential area.
- Comments furnished for VIP Reference received from Chairman Chief Executive Councillor, Ladakh Autonomous Hill Development Council, Leh regarding development of Power Sector in UT of Ladakh.
- Formulation of Policy in respect of VIP reference of Hon'ble MP, Amravati Constituency, Maharashtra- Reference received from Hon'ble MP, Amravati Constituency, Maharashtra for providing electricity to 24 villages of tribal dominated areas of Dharni and Chikaldhara blocks.
- Inputs provided for VIP Reference- DO Letter from Sh. Pushkar Singh Dhami, Hon'ble CM Uttarakhand and Shri Shrikant Sharma, Hon'ble Power Minister, Uttar Pradesh.
- Preparation of material for various references

received from MOP reg. bilateral issues between India and other Countries.

- Proposal on ASEAN Decarbonisation Programme was examined and comments furnished to MOP
- References regarding Bilateral Cooperation between India –UK, India-US, India- Germany, India –Japan etc. were examined and comments furnished to MOP.
- Chapter on Power of Draft Regional Plan of NCRPB– 2041 for NCR Region, was examined and comments furnished to MOP
- Inputs provide to Task Force constituted by MOP to Develop Framework of Application of AI/ML/Big data etc.
- Examination of the Concept Note of Ministry of IT on Center of Excellence(COE) and comments were furnished.
- Comments furnished on MoEFCC DO Letter dated 19.01.2022 regarding preparation of Third National Communication for UNFCC
- Regular inputs are provided to Standing Committee on Energy (2021-22) Examination of the Demands for Grants for the year 2022-23 of the Ministry of Power.
- Inputs were provided on 5TH BIMSTEC Summit, Sri Lanka 30th March.
- Inputs provided on the Matter raised in LS during Zero Hour by Sh Jamyang Tsering Namgyal, Hon'ble MP (LS) on 10.02.2022
- Inputs furnished on promotion of Bamboo area for Biomass pellets production for utilization of Power generation through co-firing in coal based TPP.
- Approved report of the Committee on Low Carbon Technologies formed under chairmanship of Shri Neeraj Sinha, Sr Adviser (S&T), NITI Aayog, as part of the Sustainable Growth Pillar of the India-US Strategic Clean Energy Partnership, was examined and comments were furnished.
- DIB proposal of CPRI for augmentation of existing test facilities & Establishment of new test facilities at various centers of CPRI was examined and comments were furnished.
- EFC proposal for continuation of the scheme of "Promoting Energy Efficiency Activities in Different Sectors of Indian Economy" by BEE was examined and comments were furnished.
- EFC Memo of M/o Steel regarding Production Linked Incentive (PLI) Scheme for speciality Steel was examined and comments were furnished.
- Proposed skill development of workforce for roll-out of smart metering for Skill Council Training.
- Presentation was made before Hon'ble Minister reg capability of Cut off relay of smart meter.
- Matter regarding serious issues arising out of acute scarcity of Cold Rolled Grain Oriented (CRGO) material and steep rise in the commodity prices was examined and comments were furnished.
- Material provided on draft guidelines on recovery and reconstruction assistance under NDRF/ SDRF and items & norms of assistance.
- Matter regarding Machine Vision (MV) and expanding Chinese CCTV footprints in India was circulated to all the stakeholders for taking necessary precautions.
- Material for Legal Notice served by Shri Rukhsar Sheikh, Advocate on behalf of Shri Girish Manoharrao Bachate r/o Lathur, Maharashtra regarding patent issue of Smart Meters was furnished to Legal division.
- Proposals of CPRI regarding continuation of R&D Scheme of MoP and Road Map of 5 Years of CPRI were examined and comments furnished.
- Matter reg. Environmentally Sound Management and Final disposal of PCBs in India under Stockholm Convention on Persistent Organic Pollutants (POPs) was examined and comments were furnished.
- Document on Energy Efficiency in South Asia Opportunities for Energy Sector Transformation was examined and comments furnished.
- Document on ADB's 2021 Energy Policy was examined and comments furnished.
- Associated with the finalisation of Report on possibilities of indigenous development of SCADA software for Power System Management.
- Draft Agenda Notes on project proposals received from NE States regarding IMC/NESIDS Committee meeting, was examined and comments furnished.

7.29 Rural Electrification

7.29.1 Status of Rural Electrification in the Country:

All the 18,452 balance un-electrified villages of Census-2011 (as on 01.04.2015) in the country have already been electrified (including 1,271 uninhabited villages) by 28-04-2018 under Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY).

Therefore, 100% electrification of villages has been achieved in the country.

7.29.2 Deendayal Upadhyaya Gram Jyoti Yojna (DDUGJY):

In order to facilitate 24x7 quality and reliable power, Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) was launched by MoP on 3rd December 2014 with the following components in Rural Areas:

(i) Separation of agriculture and non-agriculture feeders facilitating judicious rostering of supply to agricultural & non-agricultural consumers;
(ii) Strengthening and augmentation of sub-transmission & distribution infrastructure in rural areas, including metering of distribution transformers/ feeders/consumers;
(iii) Rural Electrification for completion of the targets laid down under the erstwhile Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) for 12th and13th Plans.

The components at (i) and (ii) of the above scheme have an estimated outlay of Rs. 43,033 crore including a budgetary support of Rs. 33,453 crores from Government of India during the entire implementation period. The scheme of RGGVY will get subsumed in this scheme as a separate Rural Electrification component {component (iii) above}, for which Government has already approved the scheme cost of Rs. 39,275 crore including a budgetary support of Rs. 35447 crores. This outlay has been carried forward to the new scheme of DDUGJY in addition to the outlay indicated as above.

REC Ltd. is the nodal agency of monitoring committee for implementation of this scheme and as a member of Monitoring committee of this scheme, CEA has been attending meeting at MOP and providing requisite inputs and technical support for implementation. Under the scheme, projects worth Rs 1,28,612.3 crore have been sanctioned and Rs 1,00,946.37 crore have been released. The scheme is closed on 31.03.2022.

7.29.3 Decentralized Distributed Gene-ration (DDG) Projects under RE component of DDUGJY (RGGVY)

Under RGGVY, there was a provision for Rs.540 crores during 11th plan for Decentralized Distributed Generation (DDG) which has been revised to Rs.1000 crores for implementation during 12th and 13th plan by extending scope of DDG to grid connected areas to supplement the availability of Power in areas where power supply is less than six hours a day.The Decentralized Distribution Generation is being provided from conventional or renewable sources such as Biomass, Biofuels, Biogas, Mini Hydro, Solar etc. for villages/habitations where grid connectivity is either not feasible or not cost effective.

Under DDG, 3554 projects covering 2,29,468 Nos. of Households (including BPL Household of 227395) in 17 States/UTs (Andhra Pradesh, Assam, Arunachal Pradesh, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Odisha, Rajasthan, Telangana, Uttar Pradesh, Uttarakhand, Manipur, J&K and Ladakh) at an approved cost of Rs.1271.35 crores have been sanctioned, and out of which 815.02 crores have been released by the Monitoring Committee, 3419 project approved have been completed. The scheme is closed on 31.03.2022.

7.30 Saubhagya scheme:

Government of India has launched Pradhan Mantri Sahaj Bijli Har Ghar Yojana –"Saubhagya" on 11th October, 2017 with the objective to achieve universal household electrification by providing last mile connectivity and electricity connections to all households in rural and urban areas by March 2019. This scheme has the fund outlay of Rs. 16,320 crore including a Gross Budgetary Support (GBS) of Rs. 12,320.00 crores from Government of India.
As a member of Monitoring committee of this scheme, CEA has been attending meeting at MOP and providing requisite inputs and technical support for implementation.

Under the scheme, as reported by the States and UTs as on 31.03.2021, a total of 2.817 crore all the willing and un-electrified households (HHs) have been electrified since the launch of Saubhagya, thereby, 100% electrification of all the willing un-

electrified households have been achieved. The scheme is closed on 31.03.2021.

7.31 Monitoring Prime Ministers development (PMDP) 2015 in UT of J&K and Ladakh for Distribution Projects:

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 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	70%
	PGCIL	100%
Kashmir	KPDCL	61%
	PGCIL	100%
Ladakh	PGCIL	61%

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 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	52%
	RECPDCL	74%
Kashmir	KPDCL	90%
	RECPDCL	71%
Ladakh	RECPDCL	49%

Smart metering projects: Projects for providing smart meters to 2 lakh consumers at the cost of 126.54 Crores including PMA charges has been sanctioned, for which RECPDCL is the nominated PIA. The work is under progress and out of 1,15,500 meters awarded, already 51,522 meters have been installed as on 31.03.22.

Smart Grid projects: Projects worth Rs 141.26 Crores including PMA charges has been sanctioned and PGCIL is the PIA. This component is not to be implemented by J&K in view of shortage of time.

Projects under Additional fund for PMDP 2015:
Ministry of Power vide sanction order dated 01-jun-21 has 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 and the projects

7.32 Integration of Distribution Sector data with National Power Portal (NPP):

NPP, launched on 14th Nov, 2017, is a centralized system which facilitates online data capture/ input (daily, monthly, annually) and to disseminate related information (operational, capacity, demand, supply, consumption etc.) through various analyzed 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 both operational and commercial data at feeder-level for rural as well as urban areas. Operational data includes power supply position, outage data, consumer reliability data etc. and commercial data includes AT&C losses, Billing efficiency, collection efficiency for A&TC loss etc. This Division of CEA is Updating/restructuring the formats for data capturing and its presentation in NPP, in consultation with NIC and IT Division of CEA.
By end of March, 2022 data of 49,217 urban feeders in around 60 Discoms and data of 1,23,551 rural feeders in around 41 Discoms have already been integrated in NPP.

CHAPTER – 8

DESIGN & ENGINEERING SERVICES

8.1 Design & Engineering of Hydro Electric Projects

Central Electricity Authority (CEA) renders design & engineering services for Hydro Electric Projects under execution in the Country in Central / State Sectors and neighbouring countries. CEA provides consultancy for conventional type hydro generating units, bulb/tubular type units, pumped storage schemes with a underground/surface power stations. Design & Engineering includes complete design, techno-economic analysis, preparation of Technical Specifications, tender evaluation, selection and sizing of equipments, detailed layout and schematic drawings for hydro turbine, generator, transformer, GIS, switchyard equipment and other auxiliaries.

8.2 Programme and Achievement during 2021-22

During 2021-22, 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: -

S.No.	Project	State/Executive Agency	Capacity Addition
Main Consultancy			
1.	Lakhwar MPP	Uttarakhand / UJVNL	3x100
2.	Ganol SHEP	Meghalaya/ MePGCL	3x7.5
Overview Consultancy			
3.	THDC HEPs (5 nos. HEPs)	Uttarakhand / THDC	2868
Neighbouring Countries			
4	Punatsangchhu St.I	Bhutan/ PHPA-I	6x200
5.	Punatsangchhu St.II	Bhutan/ PHPA-II	6x170

8.3 Scrutiny/Examination/Preparation of DPRs of HE Projects

a) Chapters on Electro-Mechanical equipment, related drawings, bill of quantities, Memorandum of Changes, etc. of 06 nos. (05 nos. in India and 01 nos. in Nepal) of DPR of HEPs aggregating to 3040.1 MW including clarifications/ drawings/ documents etc. as received from time to time were examined and commented upon.

b) General layout Plan/Salient features of 19 nos. of HEPs (including PSPs) under Survey & Investigation (S&I) at pre-DPR stage aggregating to about 13547 MW were examined and commented upon. Revised Cost Estimates received for 01 no. of HEPs aggregating to 2880 MW were examined and commented upon.

c) Chapters on Electro-Mechanical equipment, related drawings, bill of quantities, Memorandum of Changes, etc. of 06 nos. (05 nos. in India and 01 nos. in Nepal) of DPR of HEPs aggregating to 3040.1 MW including clarifications/ drawings/ documents etc. as received from time to time were examined and commented upon.

d) General layout Plan/Salient features of 19 nos. of HEPs (including PSPs) under Survey & Investigation (S&I) at pre-DPR stage aggregating to about 13547 MW were examined and commented upon. Revised Cost Estimates received for 01 no. of HEPs aggregating to 2880 MW were examined and commented upon.

e) Memorandum of Changes pertaining to Electro-mechanical aspect received for 01 no. HEP of 210 MW was examined and commented upon.

f) Chapters on E&M aspects along with related drawings & BoQ pertaining to 05 nos. of Lift Irrigation Schemes which were referred to CEA by CWC were examined and commented upon.

g) Electro-mechanical aspect along with related drawings & BoQ for 02 nos. DPRs are under preparation for Tlawng HEP (2x60MW), Mizoram and Ujh Multipurpose Project (3x29MW+1x2.5MW), J&K

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.	Dagmara HEP	Bihar	130.10
2.	Reoli Dugli HEP	Himachal Pradesh	456
3.	Dugar HEP	Himachal Pradesh	500
4.	Pinnapuram Pumped Storage HEP	Andhra Pradesh	1200
5.	Wah Umiam Stage-III HEP (Formerly known as Mawphu HEP, Stage-II)	Meghalaya	85
Project abroad			
6.	Lower Arun HEP	Nepal	669

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.	Gandhi Sagar PSP	Madhya Pradesh	1440
2.	Warasgaon PSP	Maharashtra	1200
3.	Somasila PSP	Andhra Pradesh	900
4.	Chitravathi PSP	Andhra Pradesh	500
5.	Owk PSP	Andhra Pradesh	800
6.	Gandikota PSP	Andhra Pradesh	1000
7.	Kurukutti PSP	Andhra Pradesh	1200
8.	Karrivalasa PSP	Andhra Pradesh	1000
9.	Yerravaram PSP	Andhra Pradesh	1200
10.	Myntdu Leshka Stage-II HEP	Meghalaya	210

11.	Demwe Upper Stage-I HEP	Arunachal Pradesh	270
12.	Niare HEP	Arunachal Pradesh	860
13.	Sela Urthing HEP	Uttarakhand	144
14.	Upper Kolab PSP	Odisha	320
15.	Uri-I Stage-II HEP	Jammu & Kashmir	240
16.	Dulhasti Stage-II HEP	Jammu & Kashmir	260
17.	Saundatti PSP	Karnataka	1260
18.	Reoli Dugli HEP	Himachal Pradesh	456
19.	Sach Khas HEP	Himachal Pradesh	287

C. 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.	Dibang Multi-Purpose Project	Arunachal Pradesh	2880

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.	Luhri Stage-I	Himachal Pradesh	210

E. 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.	Sammakka Sagar Project (erstwhile P.V. Narsimha Rao Kanthanapally Sujala Sravanthi Project)	Telangana
2.	Mukteswar (Chinna Kaleshwaram) LIS	Telangana
3.	Sita Rama Lift Irrigation Scheme	Telangana
4.	Kaddam LIS	Telangana
5.	Phina Singh Medium Irrigation Scheme	Himachal Pradesh

8.4 Proposals for Foreign Assistance/Bilateral Co-operation

Relevant material/inputs were provided for the proposal of bilateral co-operation with different countries in the field of hydro power development as and when received from various ministries as detailed below:

China, Brazil, Russia, Austria, Azerbiajan, Canada, Israel, Sweden, ASEAN Group, Kenya etc.

8.5 Review of Technical Standards/Regulations:

i) Took up revision/modification of CEA regulations entitled Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations.

ii) Preparation of Guidelines for Type Test(s) validity period and Model Quality Assurance Plan (MQAPs) of major Electro-Mechanical Equipment in Hydro Power Sector, and which shall become part of the proposed Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2022 to make them legally enforceable in the country

iii) Participated in panel meetings of BIS for preparation of /amendments in draft Indian standards as and when required.

8.6 R&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.

8.7 Examination of Innovative Proposals:

i) Examination/scrutiny of 03 nos. of Innovative Proposals on generation of electricity from renewable and other sources of energy. The list is as given below:

List of Innovative Proposals:

i. Proposal of new category of self-renewable electric energy production technology received from Shri Mehmet Niyazi Cekic pertaining to new category of self renewable electric production technology.

ii. Proposal received from Sh. Venkata Vamshi Krishna of Koppa Karnataka regarding project on electric power generation from canal.

iii. Proposal received from Sh. Padmanabham Kyama of Telangana regarding his invention for storage of power using rubber belt method from stored water of Dams.

8.8 Miscellaneous Works:

i) Providing inputs and convening of meetings to examine M/s Stucky's (private consultant engaged by DGPC/ RGoB) proposal by CWC for construction of Barrage at upstream location in place of the held-up construction of concrete Dam for Punatsangchhu-I (6x200 MW) HEP, Bhutan

ii) Co-Chair of the Sub-Group constituted by Ministry of Power (MoP) on 'Technology' for formulating comprehensive policy framework and recommend interventions to promote Energy Storage in Power Sector, and the Report of which was prepared and submitted to MoP

iii) Member of the Committee constituted by Ministry of Power (MoP) to study the concept and commercial applications of Hydro Kinetic Turbine (HKT) developed by M/s Maclec Pvt. Ltd. and the Report for which was prepared and submitted to MoP

iv) Providing inputs and participation in Technical Coordination Committee (TCC) 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.

v) 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.

vi) 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.

vii) 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 six

(6) projects namely Sunni Dam HEP & Dhaulasidh HEP of SJVNL and Ratle HEP, Dibang MPP, Loktak Downstream HEP & Teesta-VI HEP of NHPC.

viii) Inputs for preparation of National Electricity Plan in respect of Hydro Power Sector were provided.

ix) Reply of various Parliament Questions, VIP references, RTI applications etc. as and when received.

x) Analysis of issues and preparation of inputs pertaining to Mangdhechu (4x180 MW) HEP, Bhutan, as and when required were provided to Ministry of Power.

8.9 Design and Consultancy Assignments (Civil Aspects) for Thermal/Hydro/ Power Transmission Projects during 2021-222

TCD Division of CEA carried out the following specific works in respect of thermal/hydro/power transmission projects during 2021-22:

8.9.1 Thermal Power Projects:

TCD Division of CEA is providing consultancy services to power utilities for thermal power projects as and when referred by Competent Authority.

8.9.2 Hydro Power Projects:

(a) Punatsangchhu-II HEP (6 X 170 MW), Bhutan

- Designs/drawings of Towers, Equipment Support Structures and their foundations at pothead yard and Cable Support Structure at pothead yard, GIS and CAT areas, IPBD support structure, drawing of EOT 10T Crane for GIS hall were examined and necessary advice was communicated to Project Authorities.

(b) Ganol HEP (3 X 7.5 MW), Meghalaya

- Layout of Switchyard and Powerhouse was examined and comments were communicated to Project Authorities. Further, Design of Gantry and Towers of Switchyard Area was examined and necessary advice was communicated to Project Authorities.

(c) Moose Sambha–Amargarh Transmission Line of NRS XXIX Transmission Limited (NTL)

Potential Failure of foundation & damage to towers of 400 kV D/C Twin Moose Sambha – Amargarh Transmission Line of NRS XXIX Transmission Limited (NTL) due to road construction work was examined in consultation with Indigrid and Border Road Organisation (BRO) officers followed by sight inspection by officers from CEA (TCD Division and PSE&TD Division). Joint sight inspection report was finalized and Civil inputs were provided in which this Division suggested for Slope Stabilization and building of retaining wall in order to avert failure of foundation and tower of Samba-Amargarh Transmission line located at tower location no. 286, J & K

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 Performance of State Power Utilities

9.1.1 Financial health

The gap between average revenue realization and average cost of supply remained constantly high over the years, causing erosion in the volume of internal resources generation by the Distribution Companies (DISCOMs) and led many of them to virtual bankruptcy. The level of commercial losses of the DISCOMs/ utilities depend, inter-alia, on the unaccounted electricity losses, subsidies received towards sales to agriculture and domestic sectors, revenue generation through cross-subsidization etc. The Gross Subsidy on energy sales has been increasing over the years as an outcome of the policy of some of the States to provide electricity at subsidized rates to agriculture and domestic consumers.

Consequently, DISCOMs were unable to make complete payments to Central Power Sector Utilities (CPSUs) for purchase of power and coal, resulting in accumulation of huge outstanding amount. This has adversely affected the growth and performance of CPSUs. The payment deficit continues to rise and threaten the viability of the CPSUs. Further, the poor credit worthiness of DISCOMs has effectively blocked investments by the Private Sector despite the enabling and encouraging framework laid down by the Central Government.

9.1.2 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.21060.36 Crore as on 31st March 2022. 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 2021) contains information on retail electricity tariff applicable in various States / Utilities effective during the year 2020-21.

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 2021 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 References on techno financial matters in power sector.

During the year, comments / recommendations of CEA were furnished on the following important references on issues concerning financial/ commercial matters of power sector:

(i) Financial and commercial inputs provided for preparing the Report on comprehensive policy framework for promotion of Energy storage in the power sector.

(ii) **Examination of Detailed Project Report (DPR) & Revised Cost Estimates (RCE) -**

- Wah Umiam Stage-III (85 MW) HE Project in Meghalaya by M/s NEEPCO Ltd
- Pinnapuram Pumped Storage HEP (1200 MW) in Andhra Pradesh by M/s Greenko Energies Private Limited (GEPL)
- Reoli Dugli HEP (456 MW) in Himachal Pradesh by M/s SJVN Ltd
- Lower Arun HEP (669 MW) in Nepal by M/s SJVN Ltd
- Dugar H.E. Project (500 MW) in Himachal Pradesh by NHPC Ltd.
- Dagmara (130.10 MW) HE Project in Bihar of M/s Bihar State Hydroelectric Power Corporation (BHPC)
- Omkareshwar HEP (8x65 MW) in Madhya Pradesh by NHDC
- Teesta Low Dam HEP (160 MW) in West Bengal by NHPC

(iii) **Examination of PIB Proposals-**

- SECI proposal for setting up of 100 MW (AC) floating solar (FSPV) project in Getalsud reservior, Ranchi, Jharkhand.
- NHPC proposal for setting up 1000 MW solar plant under CPSE Scheme

(iv) **Cost Revision** –

- Dibang Multi-Purpose Project (2880 MW)at Aug,20 PL (including GST) inArunachal Pradesh by NHPC Ltd.
- Teesta-IV HEP (520 MW) at April, 2021 PL in Sikkim by NHPC
- Sunni Dam Hydro Electric Project (382MW) at March, 21 PL in Himachal Pradesh by M/s SJVN Ltd.

(v) Bid Documents for Selection of RE Power Developers for Supply of 5000 MW of Round-the-Clock (RTC) Power from Grid-Connected Renewable Energy (RE) Power Projects, complemented with Power from Coal based Thermal Power Projects in India under Tariff-based Competitive Bidding (RTC-II).

(vi) Detailed Project Report (DPR) India – UK Partnership Project of Technical Assistance on Smart Power.

(vii) Draft EFC Memo regarding infusion of equity of Rs. 1000 Crore in SolarEnergy Corporation of India Limited.

(viii) Detail Project Report for Reconstruction,

Renovation & Modernization of 200 MW (4x50 MW) Kopili Power Station by NEEPCO.

(ix) Sanction and release of additional fund of Rs 860.13 Crores towards land Acquisition (LA), Rehabilitation & Resettlements (R&R) construction of R&R colony and the cost of Per-project activities of NPP at Kovvada.

(x) Observations on date of commercial date of operation and Repayment Schedule of loan & interest in respect of 720MW Mangdechhu HEP in Bhutan were submitted to MoP/MEA.

(xi) Inputs on possible measures to rationalize tariff for KAPS unit # 3&4.

(xii) Studied the Implication of loss in transmission availability and its impact on transmission change recovery for M/S ATIL lines due to NHAI construction activities on NH – 1520 highways.

9.4 Standard Bidding Documents and Competitive Bidding Guidelines

CEA has submitted draft of the revised standard bid documents (comprising of RfP & TSA) along with revision in "Guidelines for encouraging competition in Transmission Projects" & "TBCB Guidelines". The aforementioned documents were published by MoP on 06th Aug 2021.

9.5 Economic Analysis of Policy Issues

(i) Section 3 (3) of the Electricity Act enables the Central Government to review or revise the National Electricity Policy from time to time. The National Electricity Policy was first notified in February 2005. The revised draft of the National Electricity Policy was submitted to the Ministry of Power in January 2021. An expert committee was constituted by MoP in April, 2021 for the finalization of the draft NEP in which F&CA Division contributed significantly.

(ii) CEA has submitted its observations on the proposal for modification in the PPP guidelines, VGF funding and Asset Monetization guidelines to Ministry.

(iii) Draft model PPA Document and Asset Monetization guidelines were drafted and are under finalization.

(iv) EPD has been regularly providing inputs/comments on various issues referred by the Ministry of Power to CEA such as Inputs on Finance Commission matters, Economic Survey , India's 7th Trade Policy Review, WTO related matters, inputs on Draft Cabinet Notes, matters concerning Revision in WPI, India’s Domestic Support to Agriculture (direct electricity subsidy) ,VIP references and so forth.

9.6 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 2021-22 (upto 31.03.2022), the information for 124 IPPs with an installed capacity of 88756.24 MW , having tied and untied capacity of 65249.15 MW & 18729.38 MW respectively has been compiled.

9.7 Reforms Monitoring Unit

A 'Reforms Monitoring Unit' has been set up in the Economic Policy Division under the direction of Ministry of Power to monitor the status of implementation of various provisions of the Electricity Act, 2003, the National Electricity Policy, 2005 and the Tariff Policy, 2016.

9.8 The Electricity Act, 2003

9.8.1 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 principle regulations and their

subsequent amendments since the enactment of the Electricity Act, 2003, is as under:

A. Notified Principal Regulations:

The following are the principle regulations already been framed and notified by the Authority during previous years since the enactment of the Electricity Act, 2003:

Sl. No.	Regulation	Notified on
1	CEA (Installation & Operation of Meters), Regulations 2006	22.03.2006
2	Central Electricity Authority (Procedure for Transaction of Business) Regulations, 2006	22.8.2006
3	Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulation, 2007	09.03.2007
4	Central Electricity Authority (Furnishing of Statistics, Returns & Information) Regulation, 2007	19.04.2007
5	Central Electricity Authority (Grid Standards) Regulation, 2010	26.06.2010
6	Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations, 2010	24.09.2010
7	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010	20.08.2010 (English Version) & 07.09.2010 (Hindi Version)
8	Central Electricity Authority (Safety requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations, 2011	14.02.2011
9	Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013	07.10.2013
10	Central Electricity Authority (Technical Standards for Communication Systems in Power Systems) Regulations, 2020	27.02.2020

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. The 12 nos. of the amendments notified by the Authority during previous years since the enactment of the Electricity Act, 2003 are as under:

Sl. No.	Regulation	Notified on
1	Central Electricity Authority (Installation and Operation of meters) (Amendment) Regulations 2010	26.06.2010
2	Central Electricity Authority (Technical Standards for Connectivity to the Grid) Amendment Regulations, 2013	15.10.2013
3	Central Electricity Authority (Installation and Operation of meters) (Amendment) Regulations 2014	03.12.2014
4	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Amendment Regulations, 2015	07.04.2015
5	1st Amendment to Central Electricity Authority (Measures relating to Safety and Electricity Supply) Amendment Regulations, 2015	13.04.2015
6	2nd Amendment to Central Electricity Authority (Measures relating to Safety and Electric Supply) Amendment Regulations, 2018	01.03.2018

7	Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2019	08.02.2019
8	Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2019	08.02.2019
9	3rd Amendment to Central Electricity Authority (Measures relating to Safety and Electric Supply) (Amendment) Regulations, 2019.	28.06.2019
10	3rd Amendment to the Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2019	23.12.2019
11	Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2022— 4th Amendment	28.02.2022
12	Revision of Formats in Central Electricity Authority (Furnishing of Statistics, Returns & Information) Regulations, 2007) (Amendment)	17.03.2022

9.8.2 Court Cases

Legal Division of CEA is dealing Court Cases filed in the Hon'ble Supreme Court, High Courts, NGTs and District Courts/Lower Courts across the Country on behalf of Government of India, Ministry of Power and Central Electricity Authority.

Legal Division dealt with more than 150 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 2021-2022.

9.9 Assistance to Ministry of Power

Comments/ inputs furnished to the Ministry of Power on the following important references/issues:

- Advice on Private Members' Bill introduction in Rajya Sabha regarding the Right to Free Electricity Bill, 2022 by Shri Sanjay Singh.
- MoP reference on - Deemed licensee status to Special Purpose Vehicle (SPVs) formed for undertaking the activities pertaining to the manufacturing hub in the country.
- Advice on Draft Cabinet Note on the proposal to discontinue the procedure for screening appeals filed by Public Sector Undertakings against awards of Labour Courts/ Central Government Industrial Tribunals.
- Advice on Standing Committee on Energy - List of Points on the subject 'Evaluation of Wind Energy in India received from MNRE' – regarding.
- Serious issues arising out of acute scarcity of Cold Rolled Grain Oriented (CRGO) material and steep rise in the commodity prices.

9.10 Legal Assistance/Advice to Utilities

The comments were furnished to various departments/organizations stakeholders/utilities on references received from them. The important issues on which the comments were furnished are as under: -

- Draft inputs for "EPTA (Electric Power Transmission Association) Representation on Implication of Electricity (Timely Recovery of Costs due to Change in Law) Rules 2021".
- Draft letter prepared for clarification on Article 14.1 of PPA signed between Adani Power Mundra Limited with Haryana Discoms.
- VIP reference received from Shri. N.K. Premachandran, Member of Parliament (MP) on the subject of Captive Power Plants.
- VIP reference received from Shri Parbatbhai Savabhai Patel, Hon'ble Member of Parliament regarding compensation for affected land under the transmission lines (RoW).

- VIP reference from Shri. N.K. Premachandran, MP enclosing representation letter from Executive Editor and Director of Malyala Marorama dated 30.11.2021 on the subject of 'Eligibility of subsidiary companies to qualify as Captive user of wind generator plant set up by the parent company'.
- VIP reference received from Shri. M.K. Stalin, Hon'ble Chief Minister of Tamil Nadu.

- Bruhat Bengaluru Mahanagara Palike query regarding acquiring a portion of land under TDR for the purpose of road widening at SRPC quarters, Kodigehalli, Bengaluru.
- Standing Committee on Energy - List of Points on the subject 'Evaluation of Wind Energy in India received from Ministry of New and Renewable Energy.
- Advice on "Approval under section 68 of the Electricity Act, 2003 - M/s JSW Renew energy Two Limited (300 MW) Wind power Project in Tuticorin, Tamil Nadu
- Techno Commercial Clearance in respect of the proposal of EESL for implementation of a Gas Engine Base Trigeneration system at Rangatt- Middle Andaman region of A & N Islands**.**

9.11 References on Policy and Regulatory aspects in the Power Sector

Comments/ inputs furnished on following issues concerning draft Regulations of CEA/CERC/SERCs, Implementation of Regulations of CEA/CERC/SERCs and Policy Matters received from Ministry of Power (MoP), Ministry of New and Renewable Energy (MNRE), other Ministries, NITI Aayog, Industry Associations etc.

1. Comments on the reference of FICCI and SPDA on draft Deviation Settlement Mechanism (DSM) Regulation of CERC.
2. EPTA Representation dated 28-12-2021 on Implication of Electricity (Timely Recovery of Costs due to Change in Law) Rules 2021 (CIL Rules, 2021).
3. Comments on Draft Electricity (Late Payment Surcharge and related matters) Rules, 2021.

9.12 Implementation issues related to Regulations/Standards of CEA/ CERC/SERCs

Comments/ inputs furnished on following implementation/ regulatory issues raised in various Writ petitions filed by the utilities /persons before Hon'ble High Courts/ Supreme Courts etc.

1. DB CWP No. 5989/2019 titled as IOCL Vs. State of Rajasthan and other connected matter in the High Court of Judicature for Rajasthan at Jaipur Bench.
2. Writ Petition No. WP No 3446 of 2021, filed by Shri Nagarajan V/s the Union of India & Others before Hon'ble High Court of Judicature , Madras at Madurai Bench.
3. Writ Petition No. 6755 of 2020 filed by Sh. Muthusamy and 20 others before Hon'ble High Court of Judicature at Madras for issuance of Writ in respect of payment of compensation towards damages in regard to Right of Way for transmission Lines.
4. PIL No 5 of 2021 filed by Chamber of Marathwada Industries Association and others versus the Maharashtra Electricity Regulatory Commission and others before the Hon'ble High Court of Judicature of Bombay bench at Aurangabad.
5. Writ Petition no. 7653 filed by K. K. Rathlnasamy and Others before Hon'ble High Court of Judicature at Madras for the issuance of direction to the Respondents to apply the provisions of Section 10(d) of the Indian Telegraph Act, 1885 & the "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013" with respect to the Compensation, for the Power Transmission Projects.
6. Writ Petition no. 4379 of 2021 filed by Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) before the Hon'ble Court of judicature at Madras seeking the CERC (Sharing of Inter State Transmission Charges and Losses) Regulations, 2020 (hereinafter referred to as "Sharing Regulations, 2020") notified by CERC as

unconstitutional, null and void and ultra vires the provisions of the Electricity Act, 2003.

7. DB CWP No 14815 of 2020 filed by M/s MB Power (Madhya Pradesh) Ltd versus State of Rajasthan and Others before the Hon'ble High Court of Judicature for Rajasthan at Jaipur Bench for Issuance of appropriate writ or order or direction in the nature of declaration or certiorari or any other writ or direction declaring Rule 69(2)(b) of the Rajasthan Transparency in Public Procurement Rules, 2013 as ultra vires Article 14, 19(1)(g) and 21 of the Constitution of India as well as Section 63 of the Electricity Act 2003.

8. Writ Appeal no. 459 of 2018 filed by Tamil Nadu Generation and Distribution Corporation Limited (TANGEOCO) and Others VS M/s. Obli Granites (Respondent No. 1, who is High Tension Consumer of TANGEDCO) and others before the Hon'ble High Court of Judicature at Madras against the Order dated 05.06.2017 passed by the single judge bench of the Hon'ble High court of Judicature at Madras in WP No. 22406 of 2015.

9. Civil Appeal no. 2721 of 2020 filed by Rajasthan Rajya Vidyut Prasaran Nigam Ltd.(RRVPN) Vs M/s SKS Power Generation (Chhattisgarh) Ltd. & Others before Hon'ble Supreme Court of India under Section 125 of Electricity Act, 2003 against the impugned Final Judgment and Order dated 03.02.2020 passed by APTEL in Appeal No. 224 of 2019 of APTEL.

10. WP No 2810 of 2021 filed by TBR Cinemas and others versus Union of India (Min. of Home Affairs) and Others before the Hon'ble High Court of Judicature of Andhra Pradesh at Amravati for waving off periodical electricity bills of Cinema theatres in general and the petitioner's theatres in particular during the lockdown period.

11. Civil Misc. Writ Petition No. Nil of 2021 filed by Shri Arun Mishra versus Union of India and Others before the Hon'ble High Court of Judicature at Allahabad to issue Writ, order or direction holding Rule 15 of Electricity (Rights of Consumers) Rules 2020 ultra vires to the provisions of Section 42(5) & 181 (r) of the Electricity Act, 2003 and being violative of judgment of the Hon'ble Apex Court in Civil Appeal No. 14697/15 in the matter of State of Gujarat Vs Utility Users Association.

12. Writ Petition No. 11357 of 2021 filed by Mr Mohd Haseeb Vs Union of India & Ors in the Hon'ble High Court of Judicature at Allahabad, Lucknow Bench challenged the provisions of Electricity (Rights of Consumers) Rules, 2020.

13. Writ Petition(WP) No 15067 of 2021 filed by South Power Distribution Company ,Eastern Power Distribution Company and Central Power Distribution Company of Andhra Pradesh VS Respondent / Govt. of India, Min. of Power before the Hon'ble High Court of Andhra Pradesh at Amravati.

14. Writ Petition (St) No. 5159 of 2021 filed by Century Rayon Vs Union of India filed in the High Court of Mumbai.

15. Writ Petition No. 25711 of 2020 filed by Surya Cinemax and others versus Union of India (Min. of Home Affairs) and Others before the Hon'ble High Court of Judicature of Andhra Pradesh at Amravati.

16. Writ Petition No. 763 of 2021 filed by the STBL Projects Limited and others versus Union of India (Min. of Home Affairs) and Others before the Hon'ble High Court of Judicature of Andhra Pradesh at Amravati.

17. WP No 23250 of 2020 filed by the Sai Ram Movie Land (Shiridi Sai and Parthi Sai) and others versus Union of India (Min. of Home Affairs) and Others before the Hon'ble High Court of Judicature of Andhra Pradesh at Amravati.

18. Writ Petition No. 88 of 2021 in the matter of GTL Mahavitaran Bhrashtachar Viruddh Samiti Aurangabad Versus Union of India and Ors.

9.13 Nomination of officers to the following Committees

(i) Member of the committee constituted to study the "Issues related to Deepening of the power markets".
(ii) Member convener of the committee for preparation of Model PPA.

(iii)Member convener of the committee for preparation of SBD for monetization of transmission assets through ToT route.

(iv)Member of various committees for promoting hydro power like committee constituted to make recommendations on fast track development of Hydro Power Projects, committee constituted to make recommendations on making hydro projects viable, committee to examine the contractual issues and different mode of contracting in hydro Power Projects etc.

(v) Member Secretary of the sub-committee on "Fund Requirement" under National Electricity Plan committee.

(vi)Member of the sub-group on financial and taxation issues formed under the committee for drafting of Energy Storage Policy.

(vii) Co-opted member of the steering committee to formulate guidelines and DPR to take up the pilot project on BESS with capacity of 1000 MW or more and for monitoring such projects.

(viii)Member of Committee for preparing guidelines and SBD for R&M of coal based power plants.

(ix)Member of the Committee to consider conversion of Once Through Cooling System to Closed Cycle Cooling System

CHAPTER – 10

POWER GENERATION

10.1 Power Generation

Generation of power from conventional sources (Theraml, Nuclear &Hydro) & inport from Bhutan by the Central Sector, State Sector, Pvt. utilities & IPPs was about 1320947.07 million units during the Year 2021-22. This represents a growth of about 6.99% over the same period during previous year 2020-21 as per details given below:

Power Generation during 2021-22

Category	Programme (MU)	Actual (MU)	Shortfall (-)/ Excess(+)	% of Programme	Growth (%) with respect to previous year Actual Gen.
Thermal	1155200.00	1114714.48	40485.52	96.50	7.96
Nuclear	43020.00	47112.06	-4092.06	109.51	9.49
Hydro	149544.00	151627.33	-2083.33	101.39	0.88
Bhutan Imp	8236.00	7493.20	742.80	90.98	-14.51
TOTAL	**1356000.00**	**1320947.07**	**35052.93**	**97.41**	**6.99**

Note: Generation from stations having installed capacity less than 25MW 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 2021-22 are as under:

- Gross annual generation of the country was 1320.94 BU.
- The annual growth in the energy generation during the year was 6.99%.
- Thermal, Nuclear, Hydro and Import from Bhutan achieved a growth rate of 7.96%, 9.49%, 0.88% and -14.51% respectively. The electricity generation during the year 2021-22 from coal based thermal power stations was 1041.49 BU showing a growth rate of 9.52 % against -1.07% over same period last year.
- In Southern Region, the growth in thermal generation was 20.09% with respect to last year, which was highest amongst all the regions.
- The national average PLF for themal stations was 58.87% and 99 Stations with an aggregate installed capacity of 117140 MW, achieved PLF above national average.

  06 number of thermal power stations with an aggregate installed capacity of 9370 MW achieved above 90% PLF.

The Sector-Wise Generation and PLF during 2021-22 is given below:

Category / Sectors	Programme (MU)	Actual (MU)	PLF (%)
CENTRAL SECTOR			
THERMAL	366595.00	414624.22	69.71
NUCLEAR	43020.00	47112.06	79.32
HYDRO	61044.00	58421.61	
TOTAL	**470659.00**	**520157.89**	
STATE SECTOR			
THERMAL	388240.00	336515.45	54.50
HYDRO	74198.00	78792.42	
TOTAL	**462438.00**	**415307.87**	
PVT. SECTOR IPP			
THERMAL*	382880.00	346612.09	53.12
HYDRO	12832.00	12823.31	
TOTAL	**395712.00**	**359435.40**	
PVT. SECTOR UTL.			
THERMAL	17485.00	16962.72	66.95
HYDRO	1470.00	1589.99	
TOTAL	**18955.00**	**18552.71**	
TOTAL PVT	**414667.00**	**377988.11**	
BHUTAN IMP	8236.00	7493.20	
ALL INDIA REGION			
THERMAL	1155200.00	1114714.48	58.87
NUCLEAR	43020.00	47112.06	79.32
HYDRO	149544.00	151627.33	
BHUTAN IMP	8236.00	7493.20	
TOTAL	**1356000.00**	**1320947.07**	

***Includes import form some of the Captive Plants

10.2 Plant Load Factor of Thermal Power Stations

During the year 2021-22 the average PLF of Thermal Power Stations was 58.87 % and for Nuclear Power Stations was 79.32%.

99 Thermal power plants (Coal and Lignite based) achieved PLF higher than the All India average PLF of 58.87% as per details given in the table below:

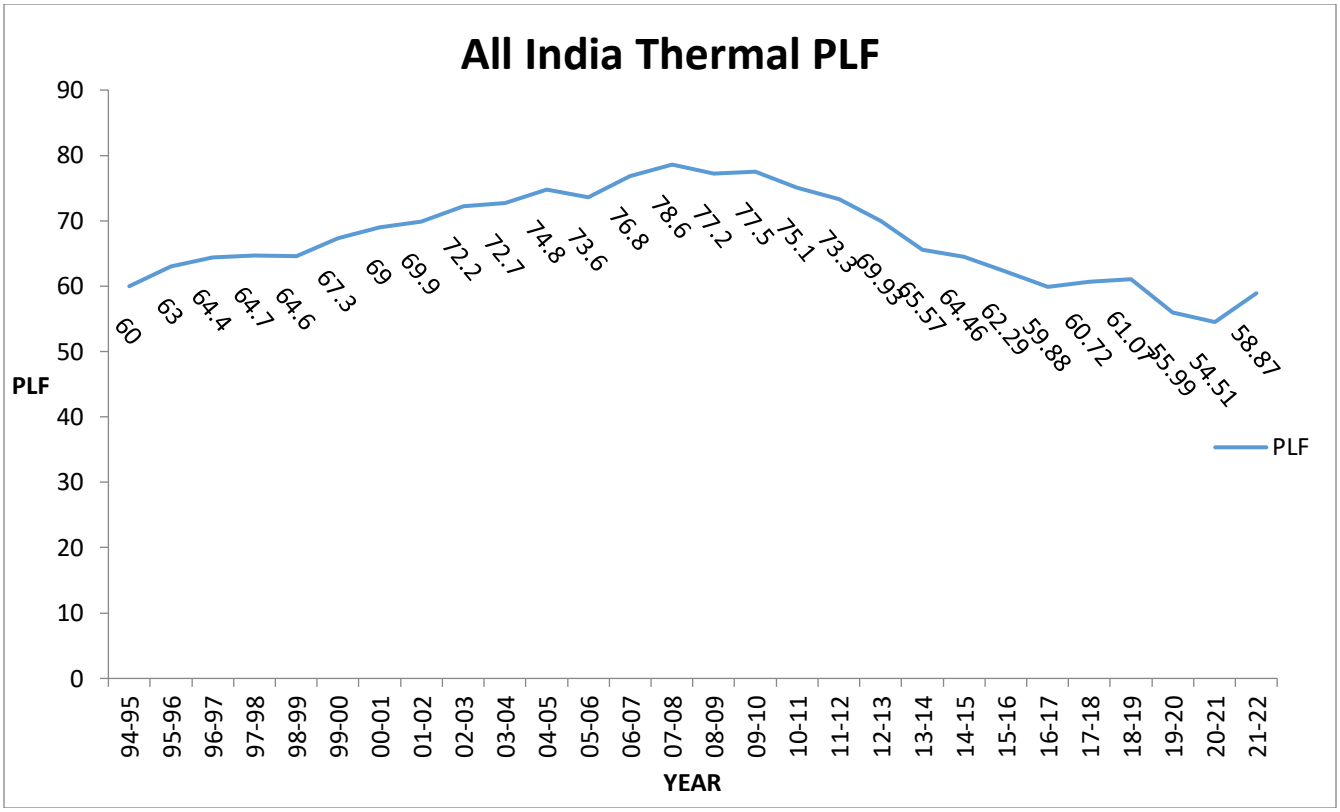
List of Thermal Power Stations (Coal and Lignite based) which have achieved PLF above National Average of 58.87 % during the year 2021-22

S. No.	STATION NAME	CAPACITY (in MW)	SECTOR	STATE	% PLF
1	KAIGA	880	CENTRAL	KARNATAKA	97.19
2	SASAN UMTPP	3960	PVT	MADHYA PRADESH	94.19
3	KORBA STPS	2600	CENTRAL	CHHATTISGARH	93.28
4	NARORA A.P.S.	440	CENTRAL	UTTAR PRADESH	92.89
5	KAKRAPARA	440	CENTRAL	GUJARAT	90.9

6	BAKRESWAR TPS	1050	STATE	WEST BENGAL	90.11
7	DSPM TPS	500	STATE	CHHATTISGARH	89.23
8	SANTALDIH TPS	500	STATE	WEST BENGAL	89.13
9	SINGARENI TPP	1200	STATE	TELANGANA	88.97
10	NEYVELI (EXT) TPS	420	CENTRAL	TAMIL NADU	88.78
11	KARAIKAL CCPP	32.5	STATE	PUDUCHERRY	88.21
12	RAJASTHAN A.P.S.	1080	CENTRAL	RAJASTHAN	87.82
13	CHANDRAPURA(DVC) TPS	500	CENTRAL	JHARKHAND	87.12
14	VINDHYACHAL STPS	4760	CENTRAL	MADHYA PRADESH	85.69
15	RIHAND STPS	3000	CENTRAL	UTTAR PRADESH	85.26
16	SAGARDIGHI TPS	1600	STATE	WEST BENGAL	84.8
17	BUDGE BUDGE TPS	750	PVT UTILITY	WEST BENGAL	84.66
18	TALCHER STPS	3000	CENTRAL	ODISHA	84.18
19	KOTHAGUDEM TPS (STAGE-7)	800	STATE	TELANGANA	83.57
20	LAKWA REPLACEMENT POWER PROJECT	69.755	STATE	ASSAM	83.47
21	KUDANKULAM	2000	CENTRAL	TAMIL NADU	82.97
22	SINGRAULI STPS	2000	CENTRAL	UTTAR PRADESH	82.5
23	BANDAKHAR TPP	300	PVT	CHHATTISGARH	82.3
24	BARADARHA TPS	1200	PVT	CHHATTISGARH	82.13
25	AMARKANTAK EXT TPS	210	STATE	MADHYA PRADESH	81.97
26	KAMALANGA TPS	1050	PVT	ODISHA	81.87
27	DERANG TPP	1200	PVT	ODISHA	81.42
28	MAITHON RB TPP	1050	PVT	JHARKHAND	81.42
29	HALDIA TPP	600	PVT	WEST BENGAL	81.37
30	SIPAT STPS	2980	CENTRAL	CHHATTISGARH	81.29
31	MONARCHAK CCPP	101	CENTRAL	TRIPURA	81.15
32	LARA TPP	1600	CENTRAL	CHHATTISGARH	81.09
33	NABINAGAR STPP	1980	CENTRAL	BIHAR	80.95
34	PAINAMPURAM TPP	1320	PVT	ANDHRA PRADESH	80.7
35	DARLIPALI STPS	1600	CENTRAL	ODISHA	80.5
36	BHILAI TPS	500	CENTRAL	CHHATTISGARH	80.31
37	KODARMA TPP	1000	CENTRAL	JHARKHAND	79.11
38	MAHADEV PRASAD STPP	540	PVT	JHARKHAND	78.73
39	RAJPURA TPP	1400	PVT	PUNJAB	78.72
40	ANPARA C TPS	1200	PVT	UTTAR PRADESH	78.68
41	KAHALGAON TPS	2340	CENTRAL	BIHAR	78.19
42	AGARTALA GT	135	CENTRAL	TRIPURA	78.14
43	NABINAGAR TPP	1000	CENTRAL	BIHAR	77.47
44	SABARMATI (D-F STATIONS)	362	PVT UTILITY	GUJARAT	76.88
45	JOJOBERA TPS	240	PVT	JHARKHAND	76.82
46	RAMAGUNDEM STPS	2600	CENTRAL	TELANGANA	76.62
47	PATHADI TPP	600	PVT	CHHATTISGARH	76.56
48	DAHANU TPS	500	PVT UTILITY	MAHARASHTRA	76.21
49	DHARIWAL TPP	600	PVT	MAHARASHTRA	75.93
50	RATIJA TPS	100	PVT	CHHATTISGARH	75.77
51	ANPARA TPS	2630	STATE	UTTAR PRADESH	75.65
52	JALIPA KAPURDI TPP	1080	PVT	RAJASTHAN	75.41
53	Dr. N.TATA RAO TPS	1760	STATE	ANDHRA PRADESH	75.18
54	AMRAVATI TPS	1350	PVT	MAHARASHTRA	75.1
55	TIRORA TPS	3300	PVT	MAHARASHTRA	74.88
56	KORBA-WEST TPS	1340	STATE	CHHATTISGARH	74.78

57	NEYVELI TPS-II	1470	CENTRAL	TAMIL NADU	74.74
58	BARSINGSAR LIGNITE	250	CENTRAL	RAJASTHAN	74.33
59	KAKATIYA TPS	1100	STATE	TELANGANA	74.11
60	RAIKHEDA TPP	1370	PVT	CHHATTISGARH	73.61
61	ANUPPUR TPP	1200	PVT	MADHYA PRADESH	73.4
62	KOTHAGUDEM TPS (NEW)	1000	STATE	TELANGANA	72.8
63	NIGRI TPP	1320	PVT	MADHYA PRADESH	72.49
64	KAWAI TPS	1320	PVT	RAJASTHAN	72.18
65	MEJIA TPS	2340	CENTRAL	WEST BENGAL	71.22
66	SEIONI TPP	600	PVT	MADHYA PRADESH	70.55
67	AVANTHA BHANDAR	600	PVT	CHHATTISGARH	70.49
68	NEYVELI TPS(Z)	250	PVT	TAMIL NADU	70.24
69	TARAPUR	1400	CENTRAL	MAHARASHTRA	70.14
70	KATHALGURI CCPP	291	CENTRAL	ASSAM	70.11
71	DURGAPUR STEEL TPS	1000	CENTRAL	WEST BENGAL	70.07
72	TROMBAY TPS	750	PVT UTILITY	MAHARASHTRA	69.26
73	BOKARO TPS `A` EXP	500	CENTRAL	JHARKHAND	68.42
74	KALISINDH TPS	1200	STATE	RAJASTHAN	67.97
75	FARAKKA STPS	2100	CENTRAL	WEST BENGAL	67.52
76	PRAYAGRAJ TPP	1980	PVT	UTTAR PRADESH	67.2
77	MAHATMA GANDHI TPS	1320	PVT	HARYANA	67.08
78	IB VALLEY TPS	1740	STATE	ODISHA	66.91
79	SURAT LIG. TPS	500	PVT	GUJARAT	66.87
80	GMR WARORA TPS	600	PVT	MAHARASHTRA	66.18
81	SIMHADRI	2000	CENTRAL	ANDHRA PRADESH	66.04
82	SGPL TPP	1320	PVT	ANDHRA PRADESH	65.98
83	MEJA STPP	1320	CENTRAL	UTTAR PRADESH	65.49
84	BALCO TPS	600	PVT	CHHATTISGARH	65.41
85	METTUR TPS	840	STATE	TAMIL NADU	65.18
86	TRIPURA CCPP	726.6	CENTRAL	TRIPURA	64.8
87	BARH II	1320	CENTRAL	BIHAR	64.45
88	BONGAIGAON TPP	750	CENTRAL	ASSAM	63.95
89	BARAMURA GT	42	STATE	TRIPURA	63.66
90	KOTA TPS	1240	STATE	RAJASTHAN	63.56
91	TORANGALLU TPS(SBU-I)	260	PVT	KARNATAKA	62.71
92	KHAPARKHEDA TPS	1340	STATE	MAHARASHTRA	60.83
93	UNCHAHAR TPS	1550	CENTRAL	UTTAR PRADESH	60.71
94	VALLUR TPP	1500	CENTRAL	TAMIL NADU	60.22
95	PARAS TPS	500	STATE	MAHARASHTRA	60.15
96	MAUDA TPS	2320	CENTRAL	MAHARASHTRA	60.06
97	GANDHI NAGAR TPS	630	STATE	GUJARAT	60.04
98	BANDEL TPS	330	STATE	WEST BENGAL	59.85
99	OP JINDAL TPS	1000	PVT	CHHATTISGARH	59.66

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 2021-22 is at the **Annexure-10A.**

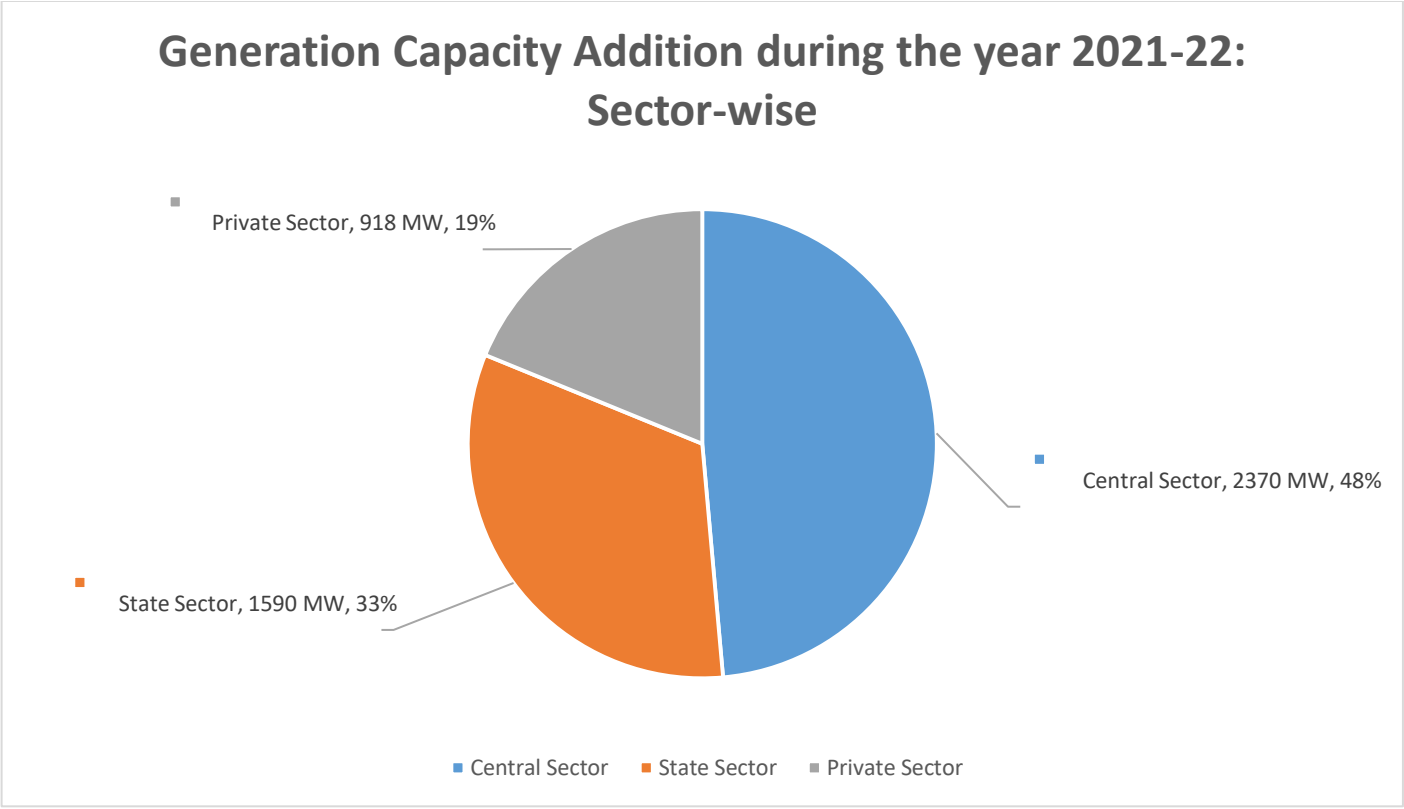
10.3 Generating Capacity Addition

During the year 2021-22, a total of 4,878 MW generation capacity was added from conventional sources. The capacity addition during the last 10 years Sector-wise and mode-wise are given below:

Capacity addition during the last 10 years – Sector-wise

(Figures in MW)

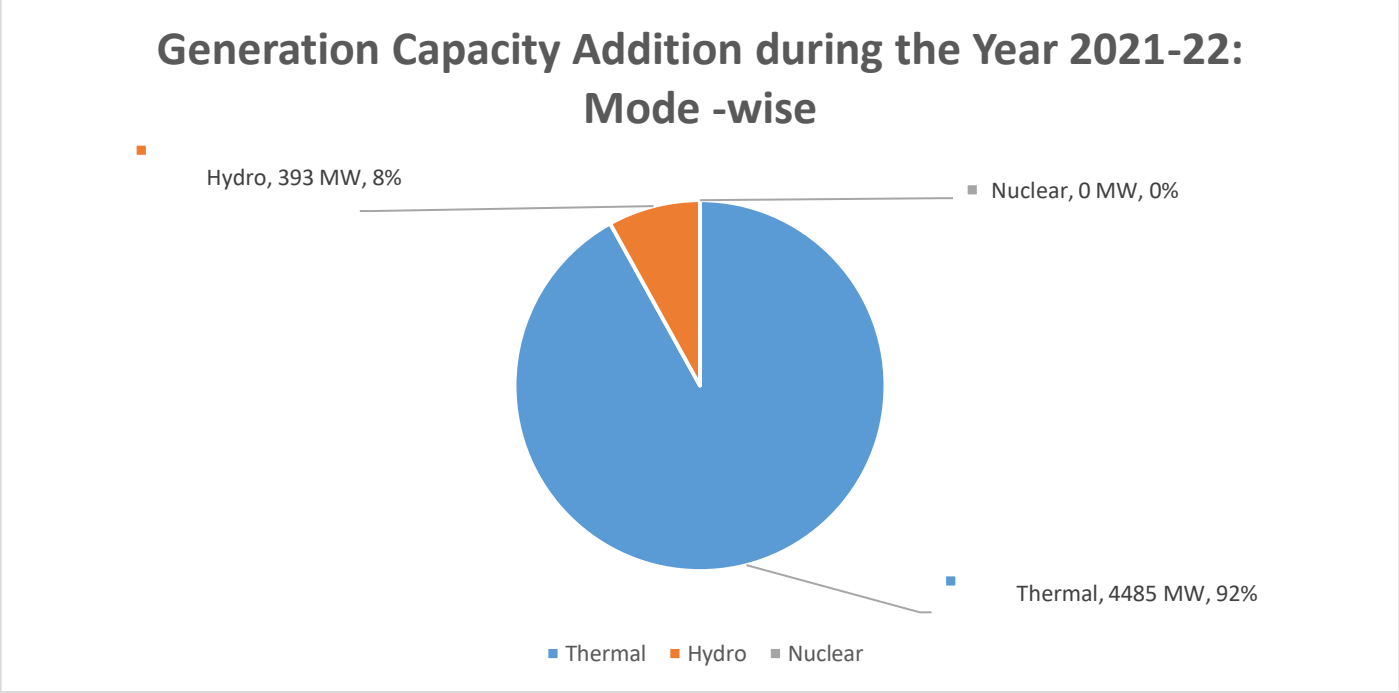
Year	Central Sector	State Sector	Private Sector	Total
2011-12	4770.00	3761.00	11971.00	20502.00
2012-13	5397.30	3977.00	11257.50	20631.80
2013-14	2574.01	3367.00	11884.00	17825.01
2014-15	4395.21	4886.10	13285.00	22566.31
2015-16	3775.60	7070.00	13131.00	23976.60
2016-17	4310.50	5177.30	4722.00	14209.80
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	957.15	99	5436.15
2021-22	2370	1590	918	4878



Capacity addition during the last 10 years – Mode-wise

(Figures in MW)

Year	Thermal	Hydro	Nuclear	Total
2010-11	11250.50	690.00	220.00	12160.50
2011-12	19079.00	1423.00	0.00	20502.00
2012-13	20121.8	510.00	0.00	20631.80
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	393	0.00	4878



10.4 Installed Electricity Generating Capacity

Total All India Installed Electricity Generating Capacity, as on 31.03.2022 is 399496.61 MW comprising of Thermal 236108.72 MW, Hydro 46722.52 MW, Nuclear 6780.00 MW and 109885.38 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	74927.91	75304.86	85875.95	236108.72
HYDRO	15664.72	27126.80	3931.00	46722.52
NUCLEAR	6780.00	0.00	0.00	6780.00
RES	1632.30	2423.31	105829.76	109885.38
Total	**99004.93**	**104854.98**	**195636.71**	**399496.61**

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

*Renewable Energy Sources (RES) includes Wind, Small Hydro Project, Biomass Gasifier, Biomass Power, 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 31.03.2022) are given at **Annexure-10B.**

CHAPTER – 11

POWER DEVELOPMENT IN NORTH-EASTERN REGION

11.1 Hydro-electric Potential in N.E. Region

As per Re-assessment studies carried out by CEA, hydro potential of the North Eastern Region in terms of installed capacity has been estimated as 58971 MW (58356 MW- above 25 MW capacity). Out of the above, 2027 MW (above 25 MW capacity) have been harnessed so far while projects amounting to 2120 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 (MW)		H. E. Schemes Developed (Above 25 MW)	H.E. Schemes Under Construction (Above 25 MW)
	Total	(Above 25 MW)		
Meghalaya	2394	2298	322	0
Tripura	15	0	0	0
Manipur	1784	1761	105	0
Assam	680	650	350	120
Nagaland	1574	1452	75	0
Ar. Pradesh	50,328	50,064	1115	2000
Mizoram	2196	2131	60	0
Total(NER):	**58,971**	**58,356**	**2027**	**2120**

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)	H. E. Schemes Dropped due to basin study/ other reasons (MW)	H. E. Schemes yet to be allotted for developmen t (MW)
Meghalaya	85	0	0	210	620	210	1312
Tripura	0	0	0	0	0	0	0
Manipur	66	0	0	0	0	1500	936
Assam	0	0	60	0	0	0	185
Nagaland	186	0	0	0	0	0	1272
Ar. Pradesh	15,858	0	5323	1400	8696	4778	16161.50
Mizoram	0	0	0	0	0	460	2076
Total(NER)	**16,195**	**0**	**5383**	**1610**	**9316**	**6948**	**21942.5**

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 31.03.2022, 4 No. of schemes aggregating to 1610 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.
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 will be pursued by NEEPCO.
3	Lower Siang (2700 MW)	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 16.02.2010.
4	Nafra (120 MW)	Sew Nafra Power Corporation Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 11.02.11.
5	Nyamjang Chhu (780 MW)	Nyamjang chhu Hydro Power Limited	Arunachal Pradesh	Concurrence accorded by CEA on 24.03.2011.
6	Tawang-I (600 MW)	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.10.2011.
7	Tawang-II (800 MW)	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 22.09.2011.
8	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 will be pursued by NEEPCO.
9	Hirong (500 MW)	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.04.2013.
10	Etalin (3097 MW)	Etalin H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 12.07.2013.
11	Talong Londa (225 MW)	GMR	Arunachal Pradesh	Concurrence accorded by CEA on 16.08.2013.
12	Naying (1000 MW)	D.S. Construction Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 11.09.2013.
13	Siyom (1000 MW)	Siyota Hydro power Pvt. Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 17.12.13.

S. No.	Name of Project	Agency	State	Present Status
14	Dikhu (186 MW)	Naga Manu Power Private Ltd.	Nagaland	Concurrence accorded by CEA on 31.03.14.
15	Kalai-II (1200 MW)	Kalai Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 27.03.2015.
16	Kynshi – I (270 MW)	Athena Kynshi power Pvt.Ltd.	Meghalaya	Concurrence accorded by CEA on 31.3.2015.
17	Heo (240 MW)	Heo Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.07.15.
18	Tato-I (186 MW)	Siyota Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.10.15.
19	Loktak Downstream (66 MW)	Loktak Downstream Hydroelectric corporation limited	Manipur	Concurrence accorded by CEA on 05.05.2017.
20	Dibang (2880MW)	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 18.09.2017.
21	Attunli (680 MW)	Attunli H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 15.03.2018.
22	Wah-Umiam Stage-III (85 MW)	NEEPCO	Meghalaya	Concurrence accorded by CEA on 26.07.2021
23	Ranganadi St-II (130MW)	NEEPCO	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
24	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.
25	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.
26	Pemashelphu (90 MW)	Mechuka Hydro Power pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
27	Sissiri (100 MW)	Soma Sissiri Hydro Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
28	Gimliang (80 MW)	SKI Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
29	Raigam (141 MW)	SKI Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
30	Kangtang Shiri (80 MW)	Kangtang Shiri Hydro Project Pvt. Ltd	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up

S. No.	Name of Project	Agency	State	Present Status
				of requisite inputs.
31	Nyukcharang Chu (96 MW)	Sew Energy Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
32	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.
33	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.
34	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.
35	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.
36	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 Under Construction Hydro Power Projects in North Eastern Region including Sikkim:

11.4.1 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/Assam on 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 per directions 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 planned to be commissioned in FY 2022-24 (Two units in FY 2022-23 and remaining six units in FY 2023-24).

(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 crunched 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.

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 March 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 revised cost of the project is Rs. 1692.60 crores at Jun-2016 price level. 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. 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.

The Resolution Plan Approval Application was listed for hearing on 17.02.2020 before NCLT, Hyderabad ("Tribunal"). Final hearing was held on 31.07.2020. Investment approval for acquisition of M/s Jal Power Corporation Ltd. and construction of balance works of Rangit-IV by NHPC was conveyed to NHPC by MoP on 30.03.2021.

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 M/s Rithwik HIPL JV on 27.08.2021. HM works and EM works (Design, Supply, Erection, Testing, commissioning of Balance of Plant) were awarded 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 May 2024.

11.4.2 State 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 August, 2024.

11.4.3 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 crunched 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 was 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 accessebility of site is under constuction with the help of State Govt of Sikkim. The project works are loikely to start after construction of the bridge.

About 48 months will be required for completion of the project after restart of works.

11.5 Status of Various Hydro Power Projects in North-Eastern Region Appraised by CEA

11.5.1 DPR appraisal/ Concurrence

(i) Attunli HE Project (4x170 = 680MW) in Arunachal Pradesh by M/s AHPCL

The project is proposed as a RoR scheme on Tangon river located in Dibang Valley district of Arunachal Pradesh having an underground powerhouse 4x170 MW units driven by Francis type turbine. The project is envisaged to generate 2796 MU annually. Attunli H.E. Project was accorded concurrence by CEA on 15.03.2018 at an estimated completed cost of ₹6111.28 crores.

11.5.2 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.

(iv) Dibang (12x240=2880 MW), Arunachal Pradesh, NHPC Limited

Dibang HE Project located in Lower Dibang Valley District of Arunachal Pradesh was accorded concurrence of CEA on 18.09.2017 for an estimated cost of ₹ 25732.79 Crores (including IDC and FC) at July, 2016 price level.

Revised cost estimates at October, 2019 price level, submitted by NHPC Limited, was vetted by CEA amounting to ₹29839.34 crores (including IDC & FC) vide CEA letter dated 22.05.2020.

Updated cost estimates at August, 2020 price level and May, 2021 price level, submitted by NHPC Limited, was vetted by CEA amounting to ₹29666.11 crores (including IDC & FC) and ₹32983.03crores (including IDC & FC) vide CEA letter dated 23.06.2021 and 13.12.2021 respectively.

(v) Loktak Downstream (2x33= 66 MW), Manipur, LDHCL

Loktak Downstream HE Project located in Tamenglong District of Manipur was accorded concurrence of CEA on 05.05.2017 for an estimated cost of ₹ 1352.77 Crores (including IDC and FC) at February, 2015 price level.

Revised cost estimates at July, 2020 price level, submitted by LDHCL, was vetted by CEA amounting to ₹1311.05 crores (including IDC & FC) vide CEA letter dated 28.12.2020.

11.5.3 CEA concurred Projects, yet to be taken under construction.

(A) Central Sector Projects

(i) Loktak Down Stream (66 MW), Manipur, LDHCL

The project to be executed by NHPC, was cleared by CEA for an Installed Capacity of (3x30=90 MW) on 31.12.1999.

The project is now proposed to be executed by a Joint Venture between NHPC and Government of Manipur with revised capacity of 66 MW. CEA accorded concurrence on 15.11.2006 to the revised proposal with reduced capacity of 66MW. MoU and Promoters' Agreement for implementation of the project on joint venture basis were signed by Govt. of Manipur with NHPC on 14.9.2007 and 26.9.2008 respectively. Concurrence was

transferred from NHPC to LHDC on 06.08.2012.

Environment clearance was accorded by MoEF&CC on 16.01.2013. In- principle forest clearance stage-I was accorded by MOEF&CC on dated 03.03.11 and Forest clearance Stage–II accorded on 22.12.2014.

The revised DPR submitted by NHPC for fresh concurrence has been concurred by CEA on 05.05.2017 at estimated present day cost of ₹1352.77 crores (including IDC&FC) at February, 2015 price level.

(ii) 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.

(iii) 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.

(iv) Dibang Multipurpose Project (12x240= 2880MW)-Arunachal Pradesh

Dibang MPP was accorded concurrence by CEA with IC of 3000 MW on 23.1.2008.

Environment clearance was accorded on 19.05.2015. MoEF&CC accorded Forest Clearance Stage – I on 15.4.2015 with a condition to reduce Dam height by 10 m in order to reduce the submergence area necessitating fresh DPR to be prepared by developer. FC-II accorded on 12.03.2020.

The fresh DPR submitted by NHPC (with 10m reduction in height of Dam) was concurred by CEA on 18.09.2017 at estimated cost of ₹25732.79crores (July, 2016 price level) including Power Component of ₹17510.84 crores, Flood Moderation component ₹4627.8 crores.

(v) Wah-Umium Stage-III (Erstwhile Mawphu Stage-II) H.E. Project (2x42.5= 85 MW)-Meghalaya

The project was concurred by CEA on 26.07.2021at 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

(C) State Sector Projects

Nil

(D) Private Sector Projects

i) Demwe Lower HE Project (5x342 + 1x40=1750 MW), Arunachal Pradesh by M/s 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), Arunachal Pradesh by M/s 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.

iii) Hirong HE Project (4x125 =500MW) in Arunachal Pradesh by M/s JAPL

Hirong H.E. Project was accorded concurrence by

CEA on 10th April , 2013 at an estimated completed cost of ₹ 5532.63 Crores. MOP vide letter dated 22.12.2021 indicated that Hirong HEP to be pursued by NEEPCO.

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.

iv) Etalin HE Project (10x307+ 1x9.6+ 1x7.4 = 3097MW) in Arunachal Pradesh By M/s 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.

v) 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.

vi) Naying HE Project (4x250 =1000MW) in Arunachal Pradesh By NDSCPL

Naying H.E. Project was accorded concurrence by CEA on 11th Sept , 2013 at an estimated completed cost of ₹ 9301.11 Crores. MOP vide letter dated 22.12.2021 indicated that Naying HEP to be pursued by NEEPCO.

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

vii) 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.

viii) Heo HE Project (3x80 = 240MW) in Arunachal Pradesh by M/s 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 10.11.15. Forest clearance stage-I accorded on 27.10.15. Forest clearance stage-II yet to be obtained.

ix) Tato – I HE Project (3x62 = 186MW) in Arunachal Pradesh by M/s 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.

x) Attunli HE Project (4x170 = 680MW) in Ar. Pradesh by M/s 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.

xi) Dikhu HE Project (3x62= 186 MW) in Nagaland by M/s 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.

Note: 1) Nafra H.E. Project has been removed from the list under the point no. 11.5.3 as Government of Arunachal Pradesh vide letter dated 09.07.2021 informed CEA that allotment of Nafra HEP to M/s. SNEL has been withdrawn/ cancelled vide GoAP letter dated 23.12.2019. Further, validity of Concurrence to project expired on 01.01.2017. NEEPCO vide letter dated 23.08.2021 to HPA informed that it has signed MoA with GoAP on 14.08.2021 for Nafra HEP. Further, as per revised e-flows under Cumulative Basin Studies of Bichom Basin, DPR of Nafra H.E. project is to be revised.

2) Kynshi-I H.E. Project has been removed from the list under the point no. 11.5.3 as M/s. AKPPL vide letter dated 05.08.2021 to HPA Division informed that it will submit the revised DPR based on e-flows under revised ToR.

11.6 Development of Transmission System in N.E. Region

11.6.1 Examination of Detailed Project Reports (DPRs) for transmission system of Hydro Power Projects as part of concurrence by CEA

Following DPRs of hydropower projects examined as part of concurrence by CEA

i) Examination and vetting of updated cost estimates of Dibang Multipurpose Project (2880 MW) in Arunachal Pradesh by M/s NHPC.

ii) Examination of DPR of Nagaland for seeking ADB funding for Lower Tizu Hydro Electric Project (3x14MW).

11.6.2 Examination of DPR/FR of Transmission Works for processing of clearance by CEA

NIL

11.7 Grant of prior approval of Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2021-22.

a) Prior approval of the Government under Section 68(1) of Electricity Act, 2003 to PFC Consulting Ltd. on 05.04.2021 for overhead lines under the transmission project "Establishment of new 220/132kV substation at Nangalbibra".

11.8 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2021-22

NIL

11.9 Standing Committee/ NERPC (TP) meetings held during 2021-22:

- 03rd meeting of North Eastern Region Power Committee (Transmission Planning) (NERPCTP) held on 19th July, 2021.

The transmission systems discussed in the meeting are given in **Annexure – 3B.**

11.10 Hydro Power Generation Performance

Hydro Power generation during the year 2021-22 (as on 31.03.2022) in the North Eastern Region was 6.37 BU against a target of 6.84 BU, which is about 6.82 % less.

11.11 R&M Schemes (Hydro) of North Eastern Region

Thirteen (13) existing hydro schemes of North Eastern Region with an aggregate installed capacity of 830 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 five (5) schemes having an aggregate installed capacity of 471 MW are under various stages of implementation and are likely to accrue a benefit of 417 MW at an estimated cost of about Rs. 1988.47 Crores. The scheme-wise status of the R&M works of the hydro schemes of North Eastern Region as on 31.03.2022 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	189.81	46(LE)	Detailed engineering on the finalized scope of works is in progress. R&M works planned for completion in 2024-25. CEA has approved Rs. 123.19 Crs. for EM Cost & Rs. 66.62 Crs. for Civil & HM Costs for Renovation and Modernisation.
10.	Kopili Power Station, NEEPCO, Assam	4x50	1117.07	200(LE)	Detailed engineering on the finalized scope of works is in progress. DPR approved by CEA in the month of June, 2021.
11.	Kyrdemkulai (Umium St.III), MePGCL, Meghalaya	2x30	408	60(LE) + 6(U)	LOA issued to M/s Integral S.A. in JV with Rodic Consultant Pvt. Ltd on 11.12.2020 after approval from JICA. Concurrence on the Bidding Document for E&M package received from JICA on 22.12.2021. The tender for E&M package was floated on 03.01.22 and the Pre-Bid meeting was held on 17.02.22. All the queries by the

					firms was replied on 04.03.22 and the last date for submission of bids by 1st April, 2022.
12.	Loktak, NHPC, Manipur	3x35	273.59	105 (LE)	CERC has approved the proposal of R&M works. R&M works planned for completion in 2023-24. Some of E&M and Civil packages have been awarded and remaining are under various stages of tendering. H&M packages have been awarded and work is in progress.
13.	Umiam-Umtru Stage-IV, MePGCL, Meghalaya	2x30	-	-	RLA studies to be taken up. R&M works planned for completion in 2022-27 period. EOI for RLA studies has been approved by Board's of Director on 15.02.22 & Tender was floated on 23.02.22 and the last date for submission of EOI is 26.04.2022.
	Sub Total(B)	**471**	**1988.47**	**417**	
	Total(A+B)	**830**	**2247.8**	**538**	

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

CHAPTER-12

HUMAN RESOURCE DEVELOPMENT

12.1 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. To fulfill its statutory duty under 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.

12.2 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.

12.3 Induction Training programme

Induction Training programme is being organized for newly recruited Assistant Directors of the CEA. Induction Training of 5th Batch comprising of 25 nos.of Assistant Directors of CEA for a duration of 26 weeks was concluded on 31st August, 2021 at an expenditure of Rs 2.63 crs.

Under this training programme the officers have under gone classroom training at National Power

Training Institute (Faridabad), Plant visits and On-Job Training at various generation, transmission and distribution facilities in Power Sector This training is intended to give the officers an immense theoretical and practical exposure to the latest technology and trends in the Power Sector.

12.4 Refresher Training Programmes in India

Various refresher training programmes for CEA officers were conducted at professional institutes of National and International repute like CBIP, ISTM, CIGRE, FICCI and IEEE. 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 2021-22 are 39.

12.5 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 2021-22, a total of 06 nos. officers of CEA at various levels visited foreign nations under 03 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	Duration of Visit
1.	117th Meeting of Permanent Indus Commission (PIC)	1. Shri Jaideep Singh Bawa, Chief Engineer 2. Ms Arpita Upadhyay Deputy Director	Pakistan	28.02.2022 To 04.03.2022
2.	9th Meeting of JSC/JWG between India and Nepal on Cooperation in Power Sector	1. Shri Goutam Roy Member (Power System) 2. Shri Gautam Ghosh Director 3. Shri B S Bairwa,Director	Nepal	22.02.2022 To 25.02.2022
3.	Meeting of the QUAD Senior Cyber Group Principals	Shri M A K P Singh,Chief Engineer	Australia	23.03.2022 To 24.03.2022

12.6 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 2021-22, 3 apprentice trainees have joined under the Apprentice Act 1961.The rate of monthly stipend for graduate increase in stipend trainee was Rs 4984/- and Rs 3542/-. Now same is increased is to Rs 9000/ and Rs 8000/- respectively w.e.f 1st April 2021 by Govt of India.

12.7 Summer Training/ Winter Training

During the financial year 2021-22, summer and winter training/internship been were given to 18 nos of students from reputed Institutes/Colleges in CEA.

12.8 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 2021-22, one technical presentation and one online lecture had been organized.

12.9 Recognition of Training Institutes

To fulfill its statutory duty under 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 2021-22, the following 15 nos. training institutes/Centers were visited and assessed for recognition: -

S.No	Name of the Institute
1	OPTCL Power Training Centre ,Bhuvaneshwar
2	OMS Power Training and Research Institute, Bhuvaneshwar
3	Hydro Power Training Centre, NPTI, Nangal
4	Power Grid Academy of Leadership, PAL, Manesar,Haryana
5	Koradi Training Centre, Nagpur
6	National Power Training Institute (Western Region), Nagpur
7	Nashik Training Centre, MAHAGENCO, Eklahare, Nashik
8	Dept. of Training & Safety, MSEDCL, Eklahare, Nashik
9	Regional Training Center, MSETCL, Padghe, Thane, Maharashtra
10	Adani Power Training Research Institute (APTRI),Mundra, Gujarat
11	Tata Power Skill Development Institute, Maithon, Jharkhand
12	DVC Training Institute, Chandrapura, Jharkhand
13	Regional Training Centre, Kolhapur, Maharashtra
14	Regional Training Centre, Jejuri, Maharashtra
15	Centre of Excellence, CBIP, Gurugram, Haryana

12.10 Sub-Committee on Human Resource Requirement under National Electricity Plan 2022-27

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. Power sector is poised for massive growth in generation and commensurate with transmission and distribution infrastructure.

Manpower development including training facilities shall commensurate with this capacity addition requirement. The technical knowledge acquired needs to be supplemented with applied engineering in various fields of power generation, transmission and distribution. All these skills need to be regularly updated to cope with rapidly advancing technology. HRD Division, CEA has conducted meetings under this sub-committee and involved in the process of calculation of Human Resources that will be required during 2022-27 and 2027-32.

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ANNEXURES

Annexure – 2A

PLANT-WISE COAL RECEIPT AND CONSUMPTION IN 2021-22

Figures in Thousand Tonnes

S.No	Name of TPS	Capacity (MW)	Receipt			Consumption
			Indigeneous	Import	Total	
1	PANIPAT TPS	710	1819	0	1819	1942
2	RAJIV GANDHI TPS	1200	1762	0	1762	1868
3	YAMUNA NAGAR TPS	600	1795	0	1795	1846
4	INDIRA GANDHI STPP	1500	4400	0	4400	4669
5	MAHATMA GANDHI TPS	1320	4535	0	4535	4714
6	GH TPS (LEH.MOH.)	920	1483	0	1483	1344
7	ROPAR TPS	840	1241	0	1241	1191
8	RAJPURA TPP	1400	5116	0	5116	5436
9	TALWANDI SABO TPP	1980	5720	0	5720	6019
10	GOINDWAL SAHIB TPP	540	1207	0	1207	1335
11	KOTA TPS	1240	4857	0	4857	4907
12	SURATGARH TPS	1500	3013	0	3013	2804
13	SURATGARH STPS	1320	2333	0	2333	2131
14	CHHABRA TPP	2320	5346	0	5346	5451
15	KALISINDH TPS	1200	4324	0	4324	4368
16	KAWAI TPS	1320	4760	0	4760	4856
17	ANPARA TPS	2630	11242	0	11242	11404
18	HARDUAGANJ TPS	1265	847	0	847	1103
19	OBRA TPS	1094	3313	0	3313	3458
20	PARICHHA TPS	1140	2274	0	2274	2613
21	DADRI (NCTPP)	1820	3706	139	3846	3847
22	RIHAND STPS	3000	14132	0	14132	13535
23	SINGRAULI STPS	2000	9505	0	9505	9464
24	TANDA TPS	1760	5684	126	5810	5925
25	UNCHAHAR TPS	1550	5189	130	5319	5542
26	ROSA TPP Ph-I	1200	3546	0	3546	3652
27	ANPARA C TPS	1200	5117	0	5117	5269
28	MAQSOODPUR TPS	90	155	0	155	158
29	KHAMBARKHERA TPS	90	150	0	150	160
30	BARKHERA TPS	90	144	0	144	161
31	KUNDARKI TPS	90	207	0	207	214
32	UTRAULA TPS	90	192	0	192	191
33	PRAYAGRAJ TPP	1980	6922	0	6922	6996

34	LALITPUR TPS	1980	6153	0	6153	5869
35	MEJA STPP	1320	5246	0	5246	5052
36	DSPM TPS	500	2753	0	2753	2805
37	KORBA-WEST TPS	1340	6715	0	6715	6723
38	KORBA STPS	2600	14082	0	14082	14127
39	SIPAT STPS	2980	13974	285	14259	14232
40	PATHADI TPP	600	2513	0	2513	2758
41	BHILAI TPS	500	2516	0	2516	2660
42	BALCO TPS	600	2433	52	2486	2532
43	MARWA TPS	1000	3583	0	3583	3574
44	AKALTARA TPS	1800	5872	0	5872	5828
45	BARADARHA TPS	1200	6723	0	6723	6473
46	AVANTHA BHANDAR	600	2932	0	2932	2762
47	TAMNAR TPP	2400	7951	0	7951	7862
48	BANDAKHAR TPP	300	1454	0	1454	1520
49	NAWAPARA TPP	600	418	0	418	550
50	OP JINDAL TPS	1000	4168	0	4168	4145
51	BINJKOTE TPP	600	1181	0	1181	1243
52	LARA TPP	1600	8069	0	8069	7946
53	RAIKHEDA TPP	1370	6191	0	6190	6186
54	UCHPINDA TPP	1440	5249	0	5249	5266
55	SALORA TPP	135	0	0	0	0
56	SABARMATI (D-F STATIONS)	362	1158	235	1393	1378
57	SIKKA REP. TPS	500	0	388	388	466
58	GANDHI NAGAR TPS	630	2301	0	2301	2213
59	UKAI TPS	1110	3478	0	3478	3434
60	WANAKBORI TPS	2270	7524	0	7524	7569
61	MUNDRA UMTPP	4000	0	4366	4366	3635
62	SALAYA TPP	1200	0	0	0	0
63	MUNDRA TPS	4620	0	6515	6515	6583
64	AMARKANTAK EXT TPS	210	984	0	984	982
65	SANJAY GANDHI TPS	1340	4903	0	4903	5108
66	SATPURA TPS	1330	2049	0	2049	2255
67	SHREE SINGAJI TPP	2520	6817	0	6817	6884
68	VINDHYACHAL STPS	4760	24719	0	24719	24072
69	GADARWARA TPP	1600	4926	173	5099	5132
70	KHARGONE STPP	1320	3757	0	3757	3846
71	BINA TPS	500	1816	0	1816	1812
72	ANUPPUR TPP	1200	5496	0	5496	5428

73	SASAN UMTPP	3960	18159	0	18159	18304
74	NIGRI TPP	1320	5015	0	5015	4969
75	MAHAN TPP	1200	2383	0	2383	2380
76	SEIONI TPP	600	2517	0	2517	2299
77	BHUSAWAL TPS	1210	4747	0	4747	4745
78	CHANDRAPUR(MAHARASHTRA) STPS	2920	11654	0	11654	11804
79	KHAPARKHEDA TPS	1340	6230	0	6230	6205
80	KORADI TPS	2190	8509	0	8509	8519
81	NASIK TPS	630	1650	0	1650	1678
82	PARLI TPS	750	1937	0	1937	1966
83	PARAS TPS	500	1986	0	1986	1998
84	TIRORA TPS	3300	14095	0	14095	14183
85	DAHANU TPS	500	1792	0	1792	2005
86	BUTIBORI TPP	600	0	0	0	0
87	AMRAVATI TPS	1350	5479	0	5479	5779
88	GMR WARORA TPS	600	2331	0	2331	2319
89	MAUDA TPS	2320	7075	1041	8116	8668
90	JSW RATNAGIRI TPP	300	0	749	749	734
91	WARDHA WARORA TPP	540	1479	0	1479	1460
92	DHARIWAL TPP	600	2733	0	2733	2721
93	TROMBAY TPS	750	0	2244	2244	2309
94	SOLAPUR STPS	1320	2590	89	2679	3172
95	MIHAN TPS	246	0	0	0	0
96	NASIK (P) TPS	1350	0	0	0	0
97	SHIRPUR TPP	150	0	0	0	0
98	BELA TPS	270	0	0	0	0
99	Dr. N.TATA RAO TPS	1760	9076	0	9076	9221
100	RAYALASEEMA TPS	1650	5052	0	5052	5123
101	SIMHADRI	2000	9114	3	9117	8939
102	DAMODARAM SANJEEVAIAH TPS	1600	3677	0	3677	3632
103	SIMHAPURI TPS	600	0	0	0	0
104	THAMMINAPATNAM TPS	300	0	294	294	305
105	VIZAG TPP	1040	95	0	95	210
106	PAINAMPURAM TPP	1320	3905	1833	5738	5652
107	SGPL TPP	1320	807	3368	4175	4186
108	RAICHUR TPS	1720	4807	0	4807	4738
109	BELLARY TPS	1700	4370	0	4370	4369
110	UDUPI TPP	1200	20	602	622	727

111	TORANGALLU TPS(SBU-II)	600	0	877	877	862
112	TORANGALLU TPS(SBU-I)	260	0	476	476	476
113	KUDGI STPP	2400	3481	240	3721	3983
114	YERMARUS TPP	1600	3239	0	3239	3288
115	METTUR TPS	840	3839	19	3858	3880
116	NORTH CHENNAI TPS	1830	9238	135	9373	7527
117	TUTICORIN TPS	1050	4553	0	4553	4599
118	METTUR TPS - II	600	2092	57	2149	2163
119	VALLUR TPP	1500	5893	0	5893	5971
120	MUTHIARA TPP	1200	4	756	760	802
121	TUTICORIN (JV) TPP	1000	2912	0	2912	2983
122	ITPCL TPP	1200	0	1624	1624	1635
123	TUTICORIN (P) TPP	300	0	0	0	0
124	TUTICORIN TPP ST-IV	525	0	0	0	0
125	BHADRADRI TPP	1080	3630	0	3630	3558
126	RAMAGUNDEM STPS	2600	10792	0	10792	10808
127	KAKATIYA TPS	1100	4102	0	4102	4123
128	RAMAGUNDEM-B TPS	62.5	203	0	203	208
129	KOTHAGUDEM TPS (NEW)	1000	4191	0	4191	4212
130	KOTHAGUDEM TPS (STAGE-7)	800	2877	0	2877	2904
131	SINGARENI TPP	1200	5376	0	5376	5411
132	MUZAFFARPUR TPS	390	2063	0	2063	2066
133	KAHALGAON TPS	2340	11528	0	11528	11974
134	BARH I	660	762	0	762	766
135	BARH II	1320	5015	0	5015	4889
136	BARAUNI TPS	710	1618	0	1618	1525
137	NABINAGAR TPP	1000	3970	0	3970	3951
138	NABINAGAR STPP	1980	5051	0	5051	4950
139	CHANDRAPURA(DVC) TPS	500	2324	0	2324	2352
140	TENUGHAT TPS	420	1065	0	1065	1274
141	BOKARO TPS `A` EXP	500	1782	0	1782	1730
142	MAITHON RB TPP	1050	4640	0	4640	4578
143	KODARMA TPP	1000	4265	0	4265	4299
144	MAHADEV PRASAD STPP	540	2526	0	2526	2533
145	JOJOBERA TPS	240	1057	0	1057	1084
146	IB VALLEY TPS	1740	8145	0	8145	8015
147	DARLIPALI STPS	1600	6559	0	6559	6390
148	TALCHER STPS	3000	16886	131	17017	17058
149	STERLITE TPP	600	1749	0	1749	1731

150	KAMALANGA TPS	1050	5466	0	5466	5458
151	DERANG TPP	1200	6500	0	6500	5862
152	UTKAL TPP (IND BARATH)	350	0	0	0	0
153	DURGAPUR TPS	210	188	0	188	251
154	BAKRESWAR TPS	1050	4890	0	4890	5134
155	MEJIA TPS	2340	9637	3	9640	9856
156	BANDEL TPS	270	1308	0	1308	1380
157	D.P.L. TPS	550	1581	0	1581	1775
158	KOLAGHAT TPS	840	3216	0	3216	3391
159	SAGARDIGHI TPS	1600	7162	0	7162	7298
160	SANTALDIH TPS	500	2593	0	2593	2778
161	BUDGE BUDGE TPS	750	3294	0	3294	3235
162	SOUTHERN REPL. TPS	135	144	0	144	131
163	TITAGARH TPS	240	0	0	0	0
164	FARAKKA STPS	2100	7844	30	7874	8115
165	DURGAPUR STEEL TPS	1000	4012	16	4028	4122
166	HALDIA TPP	600	2871	0	2871	2939
167	RAGHUNATHPUR TPP	1200	3922	0	3922	3980
168	HIRANMAYE TPP	300	884	0	884	860
169	BONGAIGAON TPP	750	2416	0	2416	2491
170	DISHERGARH TPP	12	0	0	0	0
171	CHAKABURA TPP	30	220	0	220	221
172	KASAIPALLI TPP	270	1475	0	1475	1534
173	KATGHORA TPP	35	0	0	0	0
174	RATIJA TPS	100	920	0	920	928
175	SVPL TPP	63	0	0	0	0
176	SWASTIK KORBA TPP	25	0	0	0	0
177	NIWARI TPP	90	245	0	245	245
178	GEPL TPP Ph-I	120	0	0	0	0
TOTAL (ALL INDIA)		**204080**	**667639**	**26998**	**694636**	**697339**

Annexure 2B

FUEL MANAGEMENT DIVISION
FUEL SUPPLY/CONSUMPTION FOR GAS BASED POWER STATIONS

2021-22

S. No	Name of Power Station	Installed Capacity (MW)	Name of the State	P/ I	Domestic Gas Allotted (MMSCMD)			RLNG (Imported)-Long Term Contracts	Gas Consumed/Supplied (MMSCMD)					
					APM /Non-APM/PMT	KGD-6 (Firm)	Total		Domestic			RLNG (Imported)		TOTAL
									APM /Non APM/PMT	KGD-6/ Auctioned domestic gas	Total	Long Term	SPOT	
(A) CENTRAL SECTOR														
1	NTPC, FARIDABAD CCPP	431.59	HARYANA	P	1.46	0.35	1.81	0.20	0.05	0.00	0.05	0.01	0.01	**0.07**
2	NTPC, ANTA CCPP	419.33	RAJASTHAN	P	1.31	0.24	1.55	0.50	0.02	0.00	0.02	0.05	0.01	**0.08**
3	NTPC, AURAIYA CCPP	663.36	UTTAR PRADESH	P	2.17	0.30	2.47	1.00	0.09	0.00	0.09	0.13	0.03	**0.25**
4	NTPC, DADRI CCPP	829.78	UTTAR PRADESH	P	2.39	0.86	3.25	0.30	0.13	0.00	0.13	0.25	0.08	**0.46**
	Sub Total (NR)	**2344.06**			**7.33**	**1.75**	**9.08**	**2.00**	**0.28**	**0.00**	**0.28**	**0.45**	**0.13**	**0.86**
5	NTPC, GANDHAR(JHANORE) CCPP	657.39	GUJARAT	P	2.56	0.63	3.19	0.00	0.10	0.00	0.10	0.09	0.08	**0.27**
6	NTPC, KAWAS CCPP	656.20	GUJARAT	P	3.64	2.08	5.72	0.00	0.03	0.00	0.03	0.07	0.07	**0.17**
7	RATNAGIRI (RGPPL-DHABHOL)	1967.08	MAHARASHTRA	P	0.90	7.60	8.50	1.75	0.36	0.00	0.36	1.26	0.07	**1.69**
	Sub Total (WR)	**3280.67**			**7.10**	**10.31**	**17.41**	**1.75**	**0.49**	**0.00**	**0.49**	**1.41**	**0.22**	**2.12**
8	KATHALGURI (NEEPCO)	291.00	ASSAM	I	1.40	0.00	1.40	0.00	1.42	0.00	1.42	0.00	0.00	**1.42**
9	AGARTALA GT+ST (NEEPCO)	135.00	TRIPURA	I	0.75	0.00	0.75	0.00	0.71	0.00	0.71	0.00	0.00	**0.71**
10	MONARCHAK(NEEPCO)	101.00	TRIPURA	I	0.50	0.00	0.50	0.00	0.45	0.00	0.45	0.00	0.00	**0.45**
11	TRIPURA CCPP (ONGC)	726.60	TRIPURA	I	2.65	0.00	2.65	0.00	2.20	0.00	2.20	0.00	0.00	**2.20**
	Sub Total (NER)	**1253.60**			**5.30**	**0.00**	**5.30**	**0.00**	**4.79**	**0.00**	**4.79**	**0.00**	**0.00**	**4.79**

	Total (CS)=A	**6878.33**			**19.73**	**12.06**	**31.79**	**3.75**	**5.55**	**0.00**	**5.55**	**1.86**	**0.35**	**7.77**
(B) STATE SECTOR														
12	I.P.CCPP	270.00	DELHI	P	0.95	0.00	0.95	0.60	0.05	0.00	0.05	0.12	0.00	**0.16**
13	PRAGATI CCGT-III	1500.00	DELHI	P	1.56	0.93	2.49	0.00	1.43	0.00	1.43	0.21	0.08	**1.72**
14	PRAGATI CCPP	330.40	DELHI	P	2.05	0.00	2.05	0.20	0.05	0.00	0.05	0.76	0.08	**0.89**
15	DHOLPUR CCPP	330.00	RAJASTHAN	P	1.50	0.10	1.60	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
16	RAMGARH (RRVUNL,Jaisalmer)	273.80	RAJASTHAN	I	1.65	0.00	1.65	0.00	1.27	0.00	1.27	0.00	0.00	**1.27**
	Sub Total (NR)	**2704.20**			**7.71**	**1.03**	**8.74**	**0.80**	**2.80**	**0.00**	**2.80**	**1.09**	**0.15**	**4.05**
17	DHUVARAN CCPP(GSECL)	594.72	GUJARAT	P	0.25	0.44	0.69	0.25	0.01	0.00	0.01	0.06	0.08	**0.15**
18	HAZIRA CCPP(GSEG)	156.10	GUJARAT	P	0.80	0.01	0.81	0.00	0.00	0.00	0.00	0.00	0.02	**0.02**
19	HAZIRA CCPP EXT	351.00	GUJARAT	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	**0.04**
20	PIPAVAV CCPP	702.00	GUJARAT	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	**0.08**
21	UTRAN CCPP (GSECL)	374.00	GUJARAT	P	0.00	1.45	1.45	0.24	0.00	0.00	0.00	0.17	0.05	**0.22**
22	URAN CCPP (MAHAGENCO)	672.00	MAHARASHTRA	P	3.50	1.40	4.90	0.00	1.52	0.00	1.52	0.00	0.00	**1.52**
	Sub Total (WR)	**2849.82**			**4.55**	**3.30**	**7.85**	**0.49**	**1.53**	**0.00**	**1.53**	**0.23**	**0.26**	**2.02**
23	GODAVARI (JEGURUPADU)	235.40	ANDHRA PRADESH	P	1.10	0.21	1.31	0.00	0.33	0.00	0.33	0.00	0.00	**0.33**
24	KARAIKAL CCPP (PPCL)	32.50	PUDUCHERRY	I	0.20	0.00	0.20	0.00	0.17	0.00	0.17	0.00	0.00	**0.17**
25	KOVIKALPAL (THIRUMAKOTTAI)	107.00	TAMIL NADU	I	0.45	0.00	0.45	0.00	0.17	0.00	0.17	0.00	0.00	**0.17**
26	KUTTALAM (TANGEDCO)	100.00	TAMIL NADU	I	0.45	0.00	0.45	0.00	0.29	0.00	0.29	0.00	0.00	**0.29**
27	VALUTHUR CCPP	186.20	TAMIL NADU	I	0.89	0.00	0.89	0.00	0.56	0.00	0.56	0.00	0.00	**0.56**
	Sub Total (SR)	**661.10**			**3.09**	**0.21**	**3.30**	**0.00**	**1.53**	**0.00**	**1.53**	**0.00**	**0.00**	**1.53**
28	LAKWA GT (ASEB,Maibella)	97.20	ASSAM	I	0.50	0.00	0.50	0.00	0.28	0.00	0.28	0.00	0.00	**0.28**
29	LAKWA Replacement CCPP***	69.76	ASSAM	I	0.40	0.00	0.40	0.00	0.33	0.00	0.33	0.00	0.00	**0.33**
30	NAMRUP CCPP + ST (APGCL)	162.40	ASSAM	I	0.66	0.00	0.66	0.00	0.59	0.00	0.59	0.00	0.00	**0.59**
31	BARAMURA GT (TSECL)	42.00	TRIPURA	I	0.40	0.00	0.40	0.00	0.26	0.00	0.26	0.00	0.00	**0.26**

32	ROKHIA GT (TSECL)	95.00	TRIPURA	I	0.50	0.00	0.50	0.00	0.40	0.00	0.40	0.00	0.00	**0.40**
	Sub Total (NER)	**466.36**			**2.46**	**0.00**	**2.46**	**0.00**	**1.86**	**0.00**	**1.86**	**0.00**	**0.00**	**1.86**
	Total (SS)=B	**6681.48**			**17.81**	**4.54**	**22.35**	**1.29**	**7.72**	**0.00**	**7.72**	**1.32**	**0.41**	**9.45**
(C) PVT/IPP SECTOR														
33	RITHALA CCPP (NDPL)	108.00	DELHI	P	0.00	0.40	0.40	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	0.21	**0.21**
35	KASHIPUR CCPP(Sravanthi)	225.00	UTTARAKHAND	P	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	**0.37**
	Sub Total (NR)	**558.00**			**0.00**	**0.40**	**0.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0.37**	**0.21**	**0.57**
36	BARODA CCPP (GIPCL)	160.00	GUJARAT	P	0.36	0.09	0.45	0.30	0.00	0.00	0.00	0.00	0.00	**0.00**
37	ESSAR CCPP	300.00	GUJARAT	P	0.00	1.17	1.17	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
38	PAGUTHAN CCPP (CLP)	655.00	GUJARAT	P	0.13	1.30	1.43	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
39	SUGEN CCPP (TORRENT)	1147.50	GUJARAT	P	0.90	3.31	4.21	1.14	0.00	0.09	0.09	0.86	1.38	**2.33**
40	UNOSUGEN CCPP	382.50	GUJARAT	P	0.00	0.00	0.00	0.00	0.00	0.15	0.15	0.00	0.56	**0.70**
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**
42	TROMBAY CCPP (TPC)	180.00	MAHARASHTRA	P	1.50	0.00	1.50	1.00	0.54	0.00	0.54	0.00	0.02	**0.56**
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**
	Sub Total (WR)	**4413.00**			**2.89**	**5.87**	**8.76**	**2.44**	**0.54**	**0.24**	**0.79**	**0.86**	**1.95**	**3.60**
44	GAUTAMI CCPP	464.00	ANDHRA PRADESH	P	1.96	1.86	3.82	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	0.88	0.88	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**
47	GODAVARI (SPECTRUM)	208.00	ANDHRA PRADESH	P	1.04	0.00	1.04	0.00	0.14	0.00	0.14	0.00	0.00	**0.14**
48	JEGURUPADU CCPP (GVK) PHASE- II	220.00	ANDHRA PRADESH	P	1.34	0.88	2.22	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
49	KONASEEMA CCPP	445.00	ANDHRA PRADESH	P	0.00	1.78	1.78	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	1.46	1.46	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**

52	KONDAPALLI CCPP (LANCO)	368.14	ANDHRA PRADESH	P	1.46	0.36	1.82	0.00	0.25	0.00	0.25	0.00	0.00	**0.25**
53	PEDDAPURAM (BSES)	220.00	ANDHRA PRADESH	P	0.84	0.25	1.09	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
54	VEMAGIRI CCPP	370.00	ANDHRA PRADESH	P	1.64	1.48	3.12	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
55	VIJESWARAN CCPP	272.00	ANDHRA PRADESH	P	1.32	0.00	1.32	0.00	0.63	0.00	0.63	0.00	0.00	**0.63**
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	0.50	0.00	0.50	0.00	0.16	0.00	0.16	0.00	0.00	**0.16**
61	P.NALLUR CCPP (PPN)	330.50	TAMIL NADU	I	1.50	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
62	VALANTARVY CCPP	52.80	TAMIL NADU	I	0.38	0.00	0.38	0.00	0.05	0.00	0.05	0.00	0.00	**0.05**
	Sub Total (SR)	**5314.24**			**11.98**	**9.50**	**21.48**	**0.00**	**1.23**	**0.00**	**1.23**	**0.00**	**0.00**	**1.23**
	Total (PVT/ IPPS)=C	**10285.24**			**14.87**	**15.77**	**30.64**	**2.44**	**1.77**	**0.24**	**2.01**	**1.22**	**2.16**	**5.40**
	GRAND TOTAL=A+B+C	**23845.05**			**52.41**	**32.37**	**84.79**	**7.48**	**15.05**	**0.24**	**15.29**	**4.40**	**2.93**	**22.62**

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

*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-3A

(Item no. 3.2/3.16)

Details of Inter-Regional Transmission lines as on 31.03.2022

Details of Inter-regional transmission lines	**Transmission Capacity in MW (As on 31.03.2022)**
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 (2^{nd}) 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	**36,520**
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 & 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-poles	3,000
Sub-total	**3,000**
TOTAL (CUMULATIVE)	**112,250**

Annexure – 3B

(Item no. 3.3.2)

Issues pertaining to transmission system planning taken up during 2021-22:

A. 4th meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP)

1. Implementation of Transmission System Strengthening for Srinagar – Leh Transmission System
2. Transmission system for evacuation of 10 GW power from renewable energy parks in Leh
3. Requirement of 30 MW power supply at eastern portal, Zojila tunnel
4. LILO of 220 kV Sasaram(PG) - Sahupuri (UPPTCL) line at 220kV New Karamanasa GSS (BSPTCL)
5. Enhancement of ATC/TTC for Punjab due to unprecedented load growth of summer
6. Issue of requirement of reactors and FSCs installed at various locations in Northern Region
7. Transmission system for evacuation of power from Neemuch SEZ (1000 MW)
8. Grant of Connectivity to Kutehr HEP (240 MW) by S/C LILO of 400 kV D/c (Twin Moose) line from 400/220 kV Lahal Sub-Station to 400/220 kV Chamera Pool
9. Evacuation system for Ratle HEP (850 MW)
10. Utilization of 02 Nos. 400 kV 50 MVAR spare line reactor of Meerut - Koteshwar Lines as Bus Reactor at Meerut S/s
11. Grant of 400 kV & 220 kV bays to RE generators at ISTS Pooling Stations under ISTS
12. Overloading of 400kV Bhinmal - Zerda corridor
13. Evacuation of power from hydro projects in Chandrabhaga river basin
14. Issue of evacuation constraint in the Kalisindh - Kawai- Chhabra thermal generation complex
15. Intra state transmission schemes from RVPNL for inclusion in Green Energy Corridor Phase-II Scheme
16. HVPNL proposal of Intra-State transmission schemes involving reconfiguration/interconnection with ISTS elements
17. HVPNL proposal for LILO of both circuits of 220kV Sector 72 Gurugram (HVPNL)-Rangla Rajpur line at 400 kV Sohna Road
18. HVPNL proposal for installation of additional 1x500 MVA, 400/220 kV ICT at 400 kV sub-station Deepalpur
19. Intra-state transmission schemes envisaged by HVPNL at 220 kV & above voltage level
20. Transmission system for evacuation of power from 206 MW Shahpur Kandi Power Project
21. LILO of one ckt of Auraiva (400) - Sikandra(Agra) 220 kV D/c line of Powergrid at 220kV Saifai S/s
22. New transformers for meeting station auxiliary load by NTPC at their generation stations
23. UPPTCL proposal regarding implementation of 330 MVAR line reactor, at each end of 765kV Anpara 'D' – Unnao S/C line
24. 400 kV Khandukhal(Srinagar) - Rampura (Kashipur) D/c line
25. Transmission system for evacuation of power from 60 MW Naitwar Mori HEP of SJVNL - interim arrangement
26. Transmission system for evacuation of power from Kaza Solar Power Project to be developed by SJVN Limited (880 MW)
27. Creation of 400/220 kV, 2x315 MVA S/S at Siot (earlier Akhnoor/Rajouri) as ISTS
28. Additional ICT at Kurukshetra (PG)
29. Alternate path for power evacuation form Lalitpur Thermal Power Station (3x660 MW) and evacuation of Solar power

B. 3rd meeting of Western Regional Power Committee (Transmission Planning) (WRPCTP)

1. Transmission system for evacuation of power from Neemuch Solar Park (1000 MW)
2. Review of Transmission scheme for evacuation of power from Dholera UMSP
3. Transmission System for evacuation of power from Khavda RE park
4. System Strengthening in Gujarat associated with integration of RE projects from Khavda potential energy zone
5. Creation of 220 kV level at 765/400 kV Pune GIS (Shikrapur) Substaion
6. Transmission system strengthening beyond Kolhapur for export of power from Solar & Wind Energy Zones in Southern Region

7. Restoration of 400 kV Solapur – Karad line to its original configuration
8. Evacuation of power beyond Warora
9. Establishment of the proposed Kistampeth – Sironcha 132 kV SCDC line as ISTS
10. Permission for Charging of 125MVAR switchable bus cum line reactor at Sagar 400kV substation of MPPTCL
11. Installation of 3rd 3x315 MVA, 400/220 kV ICT at Astha S/s of MPPTCL & Installation of additional ICTs at ISTS sub-stations in MP
12. Agenda points by CSPTCL
13. Scheme to control fault level at Indore S/s
14. Augmentation of Transformation capacity at various Substations in Western Region

C. 3rd meeting of Southern Regional Power Committee (Transmission Planning) [SRPC(TP)]

1. Phasing of transmission system for evacuation of power from potential REZ in Karur & Gadag
2. Modifications in 220 kV transmission system proposed by KPTCL at Yalwar (associated transmission lines of 400/220 kV Yalwar Substation)
3. Establishment of 3x500 MVA, 400/220 kV Sub-station at Mylsandra (Electronic City) in Bengaluru
4. Power Evacuation scheme for the proposed 2000 MW Sharavathy Pumped Storage Project
5. Establishing 2 x 500 MVA, 400/220 kV Sub-Station at Lokapur in Mudhol Taluk, Bagalkot district
6. Up-gradation of existing 220/66 kV sub-station by 2x500 MVA, 400/220 kV sub-station at Peenya in Bengaluru city -Modification in 400 kV incoming line
7. Evacuation of 6,100 MW (AC) of Solar Power proposed by Andhra Pradesh Green Energy Corporation Limited (APGECL) from various Pooling Stations under Phase-I out of 10,000 MW (AC) of Solar power
8. Proposal for removing LILO arrangement of 400 kV Vemagiri – Sattenapalli Line at 400/220 kV SS (PGCIL)/Nunna to make 2nd circuit of 400 kV Vemagiri – Sattenapalli Line
9. Evacuation of Power from 1x800 MW Sri Damodaram Sanjeevaiah (SDS) TPS/Stage-II (Unit-3) established by APPDCL at 400 kV SS Krishnapatnam
10. Short Circuit studies of Southern Region.
11. Augmentation of Transformer capacity in Southern Region
12. Transmission system for grant of Connectivity to NPCIL for expansion of Kudankulam NPP Unit 3&4 (2x1000 MW)
13. Assessment of Dynamic Line Loadings as a pilot project in Southern Region

D. 4th meeting of Eastern Region Power Committee (Transmission Planning) (ERPCTP).

1. High loading on 220 kV Durgapur (PG) – Parulia (DVC) D/C line.
2. Non-compliance of N-1 contingency criteria on 220 kV Maithon-Dhanbad D/C and 220 kV Maithon-Kalyaneshwari D/C line.
3. Line Reactor in Biharsharif – Lakhisarai 400kV D/c line and new bus reactor at Biharsharif.
4. Evacuation system of Teesta-IV HEP.
5. Replacement of existing 50 MVAR LR of 400kV Maithon-Gaya-I with new 50 MVAR LR (Natural Ester Oil) at Maithon S/s-reg.
6. Restoration of 400 kV TSTPS-Meramunduli-2 to its original length.
7. Arrangement for 33 kV Power Supply to Dulanga Mines from Darlipali STPP of NTPC.
8. ISTS connectivity for Railways at Sasaram (Pusauli).
9. Connectivity/Access granted after 2nd/3rd meeting of ERPCTP.
10. Interim connectivity to generation projects in ER through LILO arrangement
11. Status of downstream 220kV or 132kV network by STUs from the various commissioned and under-construction ISTS substations.
12. Status of 400kV substations being implemented by STUs in ER under intra-state schemes.
13. Revised Connectivity of GMR-Agenda item from OPTCL.

14. LILO of 132 kV Sahupuri (220 kV) - Karmnasa (Bihar) Ckt-II at 132 kV Chandauli (Chandauli) S/s-Agenda item from UPPTCL.
15. Connectivity of 400/220/132 kV, Daltonganj of PGCIL to newly constructed 220/132/33 KV (2x150+2x50) MVA Grid Substation Chatra (Itkhori) of JUSNLAgenda item from ERPC.
16. To provide 2nd source connectivity to the existing Grid Sub-station (GSSs) - Agenda item by BSPTCL.
17. To provide 2nd circuit stringing of the existing GSSs- Agenda item by BSPTCL.
18. Evacuation of Power from Kajra & Pipainti Solar Plants-Agenda item by BSPTCL.
19. LILO of 220 kV Pusauli/Sasaram PG – Sahupuri (UP, NR), DCSS at Karamnasa New- Agenda item by BSPTCL.
20. Charging of LILO of 220 kV Pusauli (PG) to Sahupuri (UP, NR) Transmission line at 220/132/33 kV GSS Karmnasa(New) – Communication arrangement- Agenda item by BSPTCL.
21. Construction of Mithapur (New) GIS and demolition of Mithapur(Old) GSSAgenda item by BSPTCL.
22. Construction of 132 kV Amnour (BGCL) – Ekma DCDS, Panther- Agenda item by BSPTCL.

E. 03rd meeting of North Eastern Region Power Committee – Transmission Planning (NERPC-TP)

1. Construction of additional 400kV transmission line from 600MW Kameng HE Project, Arunachal Pradesh to BnC and associated bays at Kameng and BnC for reliable evacuation as part of NERSIP etc.
2. Connectivity, MTOA, LTA applications processed after 02ndmeeting of NERPC-TP.
3. Installation of 125MVAR Bus Reactor at Subansiri Lower HE Project (2000 MW).
4. Downstream system development by STUs from the various commissioned and on-going ISTS substations.
5. Status of 400kV substations and other important elements being implemented by STUs in NER under intra-state schemes.
6. Utilisation of spare 132kV ISTS bays by States.
7. 132kV S/C LILO connectivity to 132kV Karimganj (AEGCL) S/S from 132kV S/C Badarpur - Kumarghat line of POWERGRID.
8. New Mariani-Mariani interconnection.
9. Restoration of Kopili generation switchyard.
10. Conversion of 132kV bus bar at Imphal.
11. Intra state scheme considering the load forecast for the year 2030 - Agenda by AEGCL.
12. Connectivity system for Dibang HEP (12x240MW) of M/s NHPC Ltd.
13. Under-utilization of 2x160MVA, 220/132kV ICTs at Balipara.
14. LILO of 400 kV D/C Silchar-Byrnihat along with 400/220 kV 2x315 MVA, 220/132 kV 2x160 MVA substation at Mynkre, Meghalaya.
15. LILO of 400 kV D/C Silchar-Byrnihat along with 400/220kV 2x315 MVA, substation at New Shillong, Meghalaya.
16. Re-conductoring and strengthening of aged 132 kV lines in Manipur with HTLS.
17. N-1 reliability requirement at Sohra (Cherrapunji).
18. N-1 reliability requirement at Zuangtui.
19. Proposals under 10% GBS-Mizoram.
20. Review and facilitate construction of inter-regional grid strengthening scheme.
21. Strengthening of transmission system in Arunachal Pradesh-Agenda by CTU.
22. Re-conductoring of 132 KV transmission lines of TSECL by HTLS conductor with allied Accessories-Agenda by TSECL.

Annexure – 3C
(Item 3.4.2)

Status of the Schemes notified through Tariff Based Competitive Bidding (TBCB) as on 31.03.2022

a) Schemes already commissioned/ready for commissioning by Transmission Service Providers: (38 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)

b) Schemes under implementation by the Transmission Service Providers: (22 Nos.)

1. 765 kV System Strengthening Scheme in Eastern Region. ERSS- XVIII
2. Transmission System for providing connectivity to RE Projects at Bhuj-II (2000 MW) in Gujarat
3. Transmission system associated with LTA applications from Rajasthan SEZ Part-A, Phase-II

4. Transmission system associated with LTA applications from Rajasthan SEZ Part-F, Phase-II
5. Transmission system associated with LTA applications from Rajasthan SEZ Part-B, Phase-II
6. Transmission system associated with LTA applications from Rajasthan SEZ Part-C, Phase-II
7. Transmission system associated with LTA applications from Rajasthan SEZ Part-D, Phase-II
8. Additional 400kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool
9. Transmission System for 400 kV Udupi (UPCL) – Kasargode D/C Line
10. Western Region Strengthening Scheme-XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme-IX (NERSS-IX)
11. WRSS – 21 Part – B – Trasnsmission System Strengthening for Relieving Over Loadings Observed in Gujarat Intra-State System Due to Re- injections in Bhuj PS
12. Additional inter regional AC link for import into southern region i.e Warora-Warangal and Chilakaluripeta – Hyderabad – Kurnool 765 kV link
13. System strengthening in northern region (NRSS XXXVI) along with LILO of Sikar-Neemrana 400 kV D/C line at Babai(RVPNL)
14. Immediate evacuation for North Karanpura (3x660MW) generation project of NTPC (ERSS XIX)
15. 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
16. Transmission System for Transmission System Associated with RE Generations at Bhuj-II, Dwarka & Lakadia
17. 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
18. Establishment of new 220/132kV substation at Nangalbibra.
19. Evacuation of Power from RE Sources in Koppal Wind Energy Zone (Karnataka) (2500 MW)
20. Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra.
21. Evacuation of Power from RE Sources in Karur/ Tiruppur Wind Energy Zone. (Tamil Nadu) (2500 MW)
22. Transmission scheme for evacuation of 3 GW RE injection at Khavda P.S. under Phase-I.

c) Schemes under bidding process by Bid Process Coordinators: (29 Nos.)

1. Transmission Scheme for Solar Energy Zone in Gadag (2500 MW), Karnataka - Part – A Phase-I.
2. Transmission Scheme for Solar Energy Zone in Bidar (2500 MW), Karnataka.
3. Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh.
4. Transmission system for evacuation of power from RE projects in Rajgarh (2500 MW) SEZ in Madhya Pradesh.
5. Transmission System Strengthening Scheme for Evacuation of Power from Solar Energy Zones in Rajasthan (8.1GW) under Phase-II Part-G.
6. Transmission System Strengthening Scheme for Evacuation of Power from Solar Energy Zones in Rajasthan (8.1GW) under Phase-II Part-E.
7. Transmission system for evacuation power from Pakaldul HEP in Chenab Valley HEPs - Connectivity System.
8. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part A, Gujarat.
9. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part B, Gujarat.
10. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part C, Gujarat.
11. Transmission scheme for evacuation of 4.5 GW RE injection at Khavda P.S. under Phase-II – Part D, Gujarat.
12. Transmission system for evacuation of power from Chhatarpur SEZ (1500 MW)
13. System Strengthening Scheme for Eastern and North Eastern Regions: A. Eastern Region Strengthening Scheme-XXV (ERSS-XXV) B. North Eastern Region Strengthening Scheme-XV (NERSS-XV)
14. Transmission system for evacuation of power from Neemuch SEZ (1000 MW)

15. Establishment of Khavda Pooling Station-2 (KPS2) in Khavda RE Park
16. Establishment of Khavda Pooling Station-3 (KPS3) in Khavda RE Park
17. Transmission scheme for injection beyond 3 GW RE power at Khavda PS1 (KPS1)
18. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part A1
19. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part A3
20. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part B1
21. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part C1
22. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part D
23. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part F
24. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part G
25. Transmission system for evacuation of power from REZ in Rajasthan (20GW) under Phase- III Part H
26. Creation of 400/220 kV, 2x315 MVA S/S at Siot, Jammu & Kashmir.
27. Transmission Network Expansion in Gujarat associated with integration of RE projects from Khavda potential RE zone
28. 400 kV Khandukhal (Srinagar) - Rampura (Kashipur) D/c line
29. Transmission Scheme for Solar Energy Zone in Gadag (1500 MW), Karnataka: Part A-Phase-II

Annexure – 3D
(Item 3.4.3)

Issues Pertaining to Transmission System Planning taken up with the National Committee on Transmission during 2021-22

5th meeting of National Committee on Transmission (NCT) held on 25.08.2021 and 02.09.2021

1. Transmission system for evacuation of power from Neemuch SEZ (1000 MW)
2. Transmission scheme for evacuation of power from Dholera UMSP
3. System Strengthening in Gujarat associated with integration of RE projects from Khavda potential REZ
4. Modification in the already agreed Transmission system for evacuation of 8 GW RE from Khavda RE park
5. Transmission system for evacuation of additional 7 GW RE power from Khavda RE park Phase-B
6. Transmission system strengthening beyond Kolhapur for export of power from Solar & Wind Energy Zones in Southern Region- Re-conductoring of Kolhapur (PG) – Kolhapur 400 kV D/c line
7. Scheme to control fault level at Indore S/s
8. Scheme for fault level control at Dehgam (PG) & Ranchhodpura (GETCO) S/s
9. Augmentation of 1x500 MVA, 400/220 kV ICT at Bhatapara (PG)
10. Transmission System requirement for additional 20 GW REZ in Northern Region (Phase-III)
11. Creation of 400/220 kV, 2x315 MVA S/S at Siot, Jammu & Kashmir
12. 400 kV Khandukhal(Srinagar)-Rampura (Kashipur) D/c line
13. System Strengthening scheme for reconductoring of portion of Dulhasti-Kishtwar-Kishenpur 400 kV (Quad) S/c
14. Grant of 400 kV & 220 kV bays to RE generators at Fatehgarh-III (erstwhile Ramgarh-II) PS under ISTS
15. Addition of new 1x315 MVA, 400/220kV ICT at Amargarh, J&K
16. Establishment of 400/220kV Nange Pooling Station for proposed SJVN Hydro Power Plant Luhri Stage-I, II & Sunni Dam
17. 1x500 MVA, 400/220 kV ICT augmentation (3rd) at Sohawal (PG) under system strengthening
18. One no of 220 kV bay at Chamera Pooling point for 2nd Circuit stringing of 220 kV Karian – Chamera Pool line under implementation by HPPTCL
19. 220 kV bays at 400 kV substation PGCIL Khatkar (Jind) & Naggal (Panchkula) substation
20. Strengthening of 220 kV Alusteng (Srinagar)- Leh Transmission System

6th meeting of National Committee on Transmission (NCT) held on 29.10.2021

1. Augmentation of Transformation Capacity in Southern Region
2. Transmission System Strengthening for Srinagar – Leh Transmission System
3. Transmission system for evacuation of 10 GW RE power from renewable energy parks in Leh
4. Transmission system for evacuation of power from Kaza Solar Power Project to be developed by SJVN limited (880 MW)
5. 400 kV Khandukhal(Srinagar)-Rampura (Kashipur) D/c line
6. Modification in intra-state transmission system to be implemented in the similar timeframe of ISTS scheme “Establishment of new 220/132kV substation at Nangalbibra”

7th meeting of National Committee on Transmission (NCT) held on 03.12.2021

1. System Strengthening in Gujarat associated with the integration of RE projects from Khavda potential REZ
2. Transmission Scheme for Solar Energy Zone in Gadag (2500 MW), Karnataka-Part A
3. Transmission system for evacuation of RE power from renewable energy parks in Leh
4. 400 kV Khandukhal (Srinagar) - Rampura (Kashipur) D/c line

8th meeting of National Committee on Transmission (NCT) held on 25.03.2022

1. Inter-regional ER-WR Interconnection
2. Western Region Expansion Scheme-XXV (WRES-XXV)
3. Western Region Expansion Scheme-XXVII (WRES-XXVII)
4. Western Region Expansion Scheme-XXVIII (WRES-XXVIII)
5. Western Region Expansion Scheme-XXIX (WRES-XXIX)
6. North Eastern Region Expansion Scheme-XVI (NERES-XVI)
7. Transmission system for evacuation of power from Luhri Stage-I HEP
8. Transmission system for evacuation of power from Kaza Solar Power Project (880 MW)
9. ISTS Network Expansion scheme in Western Region & Southern Region for export of surplus power during high RE scenario in Southern Region
10. ICT Augmentation associated with Transmission scheme for evacuation of 1500 MW from Gadag SEZ, Karnataka: Part A Phase-II
11. System Strengthening in Gujarat associated with the integration of RE projects from Khavda potential REZ
12. Transmission Scheme for Solar Energy Zone in Gadag (2500 MW), Karnataka-Part A
13. Transmission system for evacuation of RE power from renewable energy parks in Leh
14. 400 kV Khandukhal (Srinagar) - Rampura (Kashipur) D/c line

Annexure-3E
(Item no. 3.5)

Examination of DPRs / FRs of hydro power projects for processing of concurrence by CEA:

Northern Region:

- DPR examination of Bowala Nandprayag H.E. Project (300 MW) in Uttarakhand by M/s UJVN Ltd and Phasing of cost estimates of ATS works
- Preliminary examination of the DPR submitted by SJVN Ltd for Reoli Dugli Project (456 MW) in Himachal Pradesh
- DPR examination of Dugar Hydro Electric Project (500 MW) in Chamba district of Himachal Pradesh by M/s NHPC Ltd and Phasing of cost estimates of ATS works
- Revision of Cost Estimates of ATS works of Sunni Dam HEP (382 MW) in Himachal Pradesh

Western Region: NIL

Southern Region:

- DPR examination of Pinnapuram Pumped Storage Project (1200 MW) in Kurnool district of Andhra Pradesh by M/s Greenko Group

Eastern Region:

- Examination and vetting of updated cost of Teesta-IV HEP (520 MW) in Sikkim by M/s NHPC Ltd
- Examination of Power Evacuation Aspects on DPR for Dagmara (130.10 MW) HE Project in Bihar of M/s BHPC.

North Eastern Region:

- Examination and vetting of updated cost estimates of Dibang Multipurpose Project (2880 MW) in Arunachal Pradesh by M/s NHPC.
- Examination of DPR of Nagaland for seeking ADB funding for Lower Tizu Hydro Electric Project (3x14MW).

Annexure-3F
(Item no. 3.6)

Examination of DPR/FR of Transmission Works for processing of clearance by CEA:

Northern Region:

- DPR submitted by JKPTCL, Kashmir for Intra State transmission elements to be implemented in Kashmir region of UT of J&K.
- DPR submitted by JKPTCL for intra-state transmission schemes to be implemented during 13th and 14th plan period in Jammu region of UT of J&K.
- DPR of power evacuation system in Hanumangarh, Bikaner & Barmer districts for RE generation from solar and wind power projects of Rajasthan

Western Region: NIL

Southern Region:

- DPR of KPTCL for Establishing 2x100MVA, 220/110/11 kV sub-station at Savalagi in Bagalkot district.
- DPR of KPTCL for LILO of 2nd circuit of 220 kV Mahalingapura-Kudachi DC line at 220 kV Athani sub-station.
- DPR of KPTCL for Conversion of 220 kV Bidnal-Soundatti-Mahalingapura S/C line to 220 kV Bidnal - Mahalingapur D/C line.
- DPR of KPTCL for Establishing 2x100 MVA, 220/66 kV sub-station at P.D Kote in Hiriyur Taluk
- DPR of KPTCL for Establishing 2x100 MVA, 220/110/11 kV sub-station at Ron, Gadag district.
- DPR of KPTCL for Strengthening of 220 kV DC line between 220/110 kV Gadag and Lingapura switching station with Drake equivalent HTLS conductor.
- DPR of KPTCL for Strengthening of 220 kV Lingapura-Ittagi-Neelagunda-Guttur SC line by 220 kV DC line using Twin Drake conductor.
- DPR of KPTCL for Establishing 2x100MVA, 220/110 kV sub-station at Santhpur in Bidar district along with associated 220 kV and 110 kV lines.
- DPR of KPTCL for Establishing 2x100 MVA, 220/66 kV sub-station at Hangal in Chitradurga district along with associated 220 kV and 66 kV lines.
- DPR of KPTCL for Establishing 2x100 MVA, 220/110 kV sub-station at Yelburga in Koppal district long with the associated 220 kV and 110 kV lines.
- DPR of KPTCL for establishing 2 x 500 MVA, 400/ 220 kV substation at Yalwar (Hadagali) in Vijayapur district, Karnataka

Eastern Region – NIL
North Eastern Region – NIL

Annexure-3G
(Item no. 3.7)

The list of transmission proposals examined for approval of the Government of India under Section 68(1) of Electricity Act, 2003

Northern Region:

- Connectivity System for 500 MW solar power project of Adani Renewable Energy Holding Four Limited in Jodhpur, Rajasthan
- Transmission system for evacuation of RE power from renewable energy parks in Leh (5GW Leh- Kaithal transmission corridor) - Power Grid Corporation of India Ltd. (PGCIL)
- Transmission system for evacuation of power from Pakaldul HEP in Chenab Valley - Power Grid Corporation of India Ltd. (PGCIL)
- Power evacuation scheme of 210MW Luhri HEP in Himachal Pradesh - SJVN Ltd.
- Connectivity system of ABC Solar (India) Private Limited for its 300MW solar power project in Bap tehsil, Jodhpur, Rajasthan
- Transmission system for providing Connectivity system to ABC Renewable Energy Private Limited for its 400MW solar power project in Sheo tehsil, Barmer, Rajasthan
- Power evacuation scheme of 66MW Dhaulasidh HEP (DSHEP) of SJVN in Himachal Pradesh
- Connectivity system of Mahindra Susten Private Limited for its 250 MW solar power project in Kolayat tehsil, Bikaner, Rajasthan
- Connectivity system of NTPC Limited for its 250 MW and 300 MW solar projects in Bikaner, Rajasthan
- Connectivity system of 300MW to M/s Renew Solar Energy (Jharkhand Four) Private Limited for its proposed solar power project in Bikaner, Rajasthan
- Connectivity system of Renew Solar Energy (Jharkhand Three) Private Limited for its 300 MW Jaisalmer-3 solar power project in Fatehgarh tehsil, Jaisalmer, Rajasthan
- Connectivity system of Renew Solar Urja Private Limited for its 300 MW Jaisalmer-4 solar power project in Fatehgarh tehsil, Jaisalmer, Rajasthan
- Transmission system for evacuation of 528 MW of power from Khurja STPP (2x660 MW) of THDC India Limited
- Connectivity to M/s ACME Solar Holdings Private Limited for its proposed 300 MW Solar Power Plants in Jodhpur, Rajasthan
- Connectivity System of 750 MW Pholadi-Pokhran Solar Power Park, Jaisalmer, Rajasthan of M/s Essel Saurya Urja Company of Rajasthan Limited
- Transmission system for providing connectivity to Eden Renewable Passy Private Limited for its proposed 300 MW Solar Power Plant in Jaisalmer, Rajasthan.
- Transmission system for providing connectivity to M/s Tata Power Green Energy Limited for its 225MW Solar Power Plant at Bikaner, Rajasthan.
- Transmission system for providing connectivity to M/s Altra Xergi Power Private Limited for its 380MW solar plant in Jaisalmer, Rajasthan

Western Region:

- Connectivity system for 50.6 MW wind farms to M/s Powerica Limited in Jam Khambhaliya, Dev Bhoomi, Dwarka, Gujarat
- Transmission system for evacuation of power from RE projects in Osmanabad area (1 GW) in Maharashtra - M/s Kallam Transmission Limited (KTL), SPV of RECPDCL
- Transmission System for providing connectivity to Torrent Power Limited for its 115 MW wind power plant in Jam Khambaliya, Dev Bhoomi Dwarka, Gujarat
- Transmission System for providing connectivity to M/s Renew Solar Power Private Limited (RSPPL) for its 300 MW wind power project in Beed, Maharashtra
- Connectivity system for M/s SBESS Services Projectco Two Private Limited for 324.4 MW Generation Wind project in Dhar, MP
- Dedicated overhead line included in the connectivity Transmission System of M/s Sherisha Rooftop Solar SPV Four Private Ltd (SRSSFPL)

- Transmission scheme for evacuation of 3 GW RE injection at Khavda P.S. under Phase-I - Khavda-Bhuj Transmission Limited, SPV of PFCCL
- Transmission system for evacuation of power from RE projects in Rajgarh (1500 MW) SEZ in Madhya Pradesh: Phase-I - Rajgarh Transmission Limited, SPV of RECPDCL
- Transmission Network Expansion in Gujarat to increase ATC from ISTS: Part B - M/s Powergrid Corporation of India Limited (PGCIL)
- Transmission Network Expansion in Gujarat to increase ATC from ISTS: Part C - M/s Powergrid Corporation of India Limited (PGCIL)
- Transmission system for providing connectivity to Masaya Solar Energy Private Limited for its 300 MW Solar Power Project in Khandwa, Madhya Pradesh

Southern Region:

- Connectivity system to M/s Vena Energy Vidyuth Pvt. Ltd. for its 160 MW Wind & solar based hybrid generation project in Koppal, Karnataka
- Transmission scheme for Solar Energy Zone in Gadag (1000 MW), Karnataka- Part A Phase-I - Gadag Transmission Limited
- Transmission scheme for evacuation of power from RE sources in Karur/Tirrupur Wind Energy Zone (Tamil Nadu) (1000 MW) – Phase-I - Karur Transmission Limited
- Connectivity system of M/s Ayana Renewable Power Six Private Limited for 300 MW Wind Power Project in Gadag, Karnataka"
- Connectivity system for 300 MW Wind Power Project of M/s Renew Solar Power Private Limited in Gadag, Karnataka
- Connectivity system for the Solar Power Project with Storage of M/s Greenko AP01 IREP Private Limited at Pinnapuram, District Kurnool, Andhra Pradesh
- Connectivity system for 150 MW Solar Power Project of GRT Jewellers (India) Private Limited at Thoothukkudi, Tamil Nadu
- Connectivity system of M/s JSW Future Energy Limited for 300 MW Wind Power Project in Tuticorin, Tamilnadu
- Transmission system for providing connectivity to ReNew Solar Power Private Limited for its 300 MW Wind Generation Project in Gadag, Karnataka
- Transmission Scheme for providing connectivity to M/s ReNew Surya Ojas Private Limited for its 300 MW proposed hybrid generation project (Wind – 300 MW, Solar – 75 MW & Storage – 150 MWh) in Koppal, Karnataka
- Connectivity system to M/s Green Infra Wind Energy Limited for its 180 MW wind based generation project in Koppal, Karnataka
- Transmission System for providing connectivity to M/s Tunga Renewable Energy Pvt. Ltd. for its 350 MW wind based generation project in Koppal, Karnataka

Eastern Region:

- Prior approval of the Government of India under Section 68(1) of Electricity Act, 2003 to DVC on 15.04.2021 for construction of 220 kV transmission line.
- Prior approval of Government of India under Section 68(1) of Electricity Act, 2003 to DVC on 16.07.2021 for construction of 132 kV and 33 kV consumer lines.
- Prior approval of the Government of India under Section 68(1) of Electricity Act, 2003 to Lanco Teesta Hydro Power Limited (LTHPL) on 06.09.2021 for construction of transmission line from Power House of Teesta-VI H.E.P (500 MW) to Rangpo Pooling Station of PGCIL.

North Eastern Region:

- Prior approval of the Government under Section 68(1) of Electricity Act, 2003 to PFC Consulting Ltd. on 05.04.2021 for overhead lines under the transmission project "Establishment of new 220/132kV substation at Nangalbibra".

Annexure-3H
(Item no. 3.8)

The list of transmission proposals examined for approval of the Government of India under Section 164 of Electricity Act, 2003:

Northern Region:

- Connectivity system to M/s Adani Renewable Energy Park Rajasthan Limited for 1000 MW Renewable Energy Park in Fatehgarh, Rajasthan.
- Connectivity system for 925 MW Solar Park at village Nokh, Jaisalmer, Rajasthan
- Transmission system strengthening scheme for evacuation of Power from Solar energy zone in Rajasthan (8.1 GW) under Phase-II Part-A
- Connectivity system of M/s Renew Solar Energy (Jharkhand Three) Private Limited (RSEJTPL) (Jaisalmer-III) for its 300 MW solar power project in Fatehgarh, Jaisalmer, Rajasthan Connected to Fatehgarh-II PS, Jaisalmer, Rajasthan
- Connectivity system of M/s Thar Surya 1 Private Limited (a 100% subsidiary of Avikiran Surya India Private Limited) for its 300 MW solar power project in Dholera, Bikaner, Rajasthan
- Connectivity system of Renew Solar Urja Private Limited for its 300MW Jaisalmer 4 solar power project in Fatehgarh Tehsil, Jaisalmer, Rajasthan
- Transmission system strengthening scheme for evacuation of Power from Solar energy zone in Rajasthan (8.1 GW) under Phase-II Part-B" for construction of Fatehgarh II PS – Bhadla II PS 765 kV DC line (2nd)
- Connectivity System of ABC Solar (India) Private Limited for its 300 MW Solar Power Project in BAP Tehsil, Jodhpur, Rajasthan
- Transmission System for evacuation of Power from 60 MW Naitwar Mori Hydro Electric Project of SJVN Limited
- Connectivity system to M/s ACME Holdings Limited for 300 MW solar power plant in Jodhpur state of Rajasthan
- Common connectivity system to M/s NTPC Limited for 150MW and 90 MW solar power plant in Devikoot, Rajasthan
- Connectivity system to M/s ACME Solar Holdings Limited (ASHL) for its 4x300 MW Solar power plants in Jaisalmer, Rajasthan
- Connectivity system of Mahindra Susten Private Limited for its 250 MW solar power project in Kolayat Tehsil, Bikaner, Rajasthan

Western Region:

- Western Region Strengthening Scheme-XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme-IX (NERSS-IX)
- Connectivity system to M/s. Srijan Energy Systems Private Limited for its Proposed 150 MW Windfarms in Kutch, Gujarat.
- Connectivity system for M/s CLP India Private Limited (CLPIPL) for its proposed 250.8 MW wind farms in Dwarka, Gujarat
- Connectivity for 300 MW wind farms to M/s Netra Wind Private Limited in Kutch, Gujarat

Southern Region:

- Udupi (UPCL) - Kasargode 400 kV (Quad) D/c overhead transmission line of Udupi - Kasargode Transmission Limited (UKTL)
- Connectivity Transmission System for 300 MW wind power project of Ostro Kannada Power Private Limited in Chitradurga, Karnataka

Eastern Region: NIL

North Eastern Region: NIL

Annexure-3I
(Item no. 3.9.6)

Approvals granted by Designated Authority for Import/Export (Cross Border) of Electricity during 2021-22:

- Approval for export of up to 350 MW of power to NEA, NEPAL from power exchanges by NVVN through Muzaffarpur - Dhalkebar 400kV D/C line for a period from 15.04.2021 to 31.03.2022
- Approval for import of up to 15 MW of power from Devighat Hydropower Project (Nepal) by India through NVVN in Indian Power Exchange(s) - Day Ahead Market through Muzaffarpur - Dhalkebar 400kV D/C line for a period from 30.10.2021 to 30.04.2022.
- Approval for import of up to 24 MW of power from Trishuli Hydropower Project (Nepal) by India through NVVN in Indian Power Exchange(s) - Day Ahead Market through Muzaffarpur - Dhalkebar 400kV D/C line for a period from 30.10.2021 to 30.04.2022.
- Approval to PTCIL for supplying upto 65 MW power to Nepal Electricity Authority, Nepal through Tanakpur-Mahendranagar 132 kV S/c transmission line from 10.11.2021 to 31.07.2022.
- Approval to PTCIL for import of power upto 400 MW 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 01.01.2022 to 30.06.2022
- Approval to NVVN for export of upto 65 MW of power to Nepal Electricity Authority (NEA), Nepal through Indian Power Exchange(s) - Day Ahead Market through Tanakpur-Mahendranagar 132 kV S/c transmission line for a period from 15.01.2022 to 31.03.2022
- Approval to NVVN for export of upto 150 MW of power to Nepal through Muzaffarpur - Dhalkebar 400kV D/C line for a period from 07.02.2022 to 30.06.2022.
- Approval to NVVN for export of upto 100 MW of power additional to the existing approved upto 350 MW Power to Nepal Electricity Authority (NEA), Nepal, from Indian Power Exchange(s) - Day Ahead Market for a period from 04.03.2022 to 31.03.2022 through Muzaffarpur - Dhalkebar 400kV D/C line
- Approval to PTCIL for supply of up to 200 MW power to Bangladesh Power Development Board (BPDB), Bangladesh for a period from 24.03.2022 to 31.05.2033 from Sembcorp Energy India Limited Project-2, Andhra Pradesh.
- Approval to NVVN for export of power to Nepal Electricity Authority (NEA), Nepal, from Indian Power Exchange(s) - Day Ahead Market through Muzaffarpur - Dhalkebar 400kV D/C line for variable quantum and duration from 01.04.2022 to 31.03.2023

Annexure-3J
(Item no. 3.16)

Transmission Lines Completed During FY- 2021-22

As on 31-Mar-2022

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	Ajmer (PG) - Phagi line	D/C	PGCIL	268	APR-21
2	Vindhyachal - Varansai line	D/C	PGCIL	379	JUL-21
3	Fatehgarh-II PS - Bhadla-II section (PGCIL-RTM)	D/C	PGCIL	374	AUG-21
4	Khetri - Jhatikara line (CKt-I)	D/C	PGCIL	146	SEP-21
5	Medinipur - Jeerat (New) (PM-JTL-TBCB)	D/C	PGCIL	338	SEP-21
6	Khetri - Jhatikara line (Ckt-II)	D/C	PGCIL	146	OCT-21
7	LILO of both Ckt. 765kV D/C (op. at 400kV) Fatehgarh (TBCB) - Bhadla (PG) at Fateharh-II PS (Loop in of Ckt-I)	D/C	PGCIL	40	OCT-21
8	LILO of both Ckts. of Ajmer - Bikaner line at Bhadla-II PS (PGCIL-RTM)	D/C	PGCIL	527	OCT-21
9	LILO of both Ckts. of (op.at 400 kV) Fatehgarh (TBCB)- Bhadla (PG) at Fatehgarh-II PS (Loop in of Ckt-II)	D/C	PGCIL	39	NOV-21
10	LILO of both Ckts. of 765kV D/C (op at 400kV) Fatehgarh (TBCB) - Bhadla (PG) line at Fatehgarh-II PS (Loop Out Portion) (PGCIL-RTM)	D/C	PGCIL	80	MAR-22
Total of CENTRAL SECTOR				**2337**	
STATE SECTOR					
11	Anpara D – Unnao	S/C	UPPTCL	426	NOV-21
12	Ariyalur - Thiruvalam PGCIL	D/C	TANTRANSCO	347	FEB-22
13	North Chennai PS – Ariyalur	D/C	TANTRANSCO	548	FEB-22
Total of STATE SECTOR				**1321**	
PRIVATE SECTOR					
14	Bikaner (PG) - Khetri S/S	D/C	APL	481	AUG-21

15	Ghatampur TPS-Hapur (WUPPTCL) line	S/C	APL	411	DEC-21
16	Khandwa Pool - Dhule Line (KTL - TBCB)	D/C	SGL	383	DEC-21
Total of PRIVATE SECTOR				**1275**	
Total of 765 kV				**4933**	
	400 kV				
CENTRAL SECTOR					
17	Darbhanga - Sitamarhi (New) line (Ckt-II) line	D/C	PGCIL	80	APR-21
18	Sitamarhi (New) - Motihari line (Triple Snowbird) (ERSS XXITL-TBCB)	D/C	PGCIL	171	APR-21
19	New Mariani – Misa	D/C	PGCIL	2	MAY-21
20	Jigmeling - Alipurdauar line (Q) (India Side)	D/C	PGCIL	326	JUN-21
21	LILO of Sagardighi - Subhasgram line at Jeerat	S/C	PGCIL	2	JUN-21
22	Edayarpalayam (TANTRANSCO)- Udumulpet line (Q)	D/C	PGCIL	94	JUL-21
23	Palatana – Surajmaninagar	D/C	PGCIL	24	JUL-21
24	Pugalur HVDC-Edayarpalayam (TANTRANSCO) line (Q)	D/C	PGCIL	105	JUL-21
25	Bhadla-II PS-Bhadla (PG) line (CKt-I)	D/C	PGCIL	48	SEP-21
26	Jeerat (New) - Jeerat (WBSETCL) (PM-JTL-TBCB)	D/C	PGCIL	51	SEP-21
27	Khetri - Sikar (PG) line	D/C	PGCIL	156	SEP-21
28	LILO of both Ckt. of Kishanganj - Patna 400kV (Q) line at Saharsa (Ckt-I)	D/C	PGCIL	75	SEP-21
29	LILO of both Ckt. of Kishanganj - Patna (Q) line at Saharsa (CKt-II)	D/C	PGCIL	75	OCT-21
30	Pugalur HVDC - Thiruvalam line (Q)	D/C	PGCIL	782	OCT-21
31	Bhadla-II PS-Bhadla (PG) (Twin HTLS) (Ckt.-II) (PGCIL-RTM)	D/C	PGCIL	49	DEC-21
32	Kahalgaon - Durgapur line (Bypassing of Farakka-Kahalgaon (Ckt.-3 and 4 and Farakka -Durgapur	D/C	PGCIL	6	DEC-21
33	LILO of 2nd Ckt. of Teesta-III - Kishanganj line at Rangpo (Q) - Twin HTLS Conductor	D/C	PGCIL	24	FEB-22
34	LILO of One Ckt of Bamnauli - Jhattikara at Dwarka-I	D/C	PGCIL	17	FEB-22
35	LILO of both ckts of Bawana - Mandola at Maharanibagh	D/C	PGCIL	120	MAR-22
Total of CENTRAL SECTOR				**2207**	

STATE SECTOR					
36	LILO of 400 kV Aligarh-Sikandrabad at Harduaganj TPS Line	D/C	UPPTCL	61	MAY-21
37	LILO of Gorakhpur (PG) - Lucknow (PG) line Ckt.-III at Basti	D/C	UPPTCL	47	JUL-21
38	LILO of Ibrahim Patti (PGCIL) - Kasaramau (Mau) at Rasra	D/C	UPPTCL	74	JUL-21
39	Telangana STPP – Narsapur	D/C	TSTRANSCO	354	AUG-21
40	Telangana STPP – Ramadugu	D/C	TSTRANSCO	104	AUG-21
41	LILO of ckt-II of Kursi Rd PG- Unnao line at Hardoi Rd (Jehata)	D/C	UPPTCL	25	AUG-21
42	LILO of ckt-I of 400 kV DC Kursi Rd PG- Unnao line at Hardoi Rd(Jehata)	D/C	UPPTCL	34	AUG-21
43	LILO of Mundra - Hadala line at Halvad	D/C	GETCO	89	NOV-21
44	Julurupadu - Kamalapuram line	D/C	TSTRANSCO	79	NOV-21
45	Soja - Zerda line (Pkg-1) with Twin AL-59 conductor	D/C	GETCO	134	JAN-22
46	Patratu (JUSNL)- Bero (New Ranchi)	D/C	JUSNL	98	JAN-22
47	LILO of both Ckts. of Lonikand-II -Girvali line at Karjat S/S	M/C	MSETCL	25	JAN-22
48	Kethireddypally-Rayadurg (GIS)	D/C	TSTRANSCO	83	JAN-22
49	LILO of Ckt.-I of Unchahar (NTPC) - Fatehpur PGCIL line at Raebareli	D/C	UPPTCL	65	FEB-22
50	LILO of ckt. III and IV (Quad) Patna - Balia at Naubatpur (New)	D/C	BSPTCL	6	MAR-22
51	LILO of both Ckts. of Fedra (Pachchham) - Dholera SIR AA line at Dholera Solar Park S/S	M/C	GETCO	39	MAR-22
52	Wanakbori-Soja line (Pkg-2) with Twin AL-59 conductor	D/C	GETCO	94	MAR-22
53	Jassa Singh - HMEL 400kV Switching Station at Village Behman	D/C	PSTCL	34	MAR-22
54	LILO of 400kV Talwandi Sabo-Moga Ckts. at Switching Station at Behman Jassa Singh	D/C	PSTCL	32	MAR-22
55	Rasipalayam - Dharmapuri (Palavadi)	D/C	TANTRANSCO	379	MAR-22
Total of STATE SECTOR				**1856**	
PRIVATE SECTOR					
56	LILO of both ckt. of Ranchi - Maithon-RB line at Dhanbad (NKTL-TBCB)	D/C	APL	5	JUL-21
Total of PRIVATE SECTOR				**5**	
Total of 400 kV				**4068**	

230 kV					
STATE SECTOR					
57	Dharmapuri (Palavadi) - Udanapally 230 kV S	D/C	TANTRANSCO	115	JUL-21
58	Thiruvalam - Singarapet Feeder (Loc1 to 4)	D/C	TANTRANSCO	2	JUL-21
59	LILO the existing 230 kV Alundur - Thanjavur at the proposed Thuvankudy	M/C	TANTRANSCO	30	SEP-21
Total of STATE SECTOR				**147**	
Total of 230 kV				**147**	
220 kV					
CENTRAL SECTOR					
60	Ramgarh - Ranchi (PG) (Bypassing Gola SS) (Balance portion)	S/C	DVC	95	AUG-21
61	Navsari (PG) - Bhestan line	D/C	PGCIL	37	FEB-22
Total of CENTRAL SECTOR				**132**	
STATE SECTOR					
62	2nd ckt stringing of 220 kV Valve - Jamde SCDC line	S/C	MSETCL	13	APR-21
63	LILO of onc Ckt. of 220kV Undi-Eluru (Gudivada) line to proposed S/S at Akiveedu in West Godavari District	S/C	APTRANSCO	3	MAY-21
64	Maradam (from 400kV Maradam) - Pydibhimavaram line	D/C	APTRANSCO	46	MAY-21
65	LILO of Joda-TTPS line at Telkoi	D/C	OPTCL	29	MAY-21
66	LILO of 220kV Gonda- Basti line at Bhaukhari	D/C	UPPTCL	26	MAY-21
67	(PMDP - Jammu) LILO of Hiranagar - Bishnah at Jatwal Grid station	D/C	JKPDD	4	JUN-21
68	Rajgarh (B) - Susner (Nalkheda)	DCDS	MPPTCL	124	JUN-21
69	Ujjain - Susner (Nalkheda) (GEC)	DCDS	MPPTCL	160	JUN-21
70	Akkaram-Markook	D/C	TSTRANSCO	18	JUN-21
71	LILO of Nirmal - Renzal at Mupkal	S/C	TSTRANSCO	1	JUN-21
72	LILO of one Ckt. of Mamidipally - Shadnagar at Kothur S/S	D/C	TSTRANSCO	1	JUN-21
73	LILO of one Ckt. of Shamshabad - Kethireddypalli (Manikonda) at Kothur S/S	D/C	TSTRANSCO	19	JUN-21
74	Manuguru – BTPS	D/C	TSTRANSCO	46	JUN-21

75	Ramadugu – Rampur	D/C	TSTRANSCO	70	JUN-21
76	Greater Noida (765) - Integrated township Gr. Noida line	D/C	UPPTCL	80	JUN-21
77	Mitha - Katosan TSS line	D/C	GETCO	33	JUL-21
78	Radhanesda - Vav (Khimanvas) line with AL-59 Conductor	D/C	GETCO	73	JUL-21
79	Dhanonda- Deroli Ahir	D/C	HVPNL	57	JUL-21
80	LILO of Hiranagar-Bishnah line at Samba	D/C	JKPDD	11	JUL-21
81	LILO of Thein-Hiranagar at Kathua-II (Ghatti)	D/C	JKPDD	5	JUL-21
82	Malayammma – Kunnamangalam	M/C	KSEB	15	JUL-21
83	2nd ckt. Stringing on existing line from Malyalpally - Jagityal line	S/C	TSTRANSCO	58	JUL-21
84	400/220 kV Janagaon s/s -220/132/33 Janagaon s/s	D/C	TSTRANSCO	7	JUL-21
85	Asupaka - Aswaroapet line	D/C	TSTRANSCO	40	JUL-21
86	Dindi – Nagarkurnool	S/C	TSTRANSCO	79	JUL-21
87	Gajwel - Akkaram (TMDC)	D/C	TSTRANSCO	14	JUL-21
88	Julurupadu - Pedagopathi line	D/C	TSTRANSCO	90	JUL-21
89	Kethireddypally (Manikonda) - Kankamamidi line	D/C	TSTRANSCO	9	JUL-21
90	LILO of both Ckts. Durshed-Sirchilla line at Ramadugu	D/C	TSTRANSCO	48	JUL-21
91	LILO of Dindi - Maheshwaram at Madugula	D/C	TSTRANSCO	6	JUL-21
92	LILO of Oglapur - Durshad at Huzurabad	D/C	TSTRANSCO	20	JUL-21
93	LILO of Regumangadda - Gudipalligattu at Yelluru Water Grid s/s	D/C	TSTRANSCO	7	JUL-21
94	LILO of RSS -Bheemgal Feeder at Rampur s/s	D/C	TSTRANSCO	2	JUL-21
95	LILO of RSS -Nagaram at Ramagundam Fertillizers and Chemicals Limited (RFCL)	D/C	TSTRANSCO	22	JUL-21
96	LILO of RSS -Nrimal at Jagityal line	D/C	TSTRANSCO	3	JUL-21
97	LILO of Shamshabad-Yeddumailaram line and Shadnagar-Shankerpally line to proposed at Kethireddypally	D/C	TSTRANSCO	14	JUL-21
98	LILO of Vemnur-Nirmal to 220kv Jagityal s/s	D/C	TSTRANSCO	3	JUL-21
99	LILO of Yelluru - Gudipalligattu at Gouridevipally	S/C	TSTRANSCO	4	JUL-21
100	Maheshwaram 400/220 kV SS to Fabcity 220kV SS	D/C	TSTRANSCO	47	JUL-21

101	Narketpally - Udaya Samudram (LIS)	D/C	TSTRANSCO	18	JUL-21
102	Narsapur -Meenajipet line	D/C	TSTRANSCO	48	JUL-21
103	Nirmal -Renzal line	D/C	TSTRANSCO	136	JUL-21
104	Nirmal s/s - Existing 220/132kV Nirmal s/s	D/C	TSTRANSCO	9	JUL-21
105	Rampur -Rajeshwar Rao Peta s/s	D/C	TSTRANSCO	72	JUL-21
106	Sitapuram -Huzurnagar line	D/C	TSTRANSCO	59	JUL-21
107	Sundilla - Annaram line	D/C	TSTRANSCO	58	JUL-21
108	Sundilla - Medigadda line	D/C	TSTRANSCO	148	JUL-21
109	LILO of Ckt.-I Mainpuri (PG) - Neebkarori line at Farrukhabad	D/C	UPPTCL	16	JUL-21
110	Shahjahanpur PG (400)- Azizpur line	D/C	UPPTCL	49	JUL-21
111	LILO of Vadavi - Chhatral line at Santej S/s	D/C	GETCO	51	AUG-21
112	LILO of Sector- 72 -Ranglarajpur line at Sohna Road	D/C	HVPNL	9	AUG-21
113	Melasandra (New elctronic city) - Yerandanahalli	M/C	KPTCL	27	AUG-21
114	Mylasandra - Somanahalli-Naganthapura-HSR Layout	M/C	KPTCL	20	AUG-21
115	LILO of 220 kV Uran- JNPT MUSS line at 220 kV JNPT SEZ S/S	S/C	MSETCL	5	AUG-21
116	Second Ckt. stringing Padegaon - Sawangi line	S/C on D/C	MSETCL	15	AUG-21
117	Solapur (PG) – Narangwadi	D/C	MSETCL	148	AUG-21
118	LILO of one Ckt. of Budhipadar-Basundhara at Lephripara s/s	D/C	OPTCL	9	AUG-21
119	LILO of one ckt of Rengali-Barkote line at Deogarh	S/C	OPTCL	25	AUG-21
120	Nirmal - Indravelly (Utnoor) proposed line at Adilabad District	D/C	TSTRANSCO	199	AUG-21
121	Chhatarpur - Tikamgarh 220 KV Line	DCDS	MPPTCL	92	SEP-21
122	Halvad - Sadla line with AL-59 conductor	D/C	GETCO	76	OCT-21
123	LILO of both Ckts. Kansari -Deodar line at Bhildi S/S M/C Tower	M/C	GETCO	10	OCT-21
124	LILO of 220 kV D/C Wagoora-Mirbazar line at Lassipora	D/C	JKPDD	10	OCT-21
125	Chatra – Latehar	D/C	JUSNL	218	OCT-21
126	Kattakkada-Vizhinjam	D/C	KSEB	39	OCT-21

127	Julwaniya - Kukshi line	DCDS	MPPTCL	133	OCT-21
128	Raebareli-Amethi Line	D/C	UPPTCL	89	OCT-21
129	Sitamarhi(New) – Motipur	D/C	BSPTCL	140	NOV-21
130	TTPS - Govindpur TL	D/C	JUSNL	181	NOV-21
131	LILO Firozabad (400) (TBCB) - Agra PG (765) line at Tundla	D/C	UPPTCL	1	NOV-21
132	LILO of Shahjahanpur - Nighasan line at Gola (220)	D/C	UPPTCL	7	NOV-21
133	Bajoli Holi – Lahal	D/C	HPPTCL	36	DEC-21
134	LILO of existing Hiriyur -Gowribidanur line to the proposed 220kV at Sira S/S	D/C	KPTCL	25	DEC-21
135	LILO of 220kV Gachibowli - Miyapur line at Rayadurg GIS (UG Cable)	D/C	TSTRANSCO	7	DEC-21
136	LILO of 220kV Gachibowli - Shapurnagar line at Rayadurg GIS (UG Cable)	D/C	TSTRANSCO	9	DEC-21
137	LILO of Sasaram - Sahupuri at Karmnasa (New)	D/C	BSPTCL	1	JAN-22
138	Sitamarhi (New) - Raxaul (New) (Twin Moose)	D/C	BSPTCL	177	JAN-22
139	LILO of 220kV Fatehabad (PGCIL) - Chormar line with (MC at 220kV Hukmawali S/S (Loop in Portion)	D/C	HVPNL	41	JAN-22
140	Patratu - Ratu (Burmu) line	D/C	JUSNL	63	JAN-22
141	LILO of existing 220kV S/C Lingpur-Kushatagi and 220kV Lingapur-Sindhanur lines to the proposed 220/110/11kV Gangavathi (Sulekal) s/s	M/C	KPTCL	52	JAN-22
142	LILO of 220kV Nanauta -Shamli line at Shamli (400) (GIS)	D/C	UPPTCL	12	JAN-22
143	Satgachia – Rishra	D/C	WBSETCL	15	JAN-22
144	Hindupur (400) - Hindupur (220)(GEC-I)	S/C	APTRANSCO	16	FEB-22
145	Bakhtiyarpur (New) - Hathidah (New)	D/C	BSPTCL	62	FEB-22
146	Bakhtiyarpur (New) - Sheikhpura (New)	D/C	BSPTCL	86	FEB-22
147	LILO of Gaya (PG) - Sonenagar at both Bodhgaya (BSPTCL) and Chadauti (New)	D/C	BSPTCL	41	FEB-22
148	LILO of Korba (E) - Siltara at DSPM	D/C	CSPTCL	3	FEB-22
149	Bidadi GI S/s - 220/66/11 kV Vrushabhavathi Valley S/s (UG cable)	S/C	KPTCL	23	FEB-22
150	Guttur S/S - Proposed 220/66 kV S/S at Guttur	D/C	KPTCL	2	FEB-22
151	Honnali - Benkikere (Channagiri)	D/C	KPTCL	97	FEB-22

152	Manyatha-(GIS in premises of existing HBR Layout	D/C	KPTCL	10	FEB-22
153	Basni-NPH (Jodhpur) Line Ckt-I	D/C	RVPNL	7	FEB-22
154	LILO of 220kV Gachibowli - Erragadda line-400/220/132kV Rayadurg GIS (UG Cable)	D/C	TSTRANSCO	7	FEB-22
155	LILO of 220kV Sitapur (220) -Shahjahanpur (220) S/C line at Shahjahanpur (400) PG	S/C	UPPTCL	7	FEB-22
156	Bihta (New) – Bihta	D/C	BSPTCL	34	MAR-22
157	Bihta-Sipara (New)	D/C	BSPTCL	84	MAR-22
158	LILO of Ara (PG) - Pusauli (PG) at Dumraon GIS	D/C	BSPTCL	81	MAR-22
159	LILO of Begusarai - Biharsarif at Mokama line	D/C	BSPTCL	13	MAR-22
160	Amreli - Babara line (AL-59)	D/C	GETCO	53	MAR-22
161	Fedra (Pachchham) - Dholera AA line with Twin AL-59 Conductor	D/C	GETCO	67	MAR-22
162	Kapadwanj - Mehmdabad line	D/C	GETCO	93	MAR-22
163	LILO of both Ckts. Otha - Sagapara line at Talaja	D/C	GETCO	40	MAR-22
164	LILO of one Ckt. of Hadala-Sartanpar line at propsed 220kV Ghiyavad on M/C tower	D/C	GETCO	17	MAR-22
165	220kV cable terminating tower (Loc No-11 VTP line) to the proposed 220/66kv GIS Exora S/S (UG Cable)	D/C	KPTCL	3	MAR-22
166	Chitradurga - Hiriyur S/S	D/C	KPTCL	46	MAR-22
167	LILO line on M/C towers from existing 220KV Belagavi-Chikkodi line to the AEQUS S/S	D/C	KPTCL	23	MAR-22
168	Nagamangala- Anchepalya	D/C	KPTCL	100	MAR-22
169	PGCIL Station at Beerenahalli (Hiriyur) to existing Hiriyur s/s	S/C	KPTCL	15	MAR-22
170	Kottayam – Ettumanoor	D/C	KSEB	12	MAR-22
171	Kottayam - Thuravoor (Kottayam Dist Alapuzha Dist)	D/C	KSEB	51	MAR-22
172	LILO of PL -AM - Kottayam at Kottayam	M/C	KSEB	8	MAR-22
173	Pallivasal - Aluva line	D/C	KSEB	166	MAR-22
174	Itarsi (PGCIL) – Budhni	DCDS	MPPTCL	60	MAR-22
175	Bolangir - Kesinga line	D/C	OPTCL	164	MAR-22
176	LILO of Narendrapur - Therubali line at Gunupur S/S	D/C	OPTCL	27	MAR-22
177	Gaunsgarh – Ladhowal	D/C	PSTCL	34	MAR-22

178	Muktsar - Sandhwan line	S/C on D/C	PSTCL	39	MAR-22
179	Sandhour- Kup Kalan line (Raiway)	D/C	PSTCL	11	MAR-22
180	Basni-NPH (Jodhpur) line (Ckt.-II)	D/C	RVPNL	7	MAR-22
181	LILO of 220kV Sikar -Dhod line at GSS PGCIL Sikar	D/C	RVPNL	16	MAR-22
182	Bhaukhari (400) - Dulhipar (220) line	D/C	UPPTCL	108	MAR-22
183	Jeheta (400)- Hardoi Rd (220) Interconnector	D/C	UPPTCL	20	MAR-22
Total of STATE SECTOR				**5615**	
Total of 220 kV				**5747**	
Grand Total				**14895**	

Annexure-3K
(Item no. 3.16)

Sub-Stations Completed During FY - 2021-22

As on 31-Mar-22

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	**2.**	**3.**	**4.**	**5.**	**6.**
		800 kV			
CENTRAL SECTOR					
1	Raigarh and Pugalur Station with 6000 MW HVDC Terminal (Pole-III)	800	PGCIL	1500	JUL-21
2	Raigarh and Pugalur HVDC (Pole-4)	800	PGCIL	1500	OCT-21
	TOTAL CENTRAL SECTOR			**3000**	
	TOTAL 800 kV			**3000**	
		765 kV			
CENTRAL SECTOR					
3	Extension 765/400/220 kV Fatehgarh-II PS (Jaisalmer) (PGCIL-RTM)	765/400/220	PGCIL	1000	AUG-21
4	Eastablishment of 765/400 Fathehgarh -II PS	765/400	PGCIL	1500	AUG-21
5	Bhuj S/S	765/400	PGCIL	3000	MAY-21
6	1x1500MVA 765/400kV ICT at Fatehgarh-II	765/400	PGCIL	1500	NOV-21
7	765/400kV ICT at Bhiwani (PG) SS	765/400	PGCIL	1000	NOV-21
8	Establishment of 765/400 kV 2x1500 MVA S/S at Khetri	765/400	PGCIL	1500	OCT-21
9	Establishment of 765/400 kV Bhadla-II PS (PGCIL-RTM)	765/400	PGCIL	3000	OCT-21
10	Fatehgarh-II PS (2nd ICT Bank)	765/400	PGCIL	1500	OCT-21
11	Jeerat (New) S/s (PM-JTL -TBCB)	765/400	PGCIL	3000	SEP-21
12	Khetri SS (ICT-I)	765/400	PGCIL	1500	SEP-21
	TOTAL CENTRAL SECTOR			**18500**	
	TOTAL 765 kV			**18500**	
		400 kV			
CENTRAL SECTOR					
13	Sitamarhi S/S ERSS XXITL-TBCB)	400/220/132	PGCIL	1400	APR-21
14	Extn. at Jeypore s/s (ICT-I)	400/220	PGCIL	315	APR-21
15	Extension 400/220 kV Bikaner (PG) Substation (PGCIL-RTM)	400/220	PGCIL	500	AUG-21
16	Extn. at 400/220 kV Bhadla	400/220	PGCIL	500	AUG-21
17	Extn. at 400/220 kV Jabalpur S/S	400/220	PGCIL	500	AUG-21
18	Extn. at 400/220 kV Roorkee (ICT-III)	400/220	PGCIL	500	DEC-21
19	Establishment of 765/400 kV Fatehgarh-II PS(Jaisalmer) (500MVA 400/220kV ICT) (PGCIL-RTM)	400/220	PGCIL	500	DEC-21
20	Extn. of 765/400/220 kV Bhadla (PG) (1x500MVA 400/220kV ICT)S/S	400/220	PGCIL	500	DEC-21
21	Wardha SS (ICT)	400/220	PGCIL	500	FEB-22

22	Malda SS (2nd ICT Replacement) (1x315MVA to 1X500MVA)	400/220	PGCIL	185	FEB-22
23	Tuticorin-II GIS Additional ICT (4th) (PGCIL-RTM)	400/220	PGCIL	500	FEB-22
24	Dwarka SS (3x500MVA 400/220kV ICT)	400/220	PGCIL	1500	FEB-22
25	Extn at New Siliguri s/s (3rd ICT)	400/220	PGCIL	315	FEB-22
26	Extension 400/220 kV Bikaner (PG) Substation (ICT-II)	400/220	PGCIL	500	JAN-22
27	Augmentation of Transformation Capacity at 400/200 KV Gajuwaka S/S	400/220	PGCIL	500	JUL-21
28	Seoni (ICT)	400/220	PGCIL	500	MAR-22
29	Extension 765/400/220 kV Bhadla-II PS (Jodhpur) (PGCIL-RTM)	400/220	PGCIL	500	MAR-22
30	Dwarka SS (4th ICT)	400/220	PGCIL	500	MAR-22
31	Bhuj S/S	400/220	PGCIL	1500	MAY-21
32	Extn. at Motihari S/S	400/132	PGCIL	315	MAY-21
33	1x500MVA 400/220 kV ICT at Fatehgarh-II PS	400/220	PGCIL	500	NOV-21
34	400/220kV ICT at Sonepat	400/220	PGCIL	500	NOV-21
35	400/220kV ICT at Itarsi S/S	400/220	PGCIL	500	NOV-21
36	Saharsa S/S (2nd 500 MVA ICT)	400/220	PGCIL	500	OCT-21
37	Extn. of 765/400/220 kV Bhadla (PG) S/S (400/220kV ICT-I at Bhadla S/S)	400/220	PGCIL	500	OCT-21
38	400/220 kV ICT at Jeypore S/S	400/220	PGCIL	315	OCT-21
39	1x500MVA 400/220kV ICT at Fatehgarh-II PS	400/220	PGCIL	500	SEP-21
40	400/220/132 kV Saharsa S/S (1x500 MVA ICT of 400/220 kV) (ERSS-XXITL-TBCB)	400/220	PGCIL	500	SEP-21
	TOTAL CENTRAL SECTOR			**15845**	
	TOTAL 400 kV			**15845**	
		320 kV			
CENTRAL SECTOR					
41	VSC based HVDC Terminal at Pugalur and North Trishur (2000MW) (Monopole-I)	320	PGCIL	1000	JUN-21
	TOTAL CENTRAL SECTOR			**1000**	
	TOTAL 320 kV			**1000**	
		220 kV			
CENTRAL SECTOR					
42	Rangpo GIS (ICT)	220/132	PGCIL	100	FEB-22
43	Dhanbad (2 Auto-Xmer)	220/132	DVC	160	JAN-22
44	Burdwan GIS along with associated line bays at Parulia S/s	220/132	DVC	320	JAN-22
45	Dimapur (PG) GIS S/S	220/132	PGCIL	220	JAN-22
46	Mokokchung (PG) GIS S/S (220/132 kV 30 MVA	220/132	PGCIL	30	MAR-22
	3rd ICT)				
47	400/220/132 kV Saharsa S/S (2 x 200 MVA ICTs of 220/132 kV) (ERSS-XXITL-TBCB)	220/132	PGCIL	400	SEP-21
	TOTAL CENTRAL SECTOR			**1230**	
	TOTAL 220 kV			**1230**	
		400 kV			

STATE SECTOR					
48	Vemagiri (ICT-4)	400/220	APTRANSCO	500	APR-21
49	Jehta (Hardoi Road) S/s Lucknow	400/220	UPPTCL	1000	AUG-21
50	Karjat S/S	400/220	MSETCL	1000	JAN-22
51	Patratu GSS (PGCIL)	400/220	JUSNL	630	JAN-22
52	Basti (GIS) (T/F-I)	400/220	UPPTCL	500	JAN-22
53	Bhogat S/S	400/220	GETCO	500	JAN-22
54	Talandage S/s (ICT Replacement) (501-315)	400/220/132	MSETCL	186	JAN-22
55	Kankani s/s (Addl T/F)	400/220	RVPNL	315	JAN-22
56	Rayadurg GIS S/S	400/220/132	TSTRANSCO	1000	JAN-22
57	Akal Jaisalmer (Aug.) (500-315)	400/220	RVPNL	185	JAN-22
58	Meramundali-B (ICT-I)	400/220	OPTCL	500	JAN-22
59	K.R.Thoppur (Addl T/F)	400/110	TANTRANSCO	200	JUL-21
60	Sundilla s/s (2x315 MVA ICTs-III and IV 50 MVA STR-II and 6x50 MVA PTR-II to VII)	400/220/33	TSTRANSCO	980	JUL-21
61	Sundilla s/s (2x315 MVA ICTs-I and II 50 MVA STR-I and 50 MVA PTR-I)	400/220/11	TSTRANSCO	730	JUL-21
62	BTPS Switchyard	400/220	TSTRANSCO	315	JUN-21
63	Ujjain S/S (T/F-II)	400/220	MPPTCL	315	JUN-21
64	Aug. at Hindupur	400/220	APTRANSCO	315	MAR-22
65	Shapar S/s	400/200	GETCO	500	MAR-22
66	(Basti) (GIS) T/F-II	400/220	UPPTCL	500	MAR-22
67	Paccham (2nd ICT)	400/220	GETCO	500	MAR-22
68	Naubatpur GIS (400/220 kV T/F-I of 500 MVA 220/132 kV T/Fs of 160 MVA and 80 MVA)	400/220/132	BSPTCL	740	MAR-22
69	Bhachunda	400/220	GETCO	500	MAR-22
70	Asoj	400/220	GETCO	500	MAR-22
71	Maath Mathura (Capacity Augmentation)	400/220	UPPTCL	500	MAY-21
72	Kamalapuram SS (2x315 ICT I and II)	400/220/11	TSTRANSCO	630	NOV-21
73	Makhu (Addl. T/F)	400/220	PSTCL	500	OCT-21
74	Addl. T/F (ICT-2) at Jaisalmer	400/220	RVPNL	500	OCT-21
	TOTAL STATE SECTOR			**14541**	
	TOTAL 400 kV			**14541**	
		230 kV			
STATE SECTOR					
75	TNEB Head Quarters	230/33	TANTRANSCO	200	APR-21
76	Thirupathur S/S	230/110	TANTRANSCO	100	AUG-21
77	Acharapakkam (Addl T/F)	230/110	TANTRANSCO	100	AUG-21
78	Mambalam (GIS)	230/110	TANTRANSCO	320	FEB-22
79	Valayapatti (Addl T/F)	230/110	TANTRANSCO	100	JUL-21
80	Mambakkam (Addl T/F)	230/110	TANTRANSCO	100	JUL-21
81	Karuvalur S/S	230/110	TANTRANSCO	100	OCT-21
82	Thuvakudy S/S	230/110	TANTRANSCO	100	OCT-21
83	Kanchipuram s/s	230/110	TANTRANSCO	100	OCT-21
	TOTAL STATE SECTOR			**1220**	
	TOTAL 230 kV			**1220**	

220 kV					
STATE SECTOR					
84	Gadag (Addl.- T/F)	220/110	KPTCL	100	APR-21
85	Hukmawali (Aug.)	220/33	HVPNL	100	APR-21
86	Hayathnagar (Aug) (2x100) - (1x100 1x50)	220/33	TSTRANSCO	50	AUG-21
87	Jehta (Hardoi Road) S/s (Lucknow)	220/132	UPPTCL	200	AUG-21
88	Indravelly (Utnoor) S/S with Automation System	220/132	TSTRANSCO	200	AUG-21
89	I.I.T.G.N.L. Gr. Noida (New) T/F-I	220/33	UPPTCL	60	AUG-21
90	Laphripara	220/33	OPTCL	40	AUG-21
91	Deogarh	220/33	OPTCL	40	AUG-21
92	Kalwan (Bhendi) (Addl T/F)	220/33	MSETCL	50	AUG-21
93	Sukha (Jabalpur) (Addl. T/F-II)	220/33	MPPTCL	50	AUG-21
94	Gurgaon Sector-107 GIS	220/33	HVPNL	200	AUG-21
95	Radhanesda (Addl T/F)	220/33	GETCO	125	AUG-21
96	Satrikh Road (Lucknow) (New) T/F-I	220/33	UPPTCL	60	DEC-21
97	Mohali (Aug. of 100 to 160 MVA)	220/66	PSTCL	60	DEC-21
98	Jadla (Addl. T/F)	220/66	PSTCL	100	DEC-21
99	Sira (T/F-I)	220/66	KPTCL	100	DEC-21
100	Badaikala Muzaffarnagar (New) T/F-II	220/132	UPPTCL	160	DEC-21
101	400 kV S/s Gr Noida G B Nagar T/F (Capacity Aug)	220/132	UPPTCL	160	DEC-21
102	Rayadurg (GIS) S/S	220/132	TSTRANSCO	320	DEC-21
103	Sagar	220/132	MPPTCL	160	DEC-21
104	Kunnamkulam	220/110	KSEB	200	FEB-22
105	Pakhowal (Augmentation of 100 to 160 MVA)	220/66	PSTCL	60	FEB-22
106	Sahnewal (Augmentation of 100 to 160 MVA)	220/66	PSTCL	60	FEB-22
107	Darbhanga GSS (Aug) (200-160) T/F-I	220/132	BSPTCL	40	FEB-22
108	Gopalganj GSS (Aug) (200-100) T/F-I	220/132	BSPTCL	100	FEB-22
109	Hazipur GSS (Aug) (200-100) T/F-I	220/132	BSPTCL	100	FEB-22
110	Kishanganj (Addl T/F)	220/132	BSPTCL	160	FEB-22
111	Sonenagar (New) GSS (Addl T/F)	220/132	BSPTCL	160	FEB-22
112	Dhuvaran (Aug) ((100 150)-(2x100))	220/132	GETCO	50	FEB-22
113	Magarpatta (ICT Replacement) (200-100)	220/132	MSETCL	100	FEB-22
114	Ranjangaon SS (Aug.)	220/132	MSETCL	100	FEB-22
115	NPH (Distt. Jodhpur)	220/132	RVPNL	160	FEB-22
116	Madhuvan Bapudham (GIS Ghaziabad) T/F-III	220/132	UPPTCL	60	FEB-22
117	Sikandara Kanpur Dehat T/F-II	220/132	UPPTCL	60	FEB-22
118	Bottianwala (Addl. T/f)	220/66	PSTCL	160	FEB-22
119	Khaperkheda s/s (T/F)	220/33	MSETCL	25	FEB-22
120	Telkoi s/s (T/F-II)	220/33	OPTCL	20	FEB-22
121	Channagiri (Nallur/Benkikere)	220/66	KPTCL	200	FEB-22
122	Guttur	220/66	KPTCL	200	FEB-22
123	HBR Layout GIS	220/66	KPTCL	300	FEB-22
124	Chithirapuram S/S	220/66	KSEB	63	FEB-22
125	Dasuya (Addl. T/F)	220/66	PSTCL	100	JAN-22
126	Jehta Hardoi Road (GIS) (New) T/F-II	220/132	UPPTCL	200	JAN-22
127	Azizpur S/s Shahjahanpur (T/F-I)	220/132	UPPTCL	160	JAN-22

128	Amaria S/S (T/F-I) Pilibhit	220/132	UPPTCL	100	JAN-22
129	Sirohi s/s (Aug)	220/132	RVPNL	100	JAN-22
130	Dechu s/s (Aug.)	220/132	RVPNL	100	JAN-22
131	Bansur s/s (Aug.)	220/132	RVPNL	100	JAN-22
132	Lonikand -II S/S (ICT-II)	220/132	MSETCL	100	JAN-22
133	Lonikand -II S/S (ICT-I)	220/132	MSETCL	100	JAN-22
134	Bhandara S/s (ICT Replacement) (200-100)	220/132	MSETCL	100	JAN-22
135	Mandsaur	220/132	MPPTCL	160	JAN-22
136	Ratu	220/132	JUSNL	300	JAN-22
137	Karamnasha (New) s/s	220/132	BSPTCL	400	JAN-22
138	Kudachi (Addl T/F)	220/110	KPTCL	100	JAN-22
139	Gangavathi (Sulekal) S/S	220/110	KPTCL	200	JAN-22
140	Bhogat s/s	220/66	GETCO	320	JAN-22
141	Kim (Aug) ((1x160 4x100)-(4x100))	220/66	GETCO	160	JAN-22
142	Timbdi (Aug) ((3x100)-(2x100 1x50))	220/66	GETCO	50	JAN-22
143	Netlamadnur (Addl T/F)	220/110	KPTCL	100	JAN-22
144	Shamli s/s (220 /132 kV T/F-I)	220/132	UPPTCL	200	JAN-22
145	Sambhal T/F-I (Capacity Aug.)	220/132	UPPTCL	60	JAN-22
146	Pilibhit T/F-II (Capacity Aug.)	220/132	UPPTCL	60	JAN-22
147	Nighasan Lakhimpur T/F-I (Capacity Aug.)	220/132	UPPTCL	160	JAN-22
148	Hoody (T/F-I Replacement of 100 MVA by 150 MVA)	220/66	KPTCL	50	JAN-22
149	Huzurabad S/S	220/132	TSTRANSCO	200	JUL-21
150	Annaram S/S (50 MVA STR-I and 4x50 MVA PTR-I to IV)	220/11	TSTRANSCO	250	JUL-21
151	Annaram S/S (50 MVA STR-II and 4x50 MVA PTR-V to VIII)	220/11	TSTRANSCO	250	JUL-21
152	Gouridevipally S/S	220/11	TSTRANSCO	100	JUL-21
153	Medigadda s/s (50 MVA STR-II and 8x50 MVA PTR-IVto XI)	220/11	TSTRANSCO	450	JUL-21
154	Rajeshwarrao peta s/s	220/11	TSTRANSCO	120	JUL-21
155	Rampur (120 MVA) S/S	220/11	TSTRANSCO	120	JUL-21
156	Yelluru Water Grid S/S	220/11	TSTRANSCO	100	JUL-21
157	Kunnamangalam GIS s/s	220/110	KSEB	100	JUL-21
158	Medigadda s/s (50 MVA STR-I and 3x50 MVA PTR-I to III)	220/110	TSTRANSCO	200	JUL-21
159	Janagaon s/s (Upgradation of existing 132/33 s/s)	220/132	TSTRANSCO	200	JUL-21
160	Kalluru S/S	220/132	TSTRANSCO	200	JUL-21
161	Madugula	220/132	TSTRANSCO	200	JUL-21
162	Mahabubabad (Ayyagaripally)	220/132	TSTRANSCO	100	JUL-21
163	Nagarkurnool	220/132	TSTRANSCO	200	JUL-21
164	Pedagopathi S/S	220/132	TSTRANSCO	200	JUL-21
165	Renzal S/S (Upgradation of existing 132/33 s/s)	220/132	TSTRANSCO	200	JUL-21
166	Aswaraopet SS upgradation from 132 kV	220/132/33	TSTRANSCO	100	JUL-21
167	Huzurnagar S/S	220/132/33	TSTRANSCO	200	JUL-21
168	Meenajipet s/s	220/132/33	TSTRANSCO	200	JUL-21
169	Radhanesda	220/33	GETCO	375	JUL-21
170	Telkoi	220/33	OPTCL	20	JUL-21
171	Domalapenta s/s	220/33	TSTRANSCO	63	JUL-21

172	Nagaram S/S	220/33	TSTRANSCO	63	JUL-21
173	Phoolbagh Kanpur (New) T/F-II	220/33	UPPTCL	60	JUL-21
174	Sikandarabad T/F-II (Capacity Augmentation)	220/33	UPPTCL	60	JUL-21
175	Kathua-II (Ghatti) (New) Grid station	220/66	JKPDD	160	JUL-21
176	Samba(New) Grid station	220/66	JKPDD	160	JUL-21
177	Mupkal LIS s/s (T/F-I and II) (2x60 MVA)	220/11	TSTRANSCO	120	JUN-21
178	Ujjain S/S (160)	220/132	MPPTCL	160	JUN-21
179	Rampur Kamboyan (Aug.)	220/66	HVPNL	100	JUN-21
180	Akkaram LIS s/s (Station T/F-I and II) and (Pump T/F-I) (3x31.5MVA)	220/11	TSTRANSCO	95	JUN-21
181	Markook LIS s/s (16 MVA Station PTR-II) and (6x40 MVA Pump PTR- I to VI)	220/11	TSTRANSCO	256	JUN-21
182	Markook LIS s/s (Station PTR-I)	220/11	TSTRANSCO	16	JUN-21
183	Pratapsasan S/s (T/F-I)	220/132	OPTCL	160	JUN-21
184	Kothur s/s (2x160 MVA)	220/132	TSTRANSCO	320	JUN-21
185	Akkaram LIS s/s (Aug) (Pump T/F-II to VI) (5x31.5MVA)	220/11	TSTRANSCO	158	JUN-21
186	Phaltan S/s (Addl T/F)	220/33	MSETCL	25	JUN-21
187	Bheemghanpur	220/33	TSTRANSCO	32	JUN-21
188	Chanchalguda GIS (3x50 MVA)	220/33	TSTRANSCO	150	JUN-21
189	Dholera	220/33	GETCO	375	MAR-22
190	Tibber (Additional T/F)	220/66	PSTCL	100	MAR-22
191	Sahakarinagar s/s	220/66	KPTCL	300	MAR-22
192	Nagamangala (Karadahally) s/s	220/66	KPTCL	200	MAR-22
193	Kumbalgodu S/S	220/66	KPTCL	300	MAR-22
194	Cessna Business Park GIS s/s	220/66	KPTCL	300	MAR-22
195	Belagavi (Addl T/F)	220/66	KPTCL	100	MAR-22
196	Aequs Sez s/s	220/66	KPTCL	200	MAR-22
197	Shapar S/s	220/66	GETCO	160	MAR-22
198	Salejada (Aug) ((3x100 1x160)-(3x100))	220/66	GETCO	160	MAR-22
199	Kalawad	220/66	GETCO	480	MAR-22
200	Road Lucknow T/F-II	220/33	UPPTCL	60	MAR-22
201	Nagda (Addl T/F)	220/33	MPPTCL	50	MAR-22
202	Tundla Firozabad (New) T/F-II	220/132	UPPTCL	160	MAR-22
203	Gola (T/F-II)	220/132	UPPTCL	160	MAR-22
204	Dulhipar Sant Kabir Nagar (New) T/F-I	220/132	UPPTCL	160	MAR-22
205	Gunupur	220/132	OPTCL	320	MAR-22
206	Sirmour Addl. Xmer	220/132	MPPTCL	160	MAR-22
207	Pichhore S/s (Upgradation)	220/132	MPPTCL	160	MAR-22
208	Nalkheda 220/132 kV S/s (T/F-II)	220/132	MPPTCL	160	MAR-22
209	Budhni s/s	220/132	MPPTCL	160	MAR-22
210	Augmnetation works at 220KV SS Anantapuramu	220/132	APTRANSCO	80	MAR-22
211	Nirpura Baghpat (New) T/F	220/33	UPPTCL	60	MAY-21
212	Akiveedu S/S at West Godavari Dist.	220/33	APTRANSCO	80	MAY-21
213	Banga (Upgradation of 132 KV S/Stn. to 220 KV S/Stn.)	220/132	PSTCL	100	MAY-21
214	Dahi Chowki Unnao (New) T/F-III	220/33	UPPTCL	60	NOV-21
215	Tubinakere (T/F-II Replacement (150-100))	220/66	KPTCL	50	NOV-21
216	Tundla Firozabad (New) T/F-I	220/132	UPPTCL	160	NOV-21

217	Pratapgarh T/F (Capacity Augmentation)	220/132	UPPTCL	160	NOV-21
218	Huzurabad (Aug) ((2x100 160) -(2x100))	220/132	TSTRANSCO	160	NOV-21
219	Gola (New) T/F-I	220/132	UPPTCL	160	NOV-21
220	Magarpatta (ICT Replacement) (200-100)	220/132	MSETCL	100	NOV-21
221	Shivpuri s/s	220/132	MPPTCL	160	NOV-21
222	Botanical Garden (Sec-38A)Noida (Capacity Aug.) T/F-III)	220/33	UPPTCL	60	OCT-21
223	Tubinakere (T/F-I Replacement (150-100))	220/66	KPTCL	50	OCT-21
224	Alawalpur (Addl. T/F)	220/66	PSTCL	100	OCT-21
225	GNDTP Bhatinda	220/66	PSTCL	200	OCT-21
226	Amethi (New) T/F-I	220/132	UPPTCL	160	OCT-21
227	GNDTP Bhatinda	220/132	PSTCL	300	OCT-21
228	Kukshi 220/132kV S/S	220/132	MPPTCL	160	OCT-21
229	Wankaner S/S (Dist. Rajkot) (GEC-I)	220/132	GETCO	300	OCT-21
230	Pydibhimavaram at (Srikakulam District)	220/132	APTRANSCO	100	OCT-21
231	Lassipora (GIS)	220/33	JKPDD	160	OCT-21
232	Indore (East)	220/33	MPPTCL	50	OCT-21
233	Chatra S/S	220/132/33	JUSNL	300	OCT-21
234	Pratap Vihar (Capacity Aug.) T/F-II	220/33	UPPTCL	60	OCT-21
235	Faridabad Sector-58 GIS	220/66	HVPNL	320	SEP-21
236	Babhaleshwar S/s (Addl T/F)	220/33	MSETCL	50	SEP-21
237	Radhanesda (Addl. T/F)	220/33	GETCO	125	SEP-21
238	Ujjain (T/F-II)	220/132	MPPTCL	160	SEP-21
	TOTAL STATE SECTOR			**22646**	
	TOTAL 220 kV			**22646**	
		400 kV			
PRIVATE SECTOR					
239	Dhanbad New s/s (NKTL-TBCB)	400/220	APL	1000	JUL-21
	TOTAL PRIVATE SECTOR			**1000**	
	TOTAL 400 kV			**1000**	
	GRAND TOTAL			**78982**	

Annexure-3L
(Item no. 3.16)

Chart-I

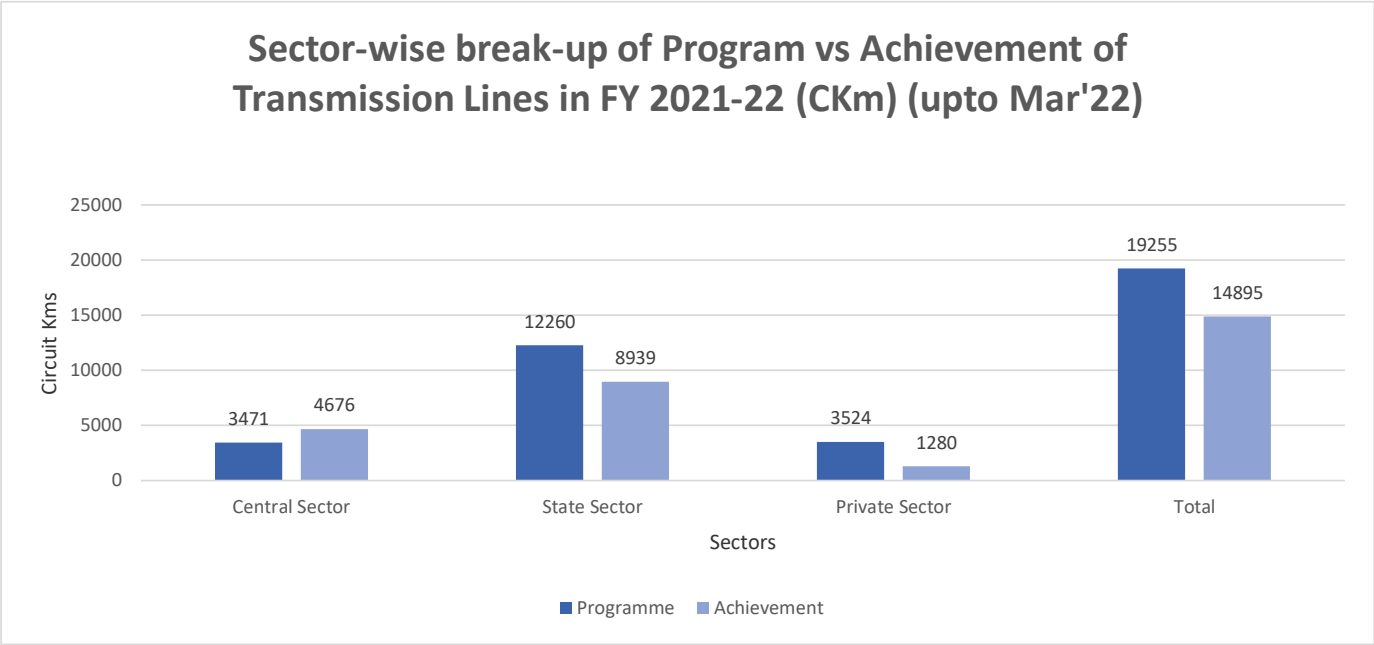


Chart-II

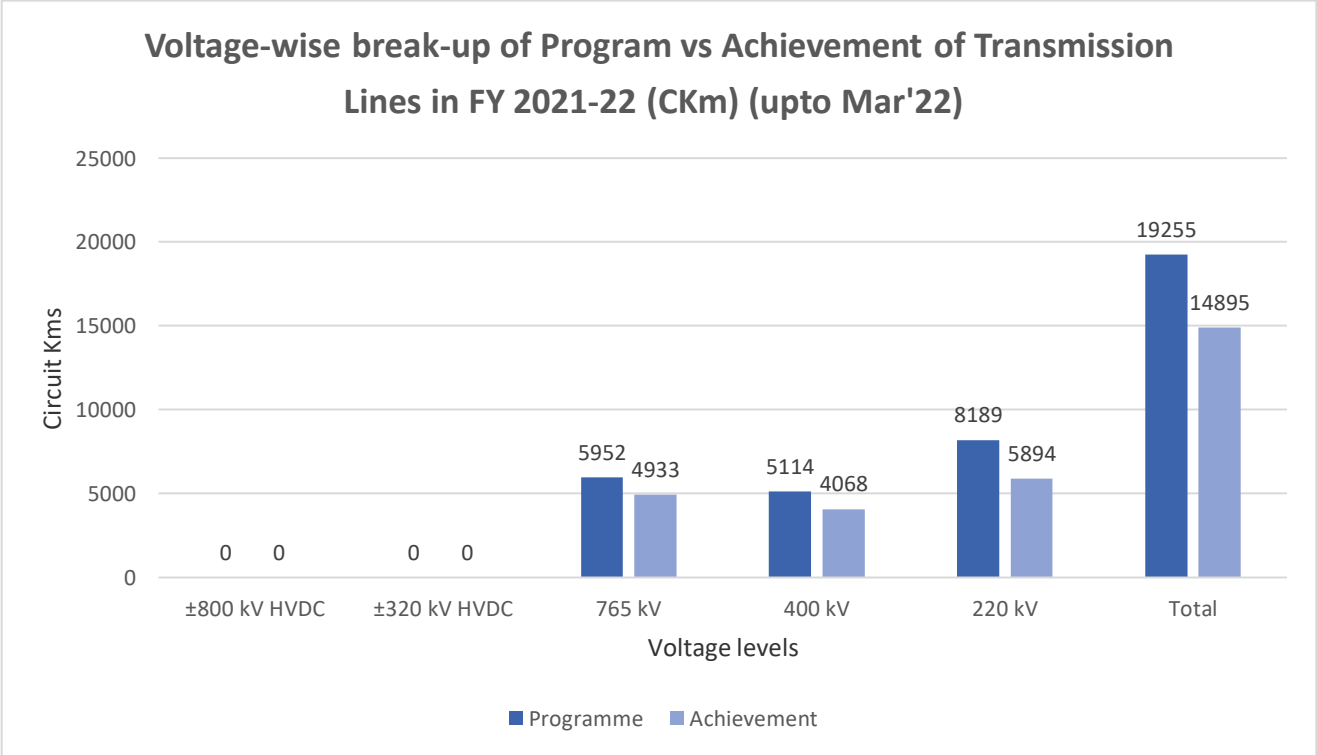


Chart-III

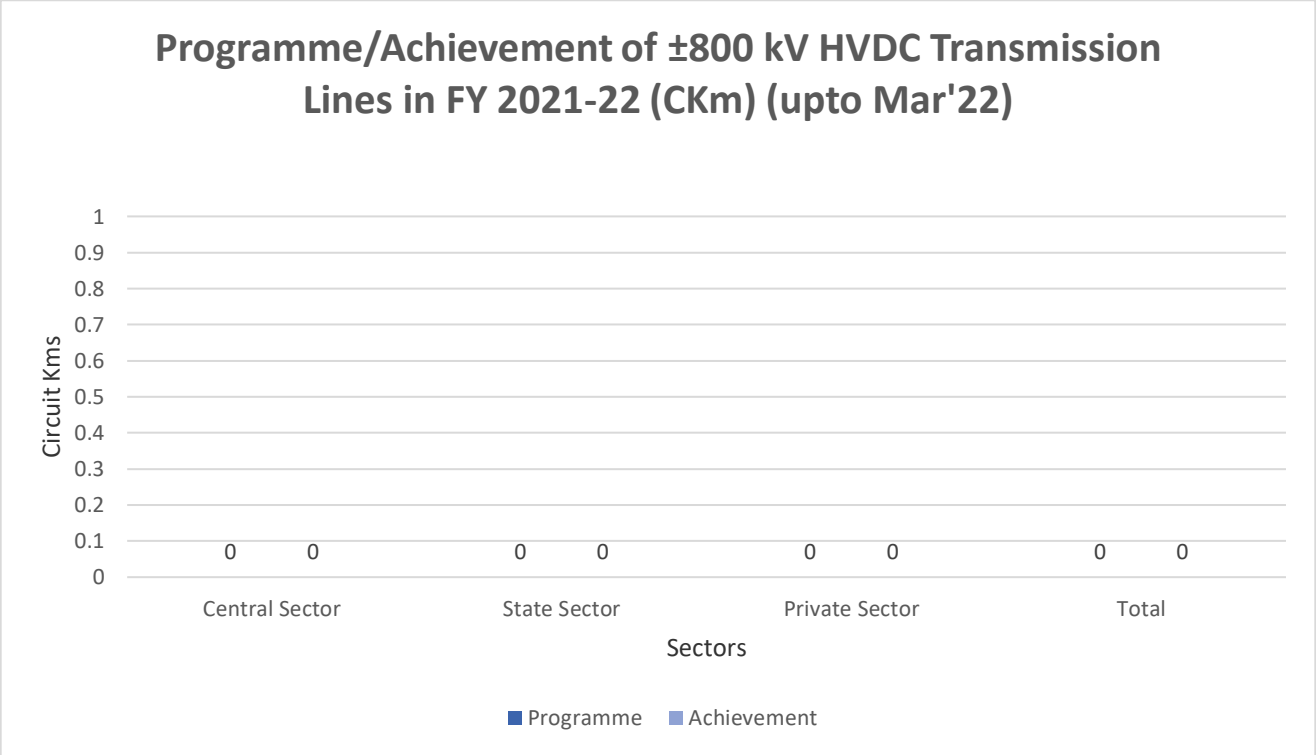


Chart-IV

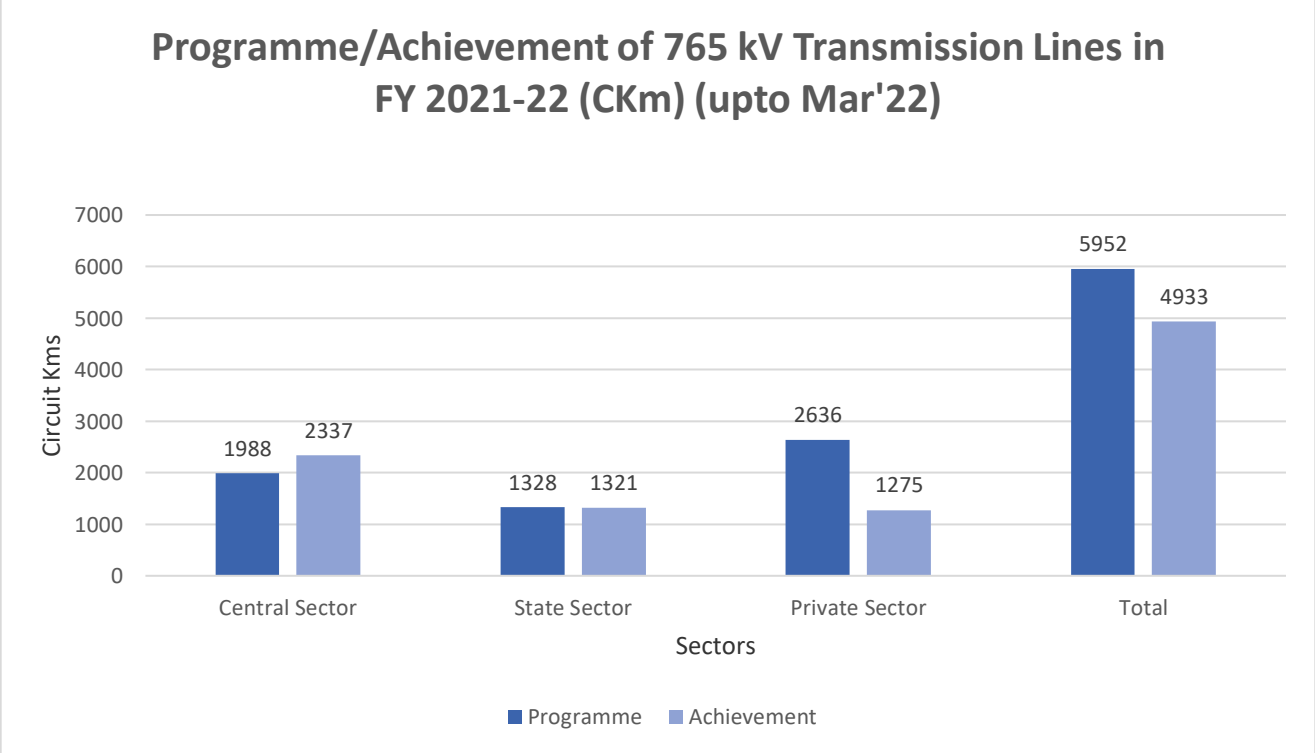


Chart-V

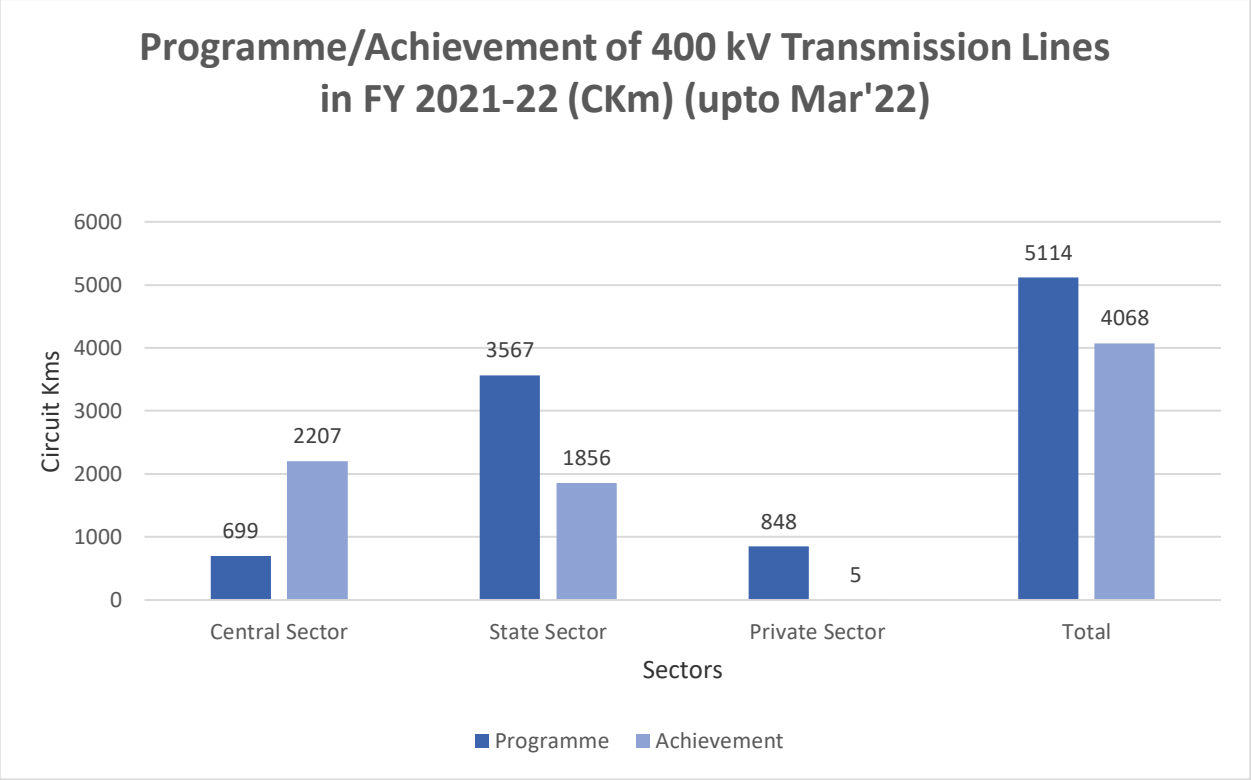


Chart-VI

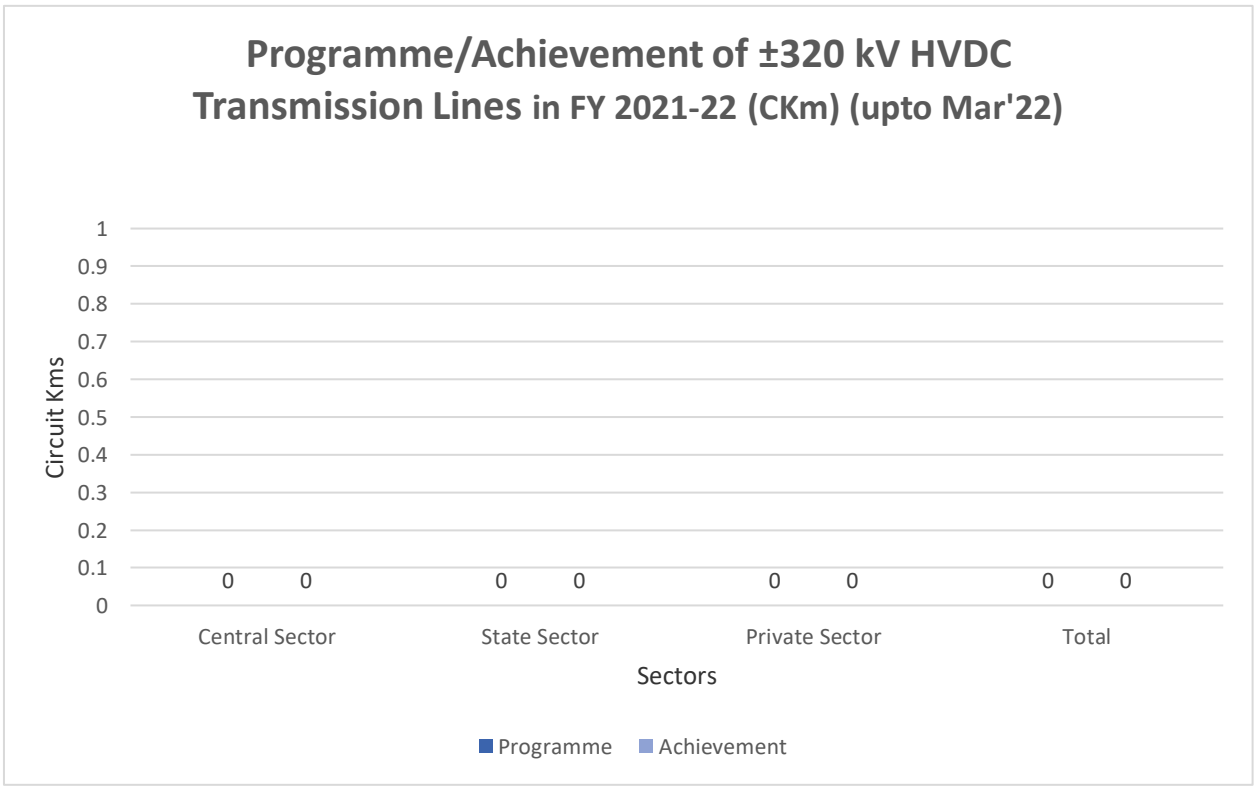


Chart-VII

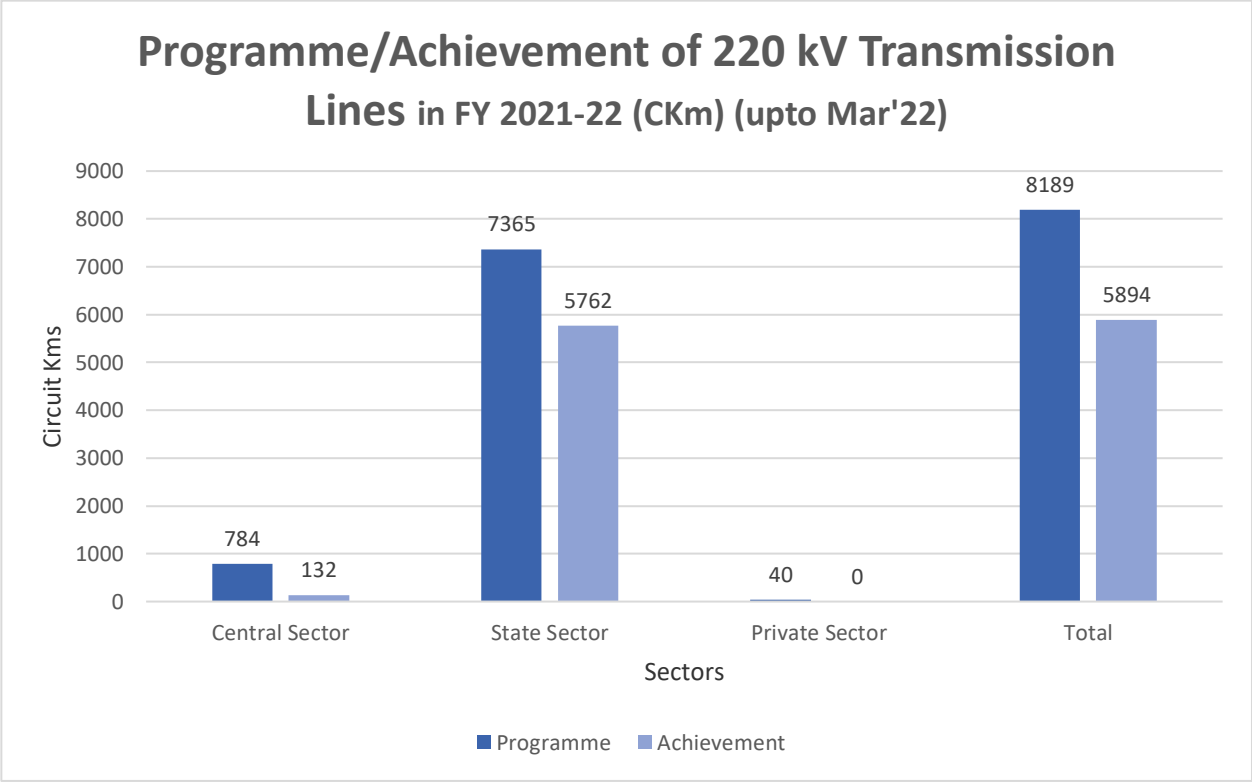


Chart-VIII

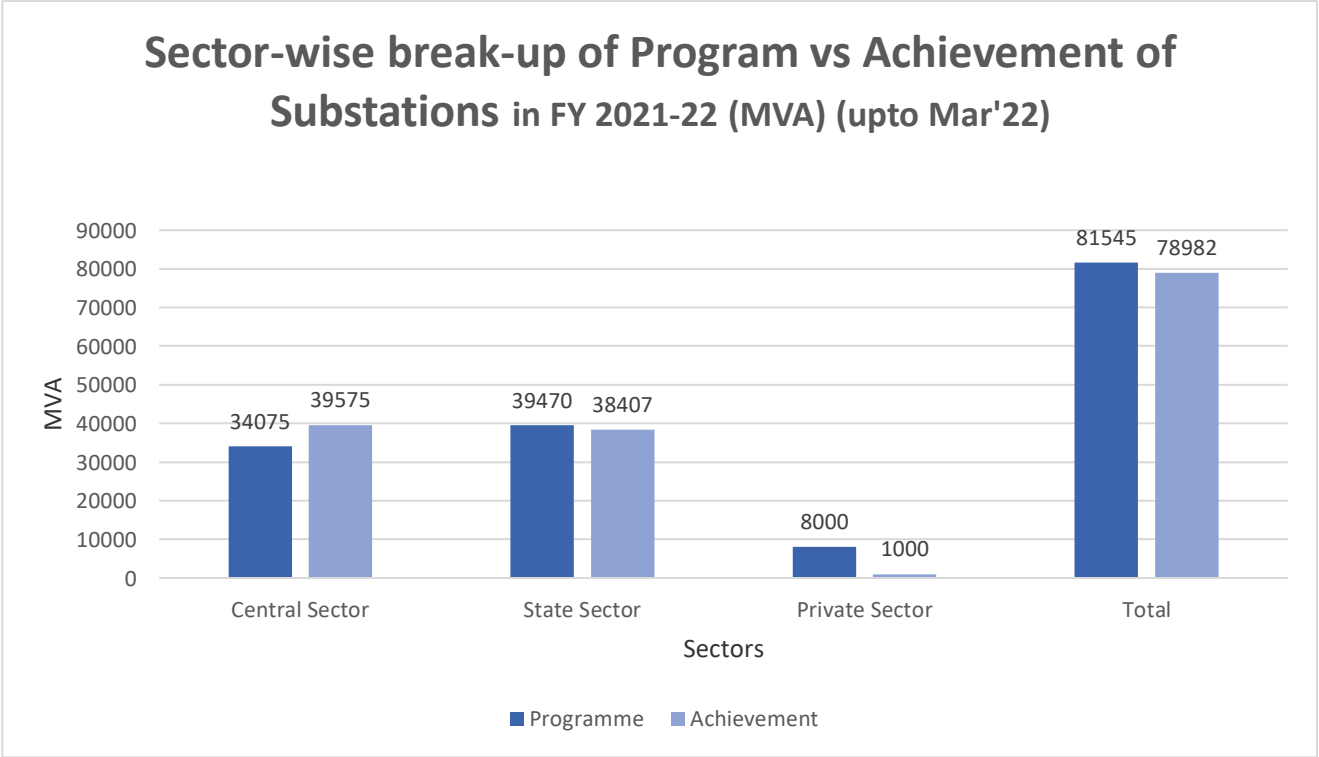


Chart-IX

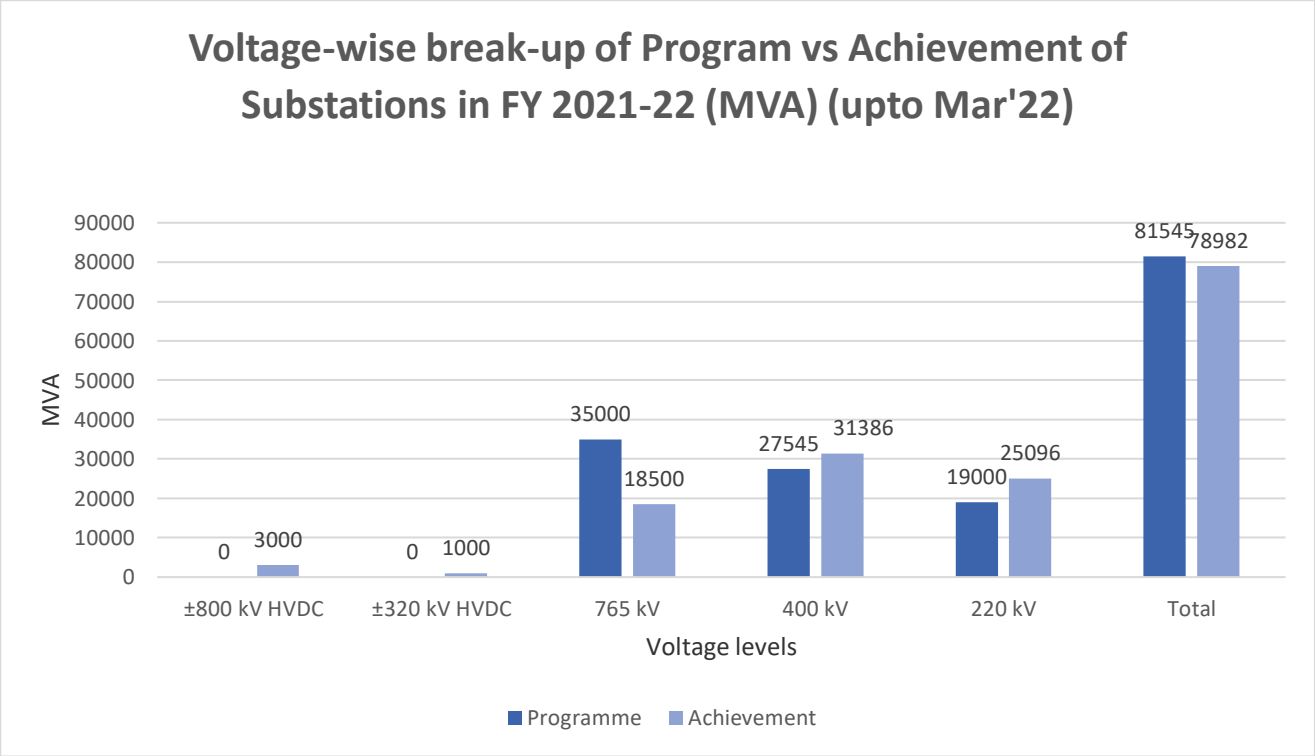


Chart-X

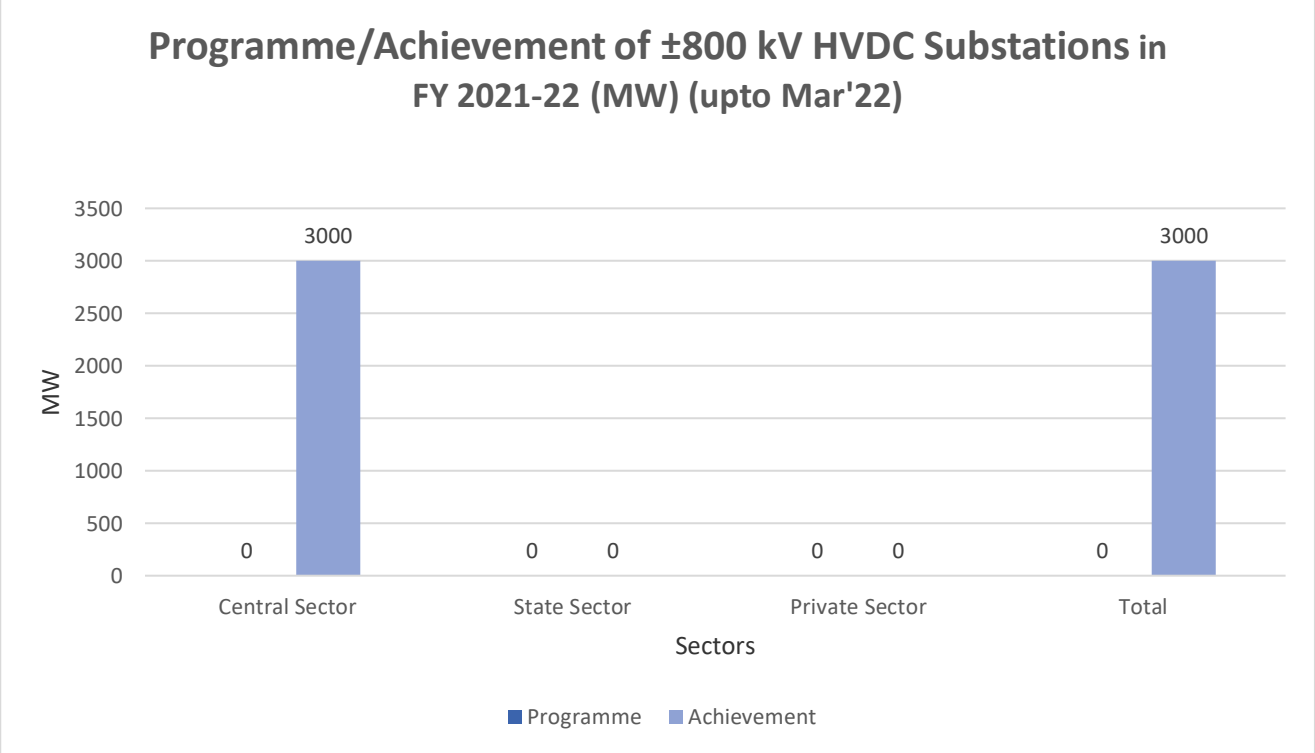


Chart-XI

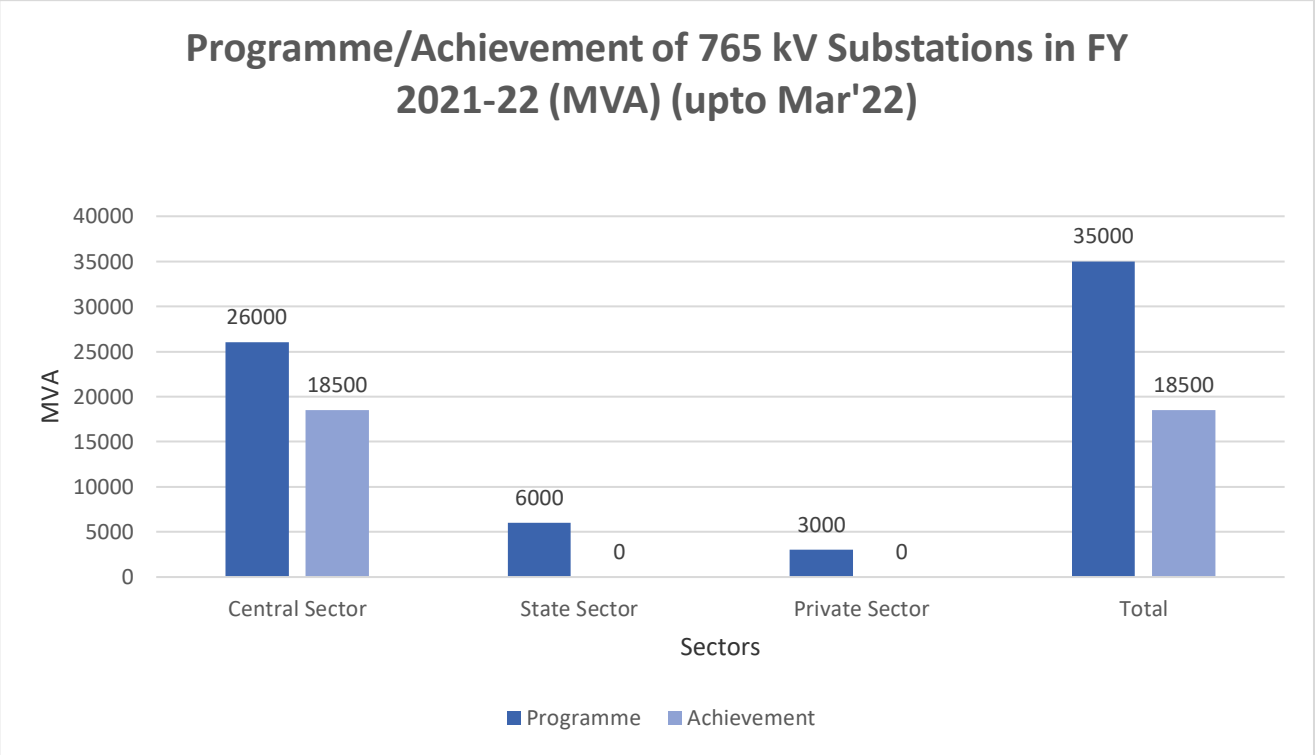


Chart-XII

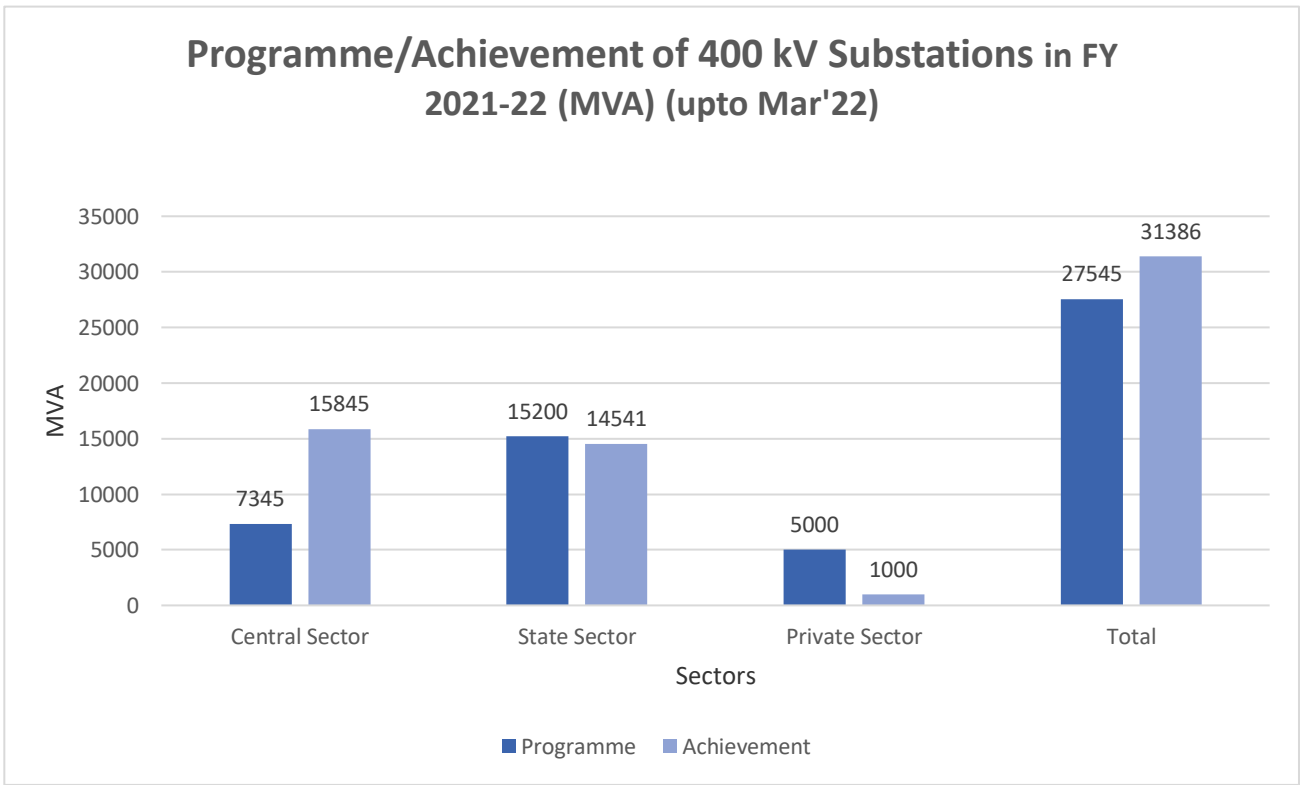


Chart-XIII

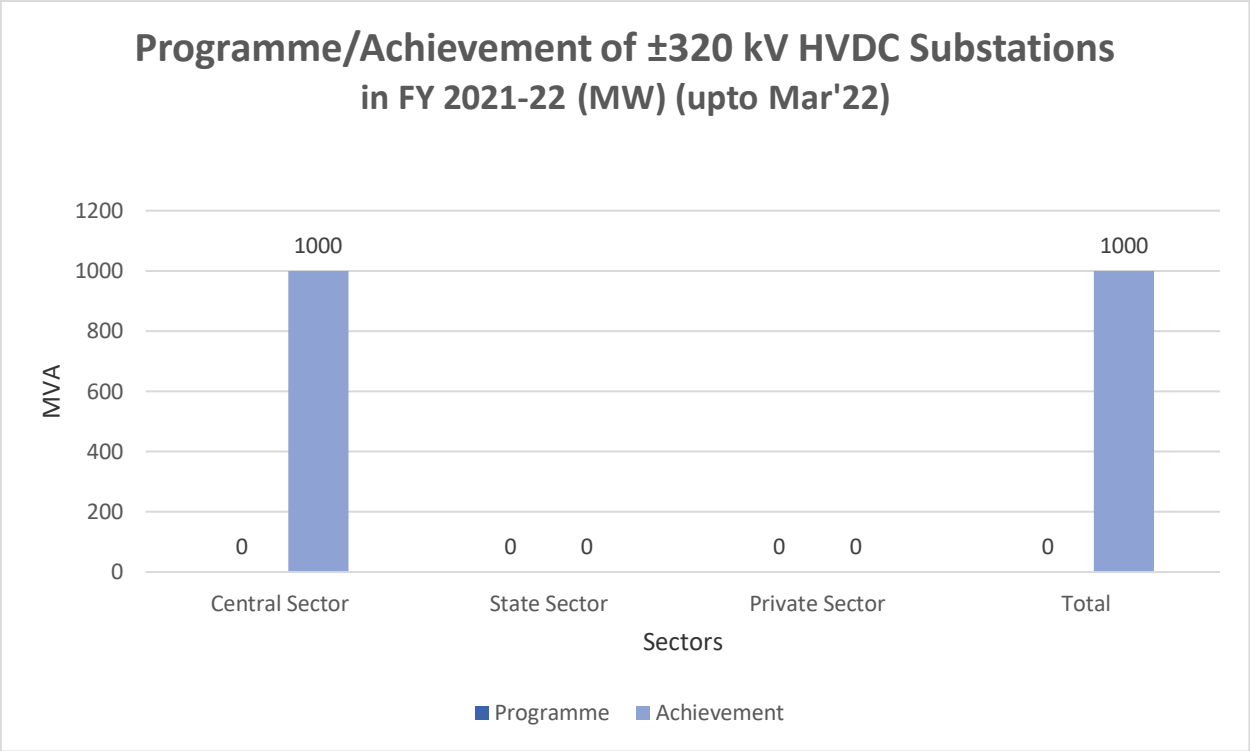
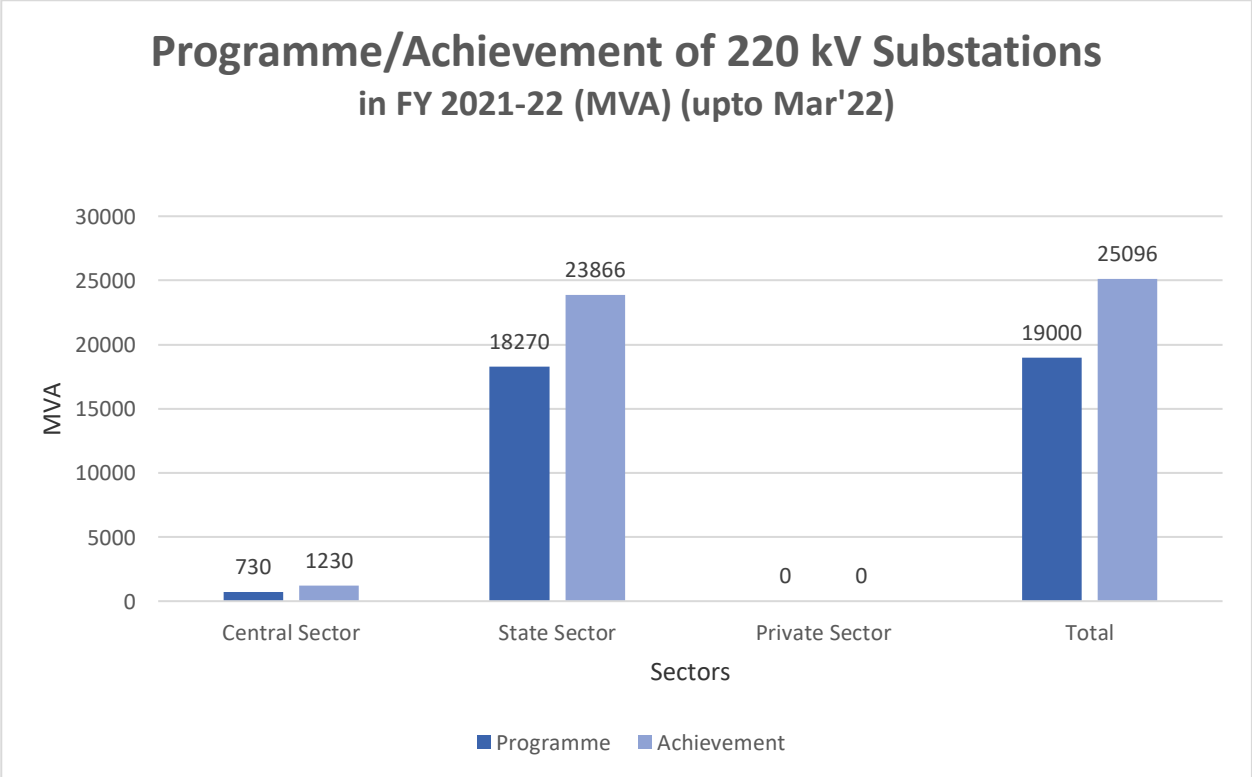


Chart-XIV



Annexure – 3M

(Item no. 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) **Substations**:

(i) 765kV Substations:

Seoni, Bina, Padghe, Wardha, Bhuj, Champa, Seoni, Bilaspur, Raigarh, Aurangabad, Indore, Bhopal, Vindhyachal, Jeerat, Bikaner, Bhadla, Jodhpur, Varanasi, Jhatikara, Bikaner, Meerut.

(ii) 400kV Substations:

Bhadrawati, Rajgarh, Gwalior, Aurangabad, Solapur, Parli, Warora, Indore, Bhachau, Rewa, Akola, Raigarh, Banaskantha, Raipur, Khedamara, Gandhar, Kawas, Sugen, Dehgam, Vindhyachal, Misa, Lalmati, P.K. Bari, Silchar, Bhadla, Jaisalmer, Jhunjhunu, Powergrid- New Jeerat, Durgapur, Maithon, Jeypore, Jamshedpur, Biharsharif, Muzzaffarpur, Malda, Farraka, Binaguri, Rangpo.

(iii) **220kV Substations**:

Korba, Raipur, Solapur, Ahmedabad, Vadodara, Solapur, Wardha, Indore, Seoni, Jaisalmer, Bhadla, Barmer, Sonipat, Sharapur, Kochi, Vizag (GIS), Mariani, Mokokchung, Dimapur, Burdwan (GIS), Chandrapur, Durgapur, Tandwa, Pakhri Bardi, Binaguri, Saharsa, Dhanbad.

(iv)132kV Substations:

Melariat, Aizawl, Haflong, Kumarghat, Ziro. Umranso, Mokukchung Burdwan(GIS), Borjora, Durgapur, Gola, Barauni, Sindri.

(v) HVDC Substations:

Champa, Raigarh, Bhadrawati Vindhyachal.

B) Generating Units:

BBMB Nangal, BBMB Mandi, NTPC Tanda, NEEPCO: Kopili, NSPCL Rourkela, BRBCL Nabinagar.

C) Transmission Lines

(i) 765 kV Lines:

Raichur-Solapur, D/C Fatehgarh II to Bhadla-II, D/C Vindhyachal –Varanasi, D/C Jhunjhunu-Jhatikara, D/C Jhunjhunu- Bikaner, D/C Jhunjhunu- Sikar, D/C Medinipur –New Jeerat.

(ii) **400 kV Lines**:

Akola - Aurangabad, Aurangabad - Wardha, Essar - Bachau, Korba- Birsingpur, Asoj - Chorania, Nagda - Dehgam, Wardha – Akola, D/C Pugalur HVDC Stn -Edayarpalayam, D/C Pugalur HVDC station – Tiruvallam, D/C Ramagundam-Chandrapur, Gooty-Sonahalli, Ranganadi- BNC, Palatana -SM Nagar, Misa- Silchar, Imphal- New Kohima, D/C Bhadla-II to Jodhpur, Bikaner to SPV Plant Noorsar.

(iii) **220 kV Lines**:

ASIPL - Bhuj PGCIL, Chugger - Kotd. Gola-Ranchi, NSPCL/CTY- MSDF, RSP Rourkela, D/C Fatehgarh-II - AHEJOL SPV Plant, Fatehgarh-II – P/S of AHEJ3L, Fatehgarh-II – P/S of AHEJ2L, Fatehgarh-II – P/S of Renew SUPL, GRT Plant to PGCIL Tuticorin II.

(iv) 132 kV Lines:

DVC Galudih-TSS SER Kharagpur, DVC Barhi -TSS ECR Dhanbad, DVC -Vananchal Concast, Meja TPP – Bijoura, Dimapur- Kohima, Palatana-SM Nagar.

Annexure – 3N

(Item no. 3.20)

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

a) **Generating plants** –

NPCIL Rawatbhata, NTPC Rihand, NTPC Tanda, MUNPL Meja, NTPC Singrauli, BPCL Kochi Refinery, Betam Wind Energy Ltd., Dharial Infrastructure ltd, Raipur Energen Ltd, Raigarh Energy Generation Limited, Jaypee Nigrie, Jindal Power ltd, KSK Mahanadi Power, NTPC Mouda, Adani Power Mundra, Jhabua, DB Power, KAPS 1 and 2, NTPC Lara, RKM Power, REGL, NTPC Jhanor, NTPC Vindhyachal, NPCIL Kakrapar, SASAN UMPP, TRN Energy, ACBIL, NTPC SAIL Power Co. Ltd, NTPC Sipat, NTPC Bongaigaon etc.

b) **Substations**:

Mahendargarh, Bhadla, Bharuch, Aurangabad, Solapur, Bhuj, Raipur, Vadodara, Sasan, Wardha, Warora, Kolhapur, Bhadrawathi, Parli, Raigarh, Jabalpur, Kotra, Indore, Korba, Bina, Seoni, Mundra, Damoh, Champa, Kutch, Bhopal, Dhule, Khandwa, Kadapa Substation, Madurai, Puducherry, Yelahanka., Dharmapuri, Kudgi, Tirchy, Salem etc.

c) **Electrical installations**:

PGCIL, NTPC, NEEPCO SAIL, GAIL, IOCL, HPCL, BPCL, NPCIL, NIFT, ONGC, AAI, NALCO, BALCO, AIR, CPWD, AAI, BALCO, IIM, IIT, SEEPZ SEZ, BDTCL, KTL Dharial Infrastructure ltd, Raipur Energen Ltd, Raigarh Energy Generation Limited, Jaypee Nigrie, Jindal Power ltd, KSK Mahanadi Power, Adani Power Mundra, Jhabua, DB Power, KAPS 1 and 2, RKM Power, REGL, NPCIL Kakrapar, SASAN UMPP, TRN Energy, ACBIL etc.

Annexure-4A

Power Supply Position for 2021-22

State / System / Region	ENERGY				PEAK			
	April, 2021 - March,2022				April, 2021 - March,2022			
	Energy Requirement	Energy Supplied	Energy not Supplied		Peak Demand	Peak Met	Demand not Met	
	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
Chandigarh	1,606	1,606	0	0.0	426	426	0	0.0
Delhi	31,128	31,122	6	0.0	7,323	7,323	0	0.0
Haryana	55,499	55,209	290	0.5	12,120	12,120	0	0.0
Himachal Pradesh	12,115	12,088	27	0.2	2,030	2,030	0	0.0
UT of J&K and Ladakh	19,957	18,434	1,524	7.6	3,076	2,826	250	8.1
Punjab	62,846	62,411	436	0.7	13,556	13,431	125	0.9
Rajasthan	89,814	89,310	504	0.6	15,784	15,784	0	0.0
Uttar Pradesh	129,448	128,310	1,138	0.9	24,965	24,795	170	0.7
Uttarakhand	15,521	15,426	94	0.6	2,468	2,468	0	0.0
Northern Region	**417,934**	**413,915**	**4,019**	**1.0**	**73,305**	**72,935**	**370**	**0.5**
Chhattisgarh	31,908	31,872	35	0.1	5,019	5,014	5	0.1
Gujarat	123,953	123,666	287	0.2	19,451	19,431	20	0.1
Madhya Pradesh	86,501	86,455	46	0.1	15,917	15,917	0	0.0
Maharashtra	172,823	172,809	14	0.0	28,075	28,016	59	0.2
Daman & Diu	2,594	2,594	0	0.0	371	369	2	0.4
Dadra & Nagar Haveli	6,839	6,839	0	0.0	891	888	3	0.3
Goa	4,448	4,448	0	0.0	703	701	2	0.3
Western Region	**429,065**	**428,683**	**383**	**0.1**	**65,433**	**65,205**	**228**	**0.3**
Andhra Pradesh	68,413	68,219	194	0.3	12,551	12,032	519	4.1
Telangana	70,539	70,523	16	0.0	14,163	14,160	3	0.0
Karnataka	72,437	72,417	20	0.0	14,830	14,818	12	0.1
Kerala	26,579	26,570	9	0.0	4,374	4,364	10	0.2
Tamil Nadu	109,816	109,798	18	0.0	16,891	16,891	0	0.0
Puducherry	2,894	2,893	1	0.0	469	467	2	0.4
Lakshadweep#	56	56	0	0.0	11	11	0	0.0
Southern Region	**350,678**	**350,421**	**258**	**0.1**	**61,138**	**59,781**	**1,357**	**2.2**
Bihar	36,216	35,761	455	1.3	7,154	6,490	664	9.3
DVC	23,741	23,736	4	0.0	3,355	3,338	17	0.5
Jharkhand	11,148	10,590	558	5.0	1,887	1,611	276	14.6
Odisha	38,339	38,332	7	0.0	5,643	5,643	0	0.0
West Bengal	54,001	53,945	57	0.1	9,089	9,087	2	0.0
Sikkim	610	609	0	0.0	133	133	0	0.0
Andaman- Nicobar #	335	327	8	2.3	60	60	0	0.0
Eastern Region	**164,054**	**162,973**	**1,081**	**0.7**	**26,019**	**25,145**	**874**	**3.4**
Arunachal Pradesh	875	874	1	0.1	197	168	29	14.6
Assam	10,844	10,825	19	0.2	2,126	2,121	5	0.2
Manipur	1,019	1,018	1	0.1	258	258	0	0.0
Meghalaya	2,256	2,243	13	0.6	408	408	0	0.0
Mizoram	656	644	12	1.8	169	156	13	7.6
Nagaland	852	851	1	0.1	173	153	20	11.7
Tripura *	1,578	1,578	0	0.0	328	327	1	0.3
NE Region	**18,079**	**18,033**	**47**	**0.3**	**3,427**	**3,360**	**67**	**1.9**
All India	**1,379,812**	**1,374,024**	**5,787**	**0.4**	**203,014**	**200,539**	**2,475**	**1.2**

 # Lakshadweep and Andaman & Nicobar Islands are stand- alone systems, power supply position of these doesn't form part of regional requirement and availability.

*** Excludes the supply to Bangladesh.**

Note: Power Supply Position Report has been compiled based on the data furnished by State Utilities/ Electricity Departments.

Annexure-4B

Allocation from Conventional Central Generating Stations as on As on 31.03.2022

Note : The following Allocation is for **Evening Peak Hours** only.
Allocation during Off-Peak Hours may vary.

S.No.	Region / State	Firm Share						Dedicated Power	Un-Allocated Power							Total Share from C.G.S.		
		Firm Power from Regional Pool (including Bhutan)	Firm from Other Regions	Non Firm	Total Firm Power				Unallocated Power from Regional Pool			Allocation from other Region / Bhutan	Total Allocation of Un-Allocated Power					
		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	207.2	8.1	2.2	0.0	207.2	7.2	2.0	376.8	1.3	0.4
2	Delhi	3064.0	741.7	0.0	3805.7	15.9	4.9	0.0	0.0	0.0	0.0	30.0	30.0	1.0	0.3	3835.7	13.6	4.0
3	Haryana	1975.6	418.3	48.0	2441.9	10.2	3.1	431.0	172.5	6.7	1.8	15.0	187.5	6.5	1.8	3060.4	10.8	3.2
4	Himachal Pradesh	1436.5	23.0	0.0	1459.5	6.1	1.9	0.0	15.0	0.6	0.2	0.0	15.0	0.5	0.1	1474.5	5.2	1.6
5	Jammu & Kashmir	1614.1	127.9	35.0	1777.0	7.4	2.3	89.0	497.1	19.3	5.3	118.1	615.1	21.4	6.1	2481.1	8.8	2.6
6	Punjab	1903.8	820.3	100.0	2824.2	11.8	3.6	0.0	244.2	9.5	2.6	30.0	274.1	9.5	2.7	3098.3	11.0	3.3
7	Rajasthan	2171.9	132.2	125.0	2429.1	10.2	3.1	550.0	672.0	26.1	7.1	15.0	687.0	23.9	6.8	3666.1	13.0	3.9
8	Uttar Pradesh	7107.4	555.2	66.0	7728.6	32.3	9.9	440.0	622.5	24.2	6.6	96.3	718.7	25.0	7.1	8887.3	31.4	9.4
9	Uttarakhand	941.0	28.1	0.0	969.0	4.1	1.2	0.0	138.0	5.4	1.5	0.0	138.0	4.8	1.4	1107.0	3.9	1.2
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				291.2		0.3
12	BTPS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Northern Region	**20387.3**	**3140.8**	**374.0**	**23902.0**	**100.0**	**30.7**	**1510.0**	**2571.7**	**100.0**	**27.3**	**304.3**	**2876.0**	**100.0**	**28.3**	**28288.0**	**100.0**	**29.8**
13	Chhattisgarh	1812.6	143.0	0.0	1955.6	9.4	2.5	50.0	25.0	0.9	0.3	0.0	25.0	0.9	0.2	2030.6	7.4	2.1
14	Gujarat	5341.2	1505.7	0.0	6846.9	33.0	8.8	160.0	350.0	12.5	3.7	5.3	355.4	12.5	3.5	7362.3	26.7	7.8
15	Madhya Pradesh	3938.6	374.0	0.0	4312.6	20.8	5.5	1520.0	532.1	19.0	5.6	40.0	572.1	20.1	5.6	6404.7	23.2	6.7
16	Maharashtra	6316.8	148.1	0.0	6464.9	31.2	8.3	2028.7	658.1	23.4	7.0	0.0	658.1	23.1	6.5	9151.7	33.2	9.6
17	Daman & Diu	103.9	2.0	0.0	105.8	0.5	0.1	109.3	164.0	5.8	1.7	0.0	164.0	5.7	1.6	379.1	1.4	0.4
18	D.N.Haveli	155.6	3.0	0.0	158.6	0.8	0.2	139.3	941.8	33.6	10.0	0.0	941.8	33.0	9.3	1239.7	4.5	1.3
19	Goa	418.3	102.0	0.0	520.3	2.5	0.7	19.7	102.0	3.6	1.1	0.0	102.0	3.6	1.0	641.9	2.3	0.7
20	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
21	HWP of DAE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	0.5	0.1	0.0	14.0	0.5	0.1	14.0	0.1	0.0
22	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
23	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	**18087.0**	**2639.2**	**0.0**	**20726.2**	**100.0**	**26.6**	**4027.1**	**2806.6**	**100.0**	**29.8**	**45.3**	**2851.9**	**100.0**	**28.1**	**27605.2**	**100.0**	**29.1**
24	Andhra Pradesh	1854.3	0.0	0.0	1854.3	11.2	2.4	0.0	113.2	4.9	1.2	0.0	113.2	4.5	1.1	1967.6	10.2	2.1
25	Telangana	2017.0	0.0	0.0	2017.0	12.2	2.6	0.0	264.2	11.5	2.8	200.0	464.2	18.6	4.6	2481.1	12.8	2.6
26	Karnataka	3597.7	450.0	0.0	4047.7	24.5	5.2	0.0	798.7	34.8	8.5	0.0	798.7	32.0	7.9	4846.4	25.0	5.1
27	Kerala	1537.5	150.0	0.0	1687.5	10.2	2.2	360.0	236.8	10.3	2.5	0.0	236.8	9.5	2.3	2284.2	11.8	2.4
28	Tamil Nadu	6104.8	300.2	0.0	6405.0	38.8	8.2	0.0	620.6	27.1	6.6	0.0	620.6	24.9	6.1	7025.6	36.2	7.4
29	Puducherry	338.6	0.0	0.0	338.6	2.0	0.4	0.0	252.3	11.0	2.7	0.0	252.3	10.1	2.5	590.9	3.0	0.6
30	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
31	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**	**911.2**	**0.0**	**16527.2**	**100.0**	**21.2**	**360.0**	**2294.0**	**100.0**	**24.4**	**200.0**	**2494.0**	**100.0**	**24.6**	**19381.2**	**100.0**	**20.4**
33	Bihar	4661.9	0.0	0.0	4661.9	33.9	6.0	710.0	824.1	57.7	8.7	0.0	824.1	57.7	8.1	6195.9	38.3	6.5
34	DVC	3584.1	0.0	0.0	3584.1	26.0	4.6	0.0	15.0	1.0	0.2	0.0	15.0	1.0	0.1	3599.1	22.2	3.8
35	Jharkhand	1346.6	50.0	0.0	1396.6	10.2	1.8	0.0	156.4	10.9	1.7	0.0	156.4	10.9	1.5	1553.0	9.6	1.6
36	Odisha	1466.0	200.0	0.0	1666.0	12.1	2.1	0.0	232.8	16.3	2.5	0.0	232.8	16.3	2.3	1898.8	11.7	2.0
37	West Bengal	2139.1	0.0	0.0	2139.1	15.5	2.7	292.0	180.7	12.6	1.9	0.0	180.7	12.6	1.8	2611.8	16.1	2.8
38	Sikkim	80.9	0.0	0.0	80.9	0.6	0.1	0.0	17.4	1.2	0.2	0.0	17.4	1.2	0.2	98.4	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	**13509.4**	**250.0**	**0.0**	**13759.4**	**100.0**	**17.7**	**1002.0**	**1429.0**	**100.0**	**15.2**	**0.0**	**1429.0**	**100.0**	**14.1**	**16190.3**	**100.0**	**17.1**
41	Arunachal Pradesh	284.5	0.0	0.0	284.5	9.7	0.4	0.0	8.6	2.7	0.1	7.0	15.6	3.1	0.2	300.1	8.7	0.3
42	Assam	1248.0	142.5	0.0	1390.5	47.4	1.8	0.0	119.0	37.3	1.3	160.6	279.7	55.2	2.8	1670.2	48.6	1.8
43	Manipur	215.0	0.0	0.0	215.0	7.3	0.3	0.0	33.8	10.6	0.4	0.0	33.8	6.7	0.3	248.8	7.2	0.3
44	Meghalaya	250.3	0.0	0.0	250.3	8.5	0.3	0.0	101.9	31.9	1.1	0.0	101.9	20.1	1.0	352.2	10.2	0.4
45	Mizoram	170.4	0.0	0.0	170.4	5.8	0.2	0.0	27.1	8.5	0.3	5.0	32.1	6.3	0.3	202.5	5.9	0.2
46	Nagaland	148.3	0.0	0.0	148.3	5.1	0.2	0.0	11.2	3.5	0.1	15.0	26.2	5.2	0.3	174.5	5.1	0.2
47	Tripura	464.8	0.0	0.0	464.8	15.9	0.6	0.0	17.6	5.5	0.2	0.0	17.6	3.5	0.2	482.3	14.0	0.5
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	**2782.8**	**148.0**	**0.0**	**2930.8**	**100.0**	**3.8**	**0.0**	**319.2**	**100.0**	**3.4**	**187.6**	**506.8**	**100.0**	**5.0**	**3437.6**	**100.0**	**3.6**
	All India	**70,382**	**7,089**	**374**	**77,846**	**100**	**100**	**6,899**	**9,420**	**100**	**100**	**737**	**10,158**	**100**	**100**	**94,902**	**100**	**100**

Note : 1. Firm share includes merchant power (50 MW each in ER and WR) and capacity allocated / diverted from other stations located within / outside the region.
2. Above allocation is for evening peak hours only (18-22 hrs for WR, SR and NER, 19-22 hrs for ER and 18-23 hrs for NR). Allocation during off-peak hours may vary.
3. 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).
4. Excludes capacity of central sector units which have been commissioned but yet to be declared under commercial operation.

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	120.00	2666.71	3.26
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	WAPCOS	5	34	170	24.54	316.13	4.89
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		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	WAPCOS	2	32.5	65	108.9	293.18	1.8
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 2020-21

Sl. No.	Particular	Unit Nos.	Capacity (MW)		Commissioning		Remarks
			Target	Actual	As Programmed	Actual (A)/ Anticipated	
A.	**Central Sector**						
1	**Kameng** NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit # 3 Unit # 4	150 150	300	March,21 March,21	21.01.2021 11.02.2021	**Commissioned** **Commissioned**
	Sub- total (A):		**300**	**300**			
B.	**State Sector**						
2	**Sawra Kuddu** HPPCL, H.P. 3x37=111 MW	Unit #1 Unit # 2 Unit # 3	37 37 37	**111**	(March,21) (March,21) (March,21)	12.11.2020 05.12.2020 16.12.2020	**Commissioned** **Commissioned** **Commissioned**
	Sub- total (B):		**111**	**111**			
C.	**Private Sector**						
3.	**Singoli Bhatwari** L&T, Uttarakhand 2x33=99 MW	Unit #1 Unit # 2 Unit # 3	33 33 33	**99**	March.,20 March.,20 March.,20	19.11.2020 18.12.2020 25.12.2020	**Commissioned** **Commissioned** **Commissioned**
4.	**Rongnichu** 2x48= 96 MW (Enhance capacity 2x56.5= 113 MW) Madhya Bharat Power Corpn., Sikkim	Unit #1 Unit # 2	56.5 56.5	--	March,21 March,21	-------- **Slipped**------	
	Sub- total (C):		**195**	**99**			
	Total (A+B+C)		**606**	**510**			

Note: 510 MW capacity addition has been achieved in FY 2020-21 out of programmed capacity of total 606 MW

Annexure -5C

Hydro Capacity addition Programme vis-a-vis achievement for 2021-22

Sl. No.	Particular	Unit Nos.	Capacity (MW)		Capacity Addition		Remarks
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 to 2022-23
2	**Thottiyar** KSEB, Kerala 1x30+1x10=40MW	Unit #1 Unit # 2	10 30		December'21 December'21	2022-23 2022-23	Slipped to 2022-23
	Sub- total (A):		**100 MW**				
B.	**Private Sector**						
3	**Sorang** HSPCL, H.P. 2x50=100 MW	Unit #1 Unit # 2	50 50	**100**	June'21 June'21	Sept '21 Sept '21	**Commissioned** **Commissioned**
4	**Bajoli Holi** GMRBHHPPL, H.P. 3x60=180 MW	Unit #1 Unit # 2 Unit # 3	60 60 60	**180**	June'21 June'21 June'21	March '22 March '22 March '22	**Commissioned** **Commissioned** **Commissioned**
5	**Rongnichu** MBPCL, Sikkim 2x56.5=113 MW	Unit #1 Unit # 2	56.5 56.5	**113**	May'21 May'21	June'21 June'21	**Commissioned** **Commissioned**
	Sub- total (B):		**393 MW**	**393 MW**			
	Total (A+B)		**493 MW**	**393 MW**			

Annexure-5D

Hydro Capacity addition Programme for 2022-23

Sl. No.	Name of Project	Unit No.	State/ Implem. Agency	Capacity (MW)
	Central Sector			
1	Naitwar Mori 2x30=60 MW	U-1 to U-2	Uttarakhand/SJVNL	60
2	Subansiri Lower 8x250= 2000 MW	U-1 to U-2	Arunachal Pradesh/NHPC	500
3	Tehri PSS 4x250= 1000 MW	U-1	Uttarakhand/THDC	250
			Sub- total (Central):	**810**
	State Sector			
4	Pallivasal 2x30= 60 MW	U-1 to U-2	Kerala/ KSEB Ltd.	60
5	Thottiyar 1x30 + 1x10= 40 MW	U-1 to U-2	Kerala/ KSEB Ltd.	40
6	Vyasi 2x60=120 MW	U-1 to U-2	Uttarakhand/UJVNL	120
			Sub- total (State):	**220**
	Private Sector			
7	Tidong-I 2x50= 100 MW	U-1	Himachal Pradesh/M/s Statkraft India Pvt. Ltd.	50
			Sub- total (Private):	**50**
			Total (CS+SS+PS)	**1080**

Annexure-5(E)

(Sheet 1 of 2)

State-wise list of Hydro RMU&LE schemes programmed for completion during 2017-22										
Sl. No	**Name of Project, Agency, Inst. Cap. (No. x MW)**	**CS/ SS**	**Capacity Covered Under RMU&LE (No.x MW)**	**Est. Cost**	**Actual Exp.**	**Benefits (MW)**	**Capacity after RMU&LE (MW)**	**Category**	**Year of Completion**	
				(Rs. in Crs.)					**Original**	**Anticipated**
A. COMPLETED SCHEMES IN 2017-22										
Jammu & Kashmir (UT)										
1	Salal, NHPC (6x115)	CS	5x115	58.01	51.08	-	575	R&M	Completed in 2019-20	
2	Chenani, J&KSPDC (5x4.66)	SS	5x4.66	34.28	21.84	23.30 (LE)	23.3	RM&LE	Completed in 2021-22	
3	Ganderbal, (Unit-3) J&KSPDC (2x3+2x4.5)	SS	1x4.5	18.00	3.26	4.5 (LE)	4.5	RM&LE	Completed in 2021-22	
Himachal Pradesh										
4	Ganguwal, BBMB (1x29.25+2x24.2) & Kotla, BBMB (1x29.25+2x24.2)	CS	1x24.2 (U-2) 1x24.2 (U-3)	14.19	9.58	48.4 (LE)	48.4	RM&LE	Completed in 2017-18	
5	Dehar Power House (Unit-6), BBMB (6x165)	CS	1x165	19.87	16.00	-	165	R&M	Completed in 2017-18	
6	Dehar Power House (Unit-3), BBMB (6x165)	CS	1x165	23.00	18.67	-	165	R&M	Completed in 2021-22	
7	Baira Siul, NHPC (3x60)	CS	3x60	341.41	295.69	180 (LE)	180	RM&LE	Completed in 2021-22	

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 (MW)	Category	Year of Completion	
									Original	Anticipated
Gujarat										
8	Ukai, GSECL (4x75)	SS	3x75 (U-1,2,&4)	7.30	7.30	-	225	R&M	Completed in 2021-22	
Karnataka										
9	Bhadra River Bed units, KPCL (2x12)	SS	2x12	23.55	20.12	-	24	R&M	Completed in 2019-20	
Tamil Nadu										
10	Sholayar-I, TANGEDCO (2x35)	SS	2x35	90.44	66.94	70 (LE) + 14(U)	84	RMU&LE	Completed in 2019-20	
Kerala										
11	Sholayar, KSEB (3x18)	SS	3x18	199.55	84.26	54 (LE)	54	RM&LE	Completed in 2020-21	
12	Idukki 1st stage, KSEB (3x130)	SS	3x130	89.90	63.44	-	390	R&M	Completed in 2020-21	
Odisha										
13	Hirakud-I OHPCL (2x37.5)	SS	2x37.5 (U5&6)	158.77	99.70	75.00 (LE) + 12.2 (U)	87.2	RMU&LE	Completed in 2021-22	
14	Hirakud-II (Chiplima), OHPCL (3x24)	SS	1x24 (U-3)	65.67	52.04	24.00 (LE)	24	RM&LE	Completed in 2019-20	
Sub Total (A)			**2023.20**	**1143.94**	**809.92**	**505.4 [479.2(LE) + 26.2(U)**	**2049.40**			

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 (MW)	Category	Year of Completion	
									Original	Anticipated
B. PROGRAMMED FOR COMPLETION DURING 2017-22 BUT DELAYED AND NOW PROGRAMMED FOR COMPLETION DURING 2022-27										
Himachal Pradesh										
15	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	552.75	540.00(LE) + 90.00 (U)	630	RMU&LE	2016-17	2021-22
16	Bhakra RB, BBMB (5x157)	CS	5x157	20.80	-	-	785	R&M	2021-22	2021-22
Punjab										
17	Mukerian St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5&3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	194.29	63.67	-	207	R&M	2019-20	2021-22
18	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.81	20.21	-	110	R&M	2019-20	2021-22
Uttar Pradesh										
19	Obra, UPJVNL (3x33)	SS	3x33	58.80	44.87	99 (LE)	99	RM&LE	2017-18	2021-22
Gujarat										
20	Kadana PSS, GSECL (4x60)	SS	4x60	11.26	6.18	-	240	R&M	2021-22	2021-22

Sl. No	Name of Project, Agency Inst. Cap. (No. x MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE (MW)	Category	Year of Completion	
				(Rs. in Crs.)					Original	Anticipated
Telangana										
21	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7x100.8	22.17	14.34	-	815.6	R&M	2018-19	2021-22
Karnataka										
22	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.60	2.20	-	28	R&M	2018-19	2021-22
Sub Total (B)			**2824.60**	**839.50**	**704.22**	**729.0 [639(LE) +90(U)**	**2914.60**			
Total (A+B)			**4847.80**	**1983.44**	**1514.14**	**1234.4 [1118.2(LE) +116.2(U)]**	**4964.00**			

@ This cost includes Scheme I only i.e. Rehabilitation of damaged/burnt equipments.

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extensionn; Res– Restoration;

MW – Mega Watt; CS-Central Sector: SS- State Sector

Annexure-5(F)

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	Completion Target
A. Ongoing Schemes – Under Implementation									
Himachal Pradesh									
1	Pong Power House, BBMB (6x66)	CS	6x66	142.25	-	396 (LE) + 54 (U)	450	RMU&LE	2026-27
2	Ganguwal & Kotla Power House, BBMB (4x24.2)	CS	4x24.2	3.12	-	-	96.8	R&M	2022-23
3	Bhabha Power House, HPSEB (3x40)	SS	3x40	90.14	40.84	120 (LE)	120	RM&LE	2022-23
4	Bhakra RB, BBMB (5x157)	CS	5x157	20.80	-	-	785	R&M	2022-23
5	Bhakra LB, BBMB (5x108)	CS	5x108	489.77	552.75	540.00(LE) + 90.00 (U)	630	RMU&LE	2022-23
Punjab									
6	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	82.16	7.45	-	600	R&M	2022-23
7	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	5.66	-	91.35	R&M	2022-23

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Completion Target
8	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	31.65	0.85	-	134	R&M	2022-23
9	Mukerian St.I, St.II, St.III & St.IV, PSPCL (3x15, 3x15, 3x19.5&3x19.5)	SS	3x15, 3x15, 3x19.5& 3x19.5	194.29	63.67	-	207	R&M	2022-23
10	Shanan HEP, PSPCL (1x50+4x15)	SS	1x50+ 4x15	37.81	20.21	-	110	R&M	2022-23
Uttarakhand									
11	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE)+ 12(U)	156	RMU&LE	2024-25
12	Tiloth, UJVNL (3x30)	SS	3x30	384.66	129.56	90 (LE)	90	RM&LE	2022-23
13	Dhalipur, UJVNL (3x17)	SS	3x17	152.65	52.08	51 (LE)	51	RM&LE	2022-23
Uttar Pradesh									
14	Rihand, UPJVNL (6x50)	SS	6x50	132.20	109.17	300 (LE)	300	RM&LE	2022-23
15	Obra, UPJVNL (3x33)	SS	3x33	58.8	44.87	99 (LE)	99	RM&LE	2022-23

Sl. No	Name of Project, Agency Inst. Cap. (No.X MW)	CS/ SS	Capacity Covered Under RMU&LE (No.x MW)	Est. Cost	Actual Exp.	Benefits (MW)	Capacity after RMU&LE	Category	Completion Target
Madhya Pradesh									
16	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	329.64	4.97	-	115	R&M	2026-27
17	Bargi, MPPGCL (2x45)	SS	2x45	21.63	2.42	-	90	R&M	2025-26
18	Pench, MPPGCL (2x80)	SS	2x80	13.36	0.36	-	160	R&M	2024-25
19	Bansagar Ton-I, MPPGCL (3x105)	SS	3x105	92.95	10.34	-	315	R&M	2025-26
Telangana									
20	Nagarjuna Sagar Left Canal Power House, TSGENCO (2x30.6)	SS	2x30.6	30.99	2.00	-	61.2	R&M	2022-27
21	Nagarjuna Sagar Ph-II works, TSGENCO (1x110+7x100.8)	SS	1x110+7 x100.8	22.17	14.34	-	815.6	R&M	2022-23
Karnataka									
22	Nagjhari (Unit-1 to 3) KPCL (3x150)	SS	3x150 (U-1 to 3)	222.00	13.108	450 (LE)	450	RM&LE	2023-24
23	Shivasamudram, KPCL (6x3+4x6)	SS	6x3+4x6	169.18	14.01	42 (LE)	42	RM&LE	2023-24
24	Munirabad Dam Power House, KPCL (2x9 + 1x10)	SS	2x9 + 1x10	4.60	2.20	-	28	R&M	2022-23

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
Tamil Nadu									
25	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	42	RMU&LE	2023-24
26	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	70	RMU&LE	2023-24
Gujarat									
27	Kadana PSS, GSECL (4x60)	SS	4x60	11.26	6.18	-	240	R&M	2022-23
Kerala									
28	Kuttiyadi, KSEB (3x25)	SS	3x25	377.41	-	75.00 (LE) + 7.5 (U)	82.5	RMU&LE	2023-24
Odisha									
29	Balimela, OHPCL (6x60)	SS	6x60	382.91	80.95	360(LE)	360	RM&LE	2023-24
Manipur									
30	Loktak, NHPC (3x35)	CS	3x35	273.59	19.16	105 (LE)	105	RM&LE	2023-24
Andhra Pradesh									
31	Upper Sileru Power House	SS	4x60	-	-	240 (LE)	240	RM&LE	2022-27
32	Nagarjunasagar Right Canal Power House	SS	3x30	-	-	90 (LE)	90	RM&LE	2022-27
Sub Total(A)			**7046.95**	**4441.63**	**1197.15**	**3377.5 [3198.0(LE) + 179.5(U)]**	**7226.45**		

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
B. Ongoing Schemes – Under Tendering									
Himachal Pradesh									
33	Giri, HPSEB (2x30)	SS	2x30	139.80	-	60.00 (LE)	60	RM&LE	2023-24
Uttarakhand									
34	Ramganaga, UJVNL (3x66)	SS	3x66	455.20	-	198(LE)	198	RM&LE	2022-27
35	Dhakrani, UJVNL (3x11.25)	SS	3x11.25	137.31	-	33.75 (LE)	33.75	RM&LE	2025-26
Karnataka									
36	Kadra Dam Power House, KPCL (3x50)	SS	3x50	44.47	1.72	150 (LE)	150	RM&LE	2022-23
37	Kodasalli Dam Power House, KPCL (3x40)	SS	3x40	50.60	1.72	120 (LE)	120	RM&LE	2022-23
38	Gerusoppa Dam Power House (Sharavathy Tail Race), KPCL (4x60)	SS	4x60	59.66	2.21	240 (LE)	240	RM&LE	2023-24
39	Linganamakki Dam Power House, KPCL (2x27.5)	SS	2x27.5	56.20	1.85	55 (LE)	55	RM&LE	2023-24

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
Jharkhand									
40	Panchet U-1, DVC (2x40)	CS	1x40 (U-1)	124.52	2.19	40(LE)+ 6(U)	46	RMU&LE	2023-24
Meghalaya									
41	Umium St.III, (Kyrdemkulai) MePGCL (2x30)	SS	2x30	408.00	1.20	60(LE) + 6(U)	66	RMU&LE	2022-27
Sub Total(B)			**956.75**	**1475.76**	**10.89**	**968.75 [956.75LE)+ 12(U)]**	**968.75**		
C. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
Uttarakhand									
42	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	30	RM&LE	2022-27
Karnataka									
43	Supa Dam Power House, KPCL (2x50)	SS	2x50	47.91	2.2	100 (LE)	100	RM&LE	2023-24
44	Sharavathy Generating Station, KPCL (10x103.5)	SS	10x103.5	196.56	11.07	1035 (LE)	1035	RM&LE	2023-24

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
45	MGHE, KPCL (4x21.6+4x13.2)	SS	4x21.6+ 4x13.2	97.00	7.75	139.2 (LE)	139.2	RM&LE	2023-24
Tamil Nadu									
46	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE)+ 6(U)	46	RMU&LE	2026-27
West Bengal									
47	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	109.29	7.76	40.00 (LE)	40	RM&LE	2024-25
Assam									
48	Khandong Power Station, NEEPCO (2x23)	CS	2x23	189.81	8.03	46 (LE)	46	RM&LE	2024-25
49	Kopili Power Station, NEEPCO (4x50)	CS	4x50	1117.07	202.44	200(LE)	200	RM&LE	2023-24
Sub Total(C)			**1630.20**	**1872.88**	**239.25**	**1636.2 1630.2(LE)+ 6(U)]**	**1636.20**		
D. Ongoing Schemes – Under RLA Studies									
Andhra Pradesh									
50	Machkund St.I & St.II, APGENCO (3x17+3x23)	SS	3x17+ 3x23	500.00	-	120 (LE) +9 (U)	129	RMU&LE	2025-26
51	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM&LE	2025-26

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
52	Hampi Canal PH, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM&LE	2025-26
53	Lower Sileru, APGENCO (4x115 MW)	SS	4x115	350.00	1.80	460(LE)	460	RM&LE	2022-27
Tamil Nadu									
54	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	60	RM&LE	2022-27
55	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	175	RM&LE	2022-27
56	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	180	RM&LE	2022-27
57	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	100	RM&LE	2022-27
58	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	40	RM&LE	2022-27
59	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	200	RM&LE	2022-27
60	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	30	RM&LE	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
61	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	25	RM&LE	2022-27
62	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	35	RM&LE	2022-27
63	Kadamparai, PH TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	400	RM&LE	2022-27
64	Aliyar, TANGEDCO (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2022-27
Jharkhand									
65	Subernrekha, JUUNL (2x65)	SS	2x65	-	-	130(LE)	130	RM&LE	2022-27
Meghalaya									
66	Umiam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	60(LE)	60	RM&LE	2022-27
Kerala									
67	Idukki 2nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	390	RM&LE	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
68	Sabarigiri, KSEB (Unit-1,2,3, 5 & 6) (4x55+ 2x60)	SS	4x55+ 1x60	155.9	-	280 (LE) + 20 (U)	300	RMU& LE	2022-27
69	Idamalayar, KSEB (2x37.5)	SS	2x37.5	-	-	75 (LE)	75	RM&LE	2022-27
70	Porigalkathu, KSEB (4x9)	SS	4x9	-	-	-	36	R&M	2022-27
Odisha									
71	Burla, OHPC Unit 7 (1x37.5 MW)	SS	1x37.5	-	-	37.5 (LE)	37.5	RM&LE	2022-27
72	Rengali, OHPC (5x50)	SS	5x50	-	-	250 (LE)	250	RM&LE	2022-27
73	Upper Kolab, OHPC (4x80)	SS	4x80	-	-	320 (LE)	320	RM&LE	2022-27
74	Vaitarna, WRD Maharashtra (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2022-27
75	Koyna Dam foot (Right Bank), WRD Maharashtra (2x40)	SS	2x20	-	-	40 (LE)	40	RM&LE	2022-27
76	Koyna St-3, WRD Maharashtra (4x80)	SS	4x80	-	-	320 (LE)	320	RM&LE	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
77	Tillari, WRD Maharashtra (1x60)	SS	1x60	-	-	60 (LE)	60	RM&LE	2022-27
78	Bhira Tail race, WRD Maharashtra (2x40)	SS	2x40	-	-	80 (LE)	80	RM&LE	2022-27
Jammu & Kashmir (UT)									
79	Salal, (Unit 1,2 &3) NHPC (6x115)	CS	3x115	-	-	345 (LE)	345	RM&LE	2022-27
Sub Total(D)			**4440.50**	**1355.90**	**1.80**	**4433.5 [4404.5 (LE)+ 29(U)]**	**4469.50**		
Total (A+B+C+D)			**14074.40**	**9146.17**	**1449.09**	**10415.95 [10189.45 (LE)+ 226.5(U)]**	**14300.90**		

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration;
MW – Mega Watt; CS-Central Sector: SS- State Sector

Annexure-6A

Thermal Capacity Addition Programme (RFD) for the year 2020-21

Sl. No.	Project	Unit	Capacity (MW)	Developer / Imp. Agency	State	Ant. Trial Run/ COD at the Beginning of the year	Achieved (MW)	Actual Date of Cap. Addition
CENTRAL SECTOR								
1	Lara STPP	2	800	NTPC	Chhattisgarh	Aug-20	800	12.07.20(A)
2	Gadarwara STPP	2	800	NTPC	Madhya Pradesh	Sep-20	800	16.02.21(A)
3	Meja STPP	2	660	JV of NTPC & UPRVUNL	Uttar Pradesh	Oct-20	660	12.01.21(A)
4	Neyveli New TPP-Lignite	2	500	NLC	Tamil Nadu	Oct-20	500	03.02.21(A)
5	Darlipalli STPP St-I	2	800	NTPC	Odisha	Nov-20		Slipped due to Covid pandemic
6	Barh STPP Stage I	1	660	NTPC	Bihar	Nov-20		Slipped due to Covid pandemic
7	Tanda TPP St-II	6	660	NTPC	Uttar Pradesh	Dec-20	660	31.03.21(A)
8	Nabi Nagar STPP	2	660	JV of NTPC & BSPGCL	Bihar	Jan-21	660	31.03.21(A)
9	Nabi Nagar TPP	4	250	JV of NTPC & Rly	Bihar	Feb-21		Slipped due to Covid pandemic
Total Central Sector			**5790**				**4080**	
STATE SECTOR								
1	Namrup CCGT-Gas	ST	36.15	APGCL	Assam	Jun'20	36.15	17.05.20(A)
2	Bhadradri TPP	1	270	TSGENCO	Telangana	Jun'20	270	05.06.20(A)
3	Bhadradri TPP	2	270	TSGENCO	Telangana	Aug'20	270	07.12.20(A)
4	Yelahanka CCPP-Gas	GT+ST	370	KPCL	Karnataka	Nov'20		Slipped due to Fire incident & Covid pandemic
5	Dr. Narla Tata Rao TPS St-V	8	800	APGENCO	Andhra Pradesh	Nov'20		Slipped due to Covid pandemic
6	Sri Damodaram TPS St-II	8	800	APGENCO	Andhra Pradesh	Dec'20		Slipped due to Covid pandemic
7	Suratgarh SCTPP	8	660	RRVUNL	Rajasthan	Dec'20		Slipped due to Covid pandemic
8	North-Chennai TPP, ST-III	1	800	TANGEDCO	Tamil Nadu	Jan-21		Slipped due to Covid pandemic
9	Bhadradri TPP	3	270	TSGENCO	Telangana	Jan-21	270	26.03.21(A)
Total State Sector			**4276.15**				**846.15**	
PRIVATE SECTOR								
1	Tuticorin Stage-IV	1	525	SEPC	Tamil Nadu	Jan'21		
Total Private Sector			**525**				**0**	
Total Thermal Sector			**10591.15**				**4926.15**	

Annexure-6B

Thermal Capacity Addition Programme (RFD) for the year 2021-22

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	1	660	NPGCL	Bihar	July'21	660	30.10.2021
2	Darlipalli STPP St-I	2	800	NTPC	Odisha	Aug'21	800	21.07.2021
3	Nabi Nagar TPP	4	250	BRBCL (JV of NTPC & Rly)	Bihar	Aug'21	250	10.11.2021
4	Rourkela TPP-II Expansion*	1	250	NSPCL (JV of NTPC & SAIL)	Odisha	Sep'21	-	Rourkela TPP-II Expansion is a captive power project and not to be included in Capacity addition.
5	Nabi Nagar STPP	3	660	NPGCL	Bihar	Oct'21	660	06.03.2022
6	North Karanpura STPP	1	660	NTPC	Jharkhand	Oct'21		Delay in readiness of power evacuation system by NKTL due to forest clearance issue.
7	Ghatampur TPP	1	660	NUPPL (JV of NLC & UPRVUNL)	U.P.	Mar'22		Financial Crunch faced by BoP Package contractor
8	Telangana STPP-I	1	800	NTPC	Telangana	Mar'22		Delay due to inadequate mobilization by the agencies and Modification work of superheater coils
9	Barh STPP-I	2	660	NTPC	Bihar	Mar'22		Supplies affected from Russia due to US sanction on M/s Power Machines / M/s TKZ.
Total Central Sector			**5400**				**2370**	
STATE SECTOR								
1	Suratgarh SCTPP	8	660	RRVUNL	Rajasthan	Jun'21	660	06.10.2021
2	Sri Damodaran Sanjeevaiah TPP St-II	1	800	APGENCO	Andhra Pradesh	Jul'21		Slipped due to continuous rains and severe cyclones in the vicinity of the plant. during the month Nov-21 & mid Dec-21
3	Harduaganj TPS Exp-II	1	660	UPRVUNL	U.P.	Jul'21	660	29.01.2022
4	Bhadradri TPP	4	270	TSGENCO	Telangana	Sep'21	270	09.01.2022
5	Yelahanka CCPP	GT+ ST	370	KPCL	Karnataka	Sep'21		Delay due to Gas supply.
6	Dr. Narla Tata Rao TPS St-V	1	800	APGENCO	Andhra Pradesh	Oct'21		Erection mill & bunker structures could not completed in time.
7	North-Chennai TPP St-III	1	800	TANGEDCO	Tamil Nadu	Dec'21		Cooling Water Pipeline got damaged resulted in delay of commissioning activities. (ii) 765 KV GIS erection works is delayed and the same is under progress.
Total State Sector			**4360**				**1590**	
PRIVATE SECTOR								
1	Tuticorin TPP Stage-IV	1	525	SEPC	Tamil Nadu	May'21	525	30.11.2021
Total Private Sector			**525**				**525**	
Total Thermal Capacity			**10285**				**4485**	

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 31st Mar 2022

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					1.4	0																			1.4
UHBVN																									**0.00**
DHBVN				0.00																					**0.00**
HPPC			0.00	0.00																					**0.00**
HPGCL									19.56	1.98															**21.54**
TOTAL (Haryana)	**0.00**	**0.00**	**0.00**	**0.00**	**1.40**	**0.00**	**0.00**	**0.00**	**19.56**	**1.98**	**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**		**22.94**
HIMACHAL					49.60	0.00												0.28							**49.88**
HPSEB			0.00						1.21	1.84															**3.05**
Govt.of HP																0.00									**0.00**
TOTAL (Himachal)	**0.00**	**0.00**	**0.00**	**0.00**	**49.60**	**0.00**	**0.00**	**0.00**	**1.21**	**1.84**			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**52.93**
DELHI																									**0.00**
DESU																									**0.00**
DTL /NDMC	19.00				39.40	0.00										15.22									**73.62**
DPCL																									**0.00**
TPDDL			0.00						0.57	0.00															**0.57**
BYPL /BSES YAMUNA	0.00		0.00	0.00	0.00	0.00			106.65	239.50	63.17	0.00							15.95	1.59					**426.86**
BRPL/BSES RAJDHANI			0.00	0.00	0.00	0.00			0.00	51.52									52.28	0.00					**103.80**
TOTAL (Delhi)	**19.00**	**0.00**	**0.00**	**0.00**	**39.40**	**0.00**	**0.00**	**0.00**	**107.22**	**291.02**	**63.17**	**0.00**	**0.00**	**0.00**	**0.00**	**15.22**	**0.00**	**0.00**	**68.23**	**1.59**	**0.00**	**0.00**	**0.00**		**604.85**
JAMMU & KASHMIR	3432.00				1085.50	94.00				.							0.00	0.23							**4611.73**
J&K PDD			25.97	0.22					3.13	31.57					526.44	0.00			3.82	3.89					**595.04**
J&K PDCL/JKPCL			902.38	38.82															308.79	0.00					**1249.99**
J&K SPTCL									534.70	97.68															**632.38**
TOTAL (J&K)	**3432.00**	**0.00**	**928.35**	**39.04**	**1085.50**	**94.00**	**0.00**	**0.00**	**537.83**	**129.25**	**0.00**	**0.00**	**0.00**	**0.00**	**526.44**	**0.00**	**0.00**	**0.23**	**312.61**	**3.89**	**0.00**	**0.00**	**0.00**	**0.00**	**7089.14**
PUNJAB					20.50	0.00																			**20.50**
PSEB																									**0.00**
PSPCL			0.00	0.53					4.72	11.49	0.00	0.00			0.00	0.00			1.97	0.00					**18.71**
TOTAL (Punjab)	**0.00**	**0.00**	**0.00**	**0.53**	**20.50**	**0.00**	**0.00**	**0.00**	**4.72**	**11.49**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.97**	**0.00**	**0.00**	**0.00**	**0.00**		**39.21**
RAJASTHAN					0.00	0.00							106.30	1.07											**107.37**
RRVUNL /RSEB																	17.22	12.03							**29.25**
RRVPNL																									**0.00**
JVVNL			0.00	0.01					12.75	5.76					0.00	0.00			0.01						**18.53**
AVVNL			0.00	0.00					5.56	4.18					0.00	0.00			0.05	0.00					**9.79**
JDVVNL	0.00		0.00	0.01					3.77	1.37					0.00	0.00			0.51	0.00					**5.66**
TOTAL (Rajasthan)	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**22.08**	**11.31**			**106.30**	**1.07**	**0.00**	**0.00**	**17.22**	**12.03**	**0.57**	**0.00**	**0.00**	**0.00**	**0.00**		**170.60**
OTHERS																									
HWB (KOTA)									0.00	0.00															**0.00**
UTTAR PRADESH	88.00				488.10	0.00	1.49	0.00																	
UPPCL	0.00		0.00	0.00		0.00	0.00	0.00	49.23	137.45					0.00	0.00			22.58	0.00					**209.26**
UPRVUNL																									**0.00**
UPJVNL																									**0.00**
TOTAL (Uttar Pradesh)	**88.00**	**0.00**	**0.00**	**0.00**	**488.10**	**0.00**	**1.49**	**0.00**	**49.23**	**137.45**			**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**22.58**	**0.00**	**0.00**	**0.00**	**0.00**		**786.85**
UTTARAKHAND																									
UPCL				0.00	0.00				0.49	0.36					0.00	0.00									**0.85**
CHANDIGARH																									
CPDD				0.00					0.29	0.00							65.66	8.68							**74.63**
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)	**3539.00**	**0.00**	**928.35**	**39.59**	**1684.50**	**94.00**	**1.49**	**0.00**	**742.63**	**584.70**	**63.17**	**0.00**	**106.30**	**1.07**	**526.44**	**15.22**	**82.94**	**21.22**	**405.96**	**5.48**	**0.00**	**0.00**	**0.00**		**8842.06**

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
WESTERN REGION																									
GUJARAT																									**0.00**
GUVNL					0.00	0.00			4.58	1.31															**5.89**
HWB (Gujarat)																									**0.00**
GOA																									**0.00**
GOA ED					0.00	0.00																			**0.00**
MADHYA PRADESH	0.00				0.70	0.00																			**0.70**
MPPCL / MPPTCL									132.18	27.68															**159.86**

MPPMCL			0.00	0.00							0.00	0.00				0.00			0.00		94.62	0.00			**94.62**
TOTAL (Madhya Pradesh)	**0.00**	**0.00**	**0.00**	**0.00**	**0.70**	**0.00**	**0.00**	**0.00**	**132.18**	**27.68**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**94.62**	**0.00**	**0.00**		**255.18**
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					0.70	0.00			0.38	68.77					26.14	19.07									**115.06**
DADRA NAGAR & SILVASA																									**0.00**
Electricity Department					0.00				0.01	0.11															**0.12**
DAMAN & DIU																									**0.00**
Electricity Department					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**	**1.40**	**0.00**	**0.00**	**0.00**	**137.15**	**97.87**	**0.00**	**0.00**	**0.00**	**0.00**	**26.14**	**19.07**	**0.00**	**0.00**	**0.00**	**0.00**	**94.62**	**0.00**	**0.00**		**376.25**
SOUTHERN REGION																									
ANDHRA PRADESH																									
APEPDCL/APNPDCL /APTRANSCO					0.80	0.00			42.20	57.85			84.22	0.93									69.67	0.00	**255.67**
TOTAL (Andhra Pradesh)	**0.00**				**0.80**	**0.00**			**42.20**	**57.85**			**84.22**	**0.93**									**69.67**	**0.00**	**255.67**
KARNATAKA					0.00	0.00																			**0.00**
BESCOM					0.00	0.00			10.87	1.91	18.33	0.00	227.93	0.00									4.17	0.00	**263.21**
MESCOM									0.12	0.00			27.89	0.00											**28.01**
CESCOM									0.06	0.63	0.00	0.00	25.17	0.00									0.00	0.00	**25.86**
HESCOM	0.00								41.15	47.70	2.37	0.00	30.97	0.01									0.73	0.00	**122.93**
GESCOM	0.00								5.71	7.00	10.37	0.00	69.10	0.23									16.84	0.00	**109.25**
ESCOMS																									**0.00**
TOTAL (Karnataka)	**0.00**			**0.00**	**0.00**	**0.00**			**57.91**	**57.24**	**31.07**	**0.00**	**381.06**	**0.24**									**21.74**	**0.00**	**549.26**
TELANGANA																									
TSNPDCL/TSSPDCL	0.00				0.00	0.00			398.08	89.29			191.10	1.09									244.48	0.00	**924.04**
Kerala																									
KSEB					0.20				16.57	5.14			197.83	0.00									0.00		**219.74**
TAMILNADU																									**0.00**
TNEB/TANGEDCO	0.00		0.00	9.69	168.60	0.00			2520.81	400.41			1765.65	228.64									156.12	0.00	**5249.92**
Puducherry																									**0.00**
PED					0.00	0.00			0.00	18.78			98.09	0.00									0.00	0.00	**116.87**
Others																									**0.00**
BHAVINI									-0.04	9.43															**9.39**
AUGF									0.19	0.00															**0.19**
TOTAL (Southern Region)	**0.00**	**0.00**	**0.00**	**9.69**	**169.60**	**0.00**	**0.00**	**0.00**	**3035.72**	**638.14**	**31.07**	**0.00**	**2717.95**	**230.90**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**492.01**	**0.00**	**7325.08**
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	39.00		7.71	0.38	19.30	0.00																			**66.39**
WEST BENGAL																									**0.00**
WBSEB	0.00		0.00	0.00	0.00	0.00					1.39	0.00													**1.39**
JHARKHAND																									
JBVNL/JUVNL	96.00		0.00	0.00	3.30	0.00					3094.05	462.73													**3656.08**
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**

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**
PTC (Regulated Power)																									**0.00**
TOTAL (Others)																									**0.00**
TOTAL (Eastern Region)	**135.00**	**0.00**	**7.71**	**0.38**	**22.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3106.97**	**462.73**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**3735.39**
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	0.80	0.00																	**0.80**
MANIPUR																									**0.00**
Electricity Department	26.00		0.00	0.03	13.00	0.00	13.51	0.00																	**52.54**
MEGHALAYA																									**0.00**
MeEcl/MeSEB	566.00		0.00	1.40	0.00	0.00	0.00	0.00																	**567.40**
MIZORAM																									**0.00**
Electricity Department	0.00		0.00	0.00	14.40	0.00	27.59	0.05																	**42.04**
NAGALAND																									**0.00**
Department of Power	0.00				0.00	0.00	0.00	0.00																	**0.00**
TRIPURA																									**0.00**
TSECL	7.00				0.00	0.00	107.92	0.00																	**114.92**
TOTAL (NE Region)	**599.00**	**0.00**	**0.00**	**1.43**	**27.40**	**0.00**	**149.82**	**0.05**	**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**		**777.70**
Andaman&Nicobar																									

Electricity Deptt	2.00												0.89	0.97										3.86
PGCIL	0.00																							
NVVN							0.01	0.00																
GRAND-TOTAL	**4275.00**	**0.00**	**936.06**	**51.09**	**1905.50**	**94.00**	**151.32**	**0.05**	**3915.50**	**1320.71**	**3201.21**	**462.73**	**2825.14**	**232.94**	**552.58**	**34.29**	**82.94**	**21.22**	**405.96**	**5.48**	**94.62**	**0.00**	**492.01**	**0.00**	**21060.36**

Note*: Rebates availed by utilities are taken into consideration 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.**

CENTRAL ELECTRICITY AUTHORITY

FINANCIAL STUDIES & ASSISTANCE DIVISION STATEMENT SHOWING ESTIMATED AVERAGE RATES OF ELECTRICITY (FY 2020-21)

Annexure-9B

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	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	Islands	01.06.2020	245.00	546.00	666.00	827.00	1092.00	1164.00	1178.00	181.00	181.00	181.00	770.00	824.00	-	-	-	-
2	Andhra Pradesh	01.04.2020	266.00	592.00	823.00	902.00	1030.00	1057.00	1063.00	350.00 #	350.00 #	350.00 #	726.00	726.00	773.00	773.00	726.00	763.00
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	01.04.2020	588.00	722.00	782.00	868.00	868.00	909.00	909.00	485.00	485.00	485.00	583.00 U	762.00	725.00	725.00	725.00	826.00
													550.00 R					
5	Bihar	01.04.2020	684.00 U	814.00	891.00	853.00 U	900.00	908.00	909.00	599.00	599.00	599.00	867.00	895.00	852.00	-	840.00	at 132kV 900.00 at 132 kV
			676.00 R			726.00 R												
6	Chandigarh	01.06.2020	294.00	422.00	492.00	593.00	627.00	634.00	635.00	290.00	290.00	290.00	511.00	614.00	557.00	557.00	557.00	-
7	Chhattisgarh	01.04.2020	348.00	469.00	693.00	720.00	915.00	932.00	932.00	480.00	480.00	480.00	556.00	645.00	983.00	983.00	937.00	661.00 at 132 kV
8	Dadra & Nagar Haveli	01.06.2020	195.00	241.00	301.00	403.00	429.00	433.00	434.00	80.00	80.00	80.00	458.00	531.00	590.00	590.00	-	-
9	Daman & Diu	01.06.2020	160.00	215.00	266.00	378.00	400.00	403.00	404.00	75.00	75.00	75.00	436.00	436.00	547.00	547.00	-	-
10	(BYPL/BRPL/NDPL)	01.09.2020	335.00	444.00	678.00	885.00	1177.00	1177.00	1177.00	204.00	204.00	204.00	1089.00	1089.00	942.00	942.00	933.00	870.00
11	Delhi (NDMC)	01.09.2020	335.00	444.00	678.00	885.00	885.00	885.00	885.00	204.00	204.00	204.00	1089.00	1089.00	942.00	942.00	933.00	870.00 at 33 kV
12	Goa	01.06.2020	195.00	283.00	380.00	512.00	576.00	589.00	591.00	179.00	179.00	179.00	482.00	497.00	613.00	613.00	613.00	-
13	Gujarat	01.04.2020	394.00 U	505.00 U	566.00 U	562.00	562.00	617.00	672.00	90.00	90.00	90.00	579.00	588.00	551.00	626.00	630.00	600.00 at 132 kV
			325.00 R	433.00 R	494.00 R													
14	Haryana	01.06.2020	235.00	471.00	720.00	645.00	715.00	893.00	893.00	10.00	10.00	10.00	757.00	870.00	838.00	838.00	826.00	875.00 at 11kV
15	Himachal Pradesh	01.06.2020	479.00	504.00	538.00	598.00	560.00	670.00	670.00	432.00	417.00	412.00	494.00	642.00	649.00	649.00	662.00	819.00 at 66 kV
16	Jammu & Kashmir	01.10.2016	200.00	307.00	369.00	420.00	656.00	656.00	656.00	85.00	85.00	85.00	418.00	416.00	441.00	441.00	429.00	-
17	Jharkhand	01.10.2020	720.00 U	668.00 U	657.00 U	680.00 U	697.00 U	697.00 U	697.00 U	512.00	512.00	512.00	760.00	760.00	649.00	649.00	627.00	839.00 at 25 kV
			615.00 R	604.00 R	601.00 R	612.00 R	638.00 R	638.00 R	638.00 R									
18	Karnataka	01.11.2020	617.00 D	844.00 D	912.00 D	1050.00 D	1065.00 D	1067.00 D	1068.00 D	0.00	0.00	0.00	800.00 D	909.00 D	885.00 D	891.00 D	890.00 D	831.00
			575.00 F	790.00 F	852.00 F	989.00 F	1003.00 F	1006.00 F	1006.00 F				748.00 F	856.00 F	863.00 F	867.00 F	866.00 F	
19	Kerala	08.07.2019	422.00	879.00	1019.00	861.00	1070.00	1116.00	1116.00	257.00	257.00	257.00	630.00	758.00	671.00	671.00	671.00	677.00 at 110 kV
20	Lakshadweep	01.06.2020	155.00	418.00	578.00	792.00	918.00	939.00	944.00	-	-	-	687.00	687.00	958.00	958.00	-	-
21	Madhya Pradesh	26.12.2020	611.00 U	708.00 U	763.00 U	846.00 U	852.00 U	946.00 U	947.00 U	523.00	579.00	605.00	952.00 U	952.00 U	803.00	803.00	856.00	762.00 132/220KV
			590.00 R	703.00 R	759.00 R	822.00 R	828.00 R	916.00 R	916.00 R				868.00 R	868.00 R				
22	Maharashtra	01.04.2020	686.00	######	1311.00	1248.00	1118.00	1853.00	1853.00	351.00	351.00	351.00	768.00	1073.00	1038.00 B	1038.00 B	1038.00	1043.00
															1069.00 C	1069.00 C		
23	Manipur	01.04.2020	480.00	623.00	669.00	727.00	784.00	794.00	795.00	442.00	442.00	442.00	483.00	707.00	814.00	814.00	-	-
24	Meghalaya	01.04.2020	435.00	548.00	600.00	776.00	808.00	813.00	814.00	347.00	347.00	347.00	685.00	685.00	795.00	795.00	750.00	-
25	Mizoram	01.04.2020	380.00	518.00	555.00	573.00	613.00	620.00	621.00	309.00	309.00	309.00	565.00	580.00	645.00	645.00	-	-
26	Nagaland	01.04.2020	523.00	618.00	667.00	812.00	874.00	885.00	887.00	310.00	310.00	310.00	633.00	673.00	729.00	730.00	-	-
27	Odisha	01.05.2020	374.00	496.00	566.00	658.00	738.00	752.00	754.00	161.00	158.00	158.00	625.00	669.00	665.00	665.00	640.00	671.00 at 25/33KV
28	Puducherry	01.06.2020	190.00	373.00	503.00	686.00	729.00	736.00	738.00	0.00 S	0.00 S	0.00 S	604.00	597.00	657.00	-	642.00	-
29	Punjab	01.06.2020	547.00	759.00	856.00	834.00	870.00	881.00	881.00	557.00 WS	557.00 WS	557.00 WS	741.00	798.00	889.00	852.00	889.00	930.00 at 132KV
30	Rajasthan	01.02.2020	833.00	830.00	845.00	1022.00	1046.00	1155.00	1157.00	574.00	574.00	574.00	793.00	868.00	763.00	-	745.00	710.00
31	Sikkim	01.04.2020	150.00	288.00	355.00	483.00	599.00	698.00	702.00	-	-	-	717.00 U	657.00	799.00	799.00	-	-
													567.00 R					
32	Tamil Nadu	11.08.2017	85.00	470.00	584.00	841.00	884.00	891.00	892.00	0.00	0.00	0.00	685.00	685.00	760.00	760.00	760.00	842.00
33	Telangana	01.04.2018	239.00	669.00	821.00	911.00	1011.00	1034.00	1039.00	258.00 $	253.00 $	252.00 $	721.00	731.00	800.00	800.00	747.00	632.00 at 33 kV
34	Tripura	01.09.2020	548.00	643.00	793.00	743.00	826.00	826.00	826.00	394.00	394.00	513.00	796.00	821.00	-	-	-	-
35	Uttar Pradesh	20.11.2020	693.00 U	739.00 U	801.00 U	1043.00 U	1219.00 U	1248.00 U	1254.00 U	665.00 U	665.00 U	665.00 U	1003.00 U	1057.00 U	985.00 U	985.00 U	944.00	1271.00 Below 132KV
			446.00 R	574.00 R	659.00 R	670.00 R	670.00 R	670.00 R	670.00 R	235.00 R	235.00 R	235.00 R	928.00 R	978.00 R	911.00 R	911.00 R		1235.00 132KV & above
36	Uttarakhand	01.04.2020	355.00	478.00	564.00	657.00	657.00	750.00	750.00	203.00	203.00	203.00	593.00	648.00	701.00	701.00	701.00	694.00
37	West Bengal	01.04.2019	654.00 U	869.00 U	967.00 U	906.00 U	1054.00 U	1071.00 U	1075.00 U	510.00	510.00	510.00	782.00 U	921.00 U	964.00	964.00	958.00	936.00 at 25KV
			640.00 R	856.00 R	962.00 R	905.00 R	1053.00 R	1071.00 R	1075.00 R				763.00 R	894.00 R				618.00 at 132KV
38	Torrent Power Ltd. (Ahmedabad)	01.04.2020	437.00	503.00	544.00	596.00	612.00	704.00	704.00	330.00	330.00	330.00	561.00	645.00	588.00	588.00	-	-
39	Torrent Power Ltd. (Surat)	01.04.2020	423.00	507.00	556.00	578.00	578.00	720.00	720.00	70.00	70.00	70.00	530.00	660.00	624.00	624.00	-	-
40	CESC Ltd. (Kolkata)	01.04.2019	613.00	852.00	960.00	883.00	1053.00	1075.00	1079.00	-	-	-	780.00	922.00	887.00	887.00	860.00	775.00
41	IPCL(West Bengal)	01.04.2019	444.00	591.00	630.00	583.00	657.00	651.00	651.00	242.00 ^	242.00 ^	242.00 ^	512.00	618.00	626.00	626.00	451.00 ^	661.00
42	D.V.C.(A) Jharkhand Area	01.10.2020	520.00	465.00	456.00	495.00	459.00	453.00	452.00	317.00	317.00	317.00	617.00	617.00	540.00	540.00	524.00	
	(B) West Bengal Area	01.04.2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	617.00	646.00 at 132KV
43	Mumbai (B.E.S.T)	01.04.2020	476.00	739.00	1010.00	989.00	865.00	1127.00	1127.00				743.00	997.00	851.00	851.00	-	-
44	Mumbai (Adani Electricity)	01.04.2020	626.00	798.00	977.00	1069.00	945.00	1243.00	1243.00	557.00	557.00	557.00	827.00	1097.00	910.00	910.00	-	-
45	Mumbai (TATA'S)	01.04.2020	545.00	806.00	1053.00	1027.00	902.00	1164.00	1164.00	-	-	-	773.00	1022.00	877.00	877.00	-	821.00 at 33/22kV

(Rates in Paise/KWh)

^ TOD tariff from 23:00 hrs to 06:00 hrs for IPCL in West Bengal.

Note: Electricity duty of Sikkim is of the year 2019-20.

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 Subsid

Tariffs notified have varying parameters for various categories of consumers.The above comparision is based on certain

Annexure-10A

All India Sector wise/Organisation wise Target, Actual Genertion & PLF(%) for the year 2021-22

Fuel, Sector/Organisation	Target (MU)	Actual (MU)	PLF (%)
THERMAL			
CENTRAL SECTOR			
APCPL	3500.00	7051.21	53.66
BRBCL	5200.00	5693.73	77.47
DVC	38625.00	40777.62	68.79
K.B.U.N.L	3000.00	2849.53	56.63
MUNPL	6590.00	7572.83	65.49
NEEPCO.	2960.00	3429.14	**
NLC	20400.00	22737.55	71.60
NPGCL	6400.00	8138.21	80.95
NSPCL	3850.00	3517.73	80.31
NTECL	8000.00	7913.49	60.22
NTPC Ltd.	253450.00	293492.14	70.82
NTPL	5600.00	4182.47	47.75
NUPPL	1000.00	0	0.00
ONGC	5000.00	4124.65	**
RGPPL	3020.00	3143.92	**
TOTAL CENTRAL SECTOR	**366595.00**	**414624.22**	**69.71**
STATE SECTOR			
HPGCL	10600.00	8039.39	36.56
IPGCL	0.00	220.62	**
PPCL	5300.00	4727.95	**
PSPCL	5880.00	3742	24.27
RRVUNL	40260.00	33893.43	49.15
UPRVUNL	34550.00	27310.19	55.91
BECL	1000.00	1656.68	37.82
CSPGCL	20015.00	17513.91	70.40
GMDCL	1200.00	589.71	26.93
GPPCL	1200.00	139.82	**
GSECL	21380.00	21452.63	51.21
GSEGL	1095.00	97.58	**
MAHAGENCO	57795.00	49705.79	56.38
MPPGCL	26170.00	21007.73	44.41
APEPDCL	800.00	516.74	**
APGENCO	22550.00	18419.7	61.66
APPDCL	10500.00	5672.41	40.47
KPCL	16850.00	13317.59	44.45
P&ED, Pudu.	225.00	251.13	#
RPCL	6000.00	5380.37	38.39
SCCL	8800.00	9352.93	88.97
TANGEDCO	28880.00	21851.46	53.88
TSGENCO	26110.00	24747.13	75.71
A&N ADM	150.00	117.24	#
DPL	2800.00	2567.62	53.29
OPGC	9000.00	10199.41	66.91
TVNL	2300.00	1767.12	48.03
WBPDC	24930.00	30079.61	72.44
APGCL	1330.00	1611.96	**

TSECL	570.00	565.6	**
TOTAL STATE SECTOR	**388240.00**	**336515.45**	**54.50**
PVT. SEC. UTILITY			
AEML	4000.00	3337.86	76.21
CESC	5930.00	5726.07	58.10
TATA PCL	5455.00	5460.97	69.26
TOR. POW. (UNOSUGEN)	2100.00	2437.82	76.88
TOTAL PVT. UTILITY SECTOR	**17485.00**	**16962.72**	**66.95**
PVT. SEC. IPP			
ABAN POWR	550.00	199.78	**
ACB	2015.00	1496.21	52.55
ADHUNIK	3400.00	3724.14	78.73
APGPCL	855.00	984.82	**
APL	59700.00	41955.17	51.83
BALCO	3000.00	3438.03	65.41
BEPL	1000.00	1120.76	28.43
BLAPPL	450.00	167.99	21.31
CEPL	4000.00	1221.72	11.62
CGPL	26630.00	9088.34	25.94
DBPCL	7200.00	8633.69	82.13
DIL	2200.00	3990.83	75.93
EPGL	4260.00	0	0.00
ESSARPMPL	4300.00	3431.14	32.64
GCEL	5600.00	8834.61	73.61
GIPCL	3215.00	2928.87	66.87
GIPL	350.00	362.59	**
GMR ENERG	11250.00	11008.68	76.16
GPGSL (GVK)	1800.00	1884.24	39.83
HEL	4250.00	4276.69	81.37
HMEL	1000.00	1110.66	42.26
HNPC	2500.00	281.39	3.09
IEPL	200.00	0	0.00
ITPCL	6500.00	3093.68	29.43
JHAPL	3000.00	3708.01	70.55
JhPL(HR)	7500.00	7756.83	67.08
JITPL	4000.00	8559.39	81.42
JPL	8950.00	14813.78	49.74
JPPVL	9500.00	10890.57	68.31
JSWBL	7200.00	7134.19	75.41
JSWEL	10420.00	6803.73	46.02
KONDAPALI	780.00	376.21	**
LANCO	4550.00	4024.01	76.56
LAPPL	8600.00	8270.56	78.68
LPGCL	9500.00	9551.59	55.07
MBPMPL	7000.00	7715.95	73.40
MCCPL	2100.00	2162.84	82.30
MEL	100.00	422.41	16.07
MPL	6950.00	7489.25	81.42
NPL	9700.00	9654.01	78.72
PENNA	250.00	72.17	**
PPGCL (Jaypee)	10450.00	11656.38	67.20

PPNPGCL	50.00	0	0.00
RATTANINDIA	4750.00	8880.99	75.10
REGL	2200.00	3704.7	70.49
RKMPPL	3500.00	6872.61	54.48
RPSCL	5995.00	5773.63	54.92
SCPL	650.00	663.75	75.77
SEIL	19300.00	16960.62	73.34
SEPCPPL	1490.00	0	0.00
SKS	2500.00	1664.15	31.66
SPGL	800.00	216.57	**
SPL	32610.00	32673.14	94.19
SrEPL	700.00	649.73	**
ST-CMSECP	1200.00	1538.28	70.24
TATA PCL	1500.00	1615.14	76.82
TOR. POW. (SUGEN)	5180.00	4457.54	**
TOR. POW. (UNOSUGEN)	2250.00	1397.93	**
TRNE	3000.00	693.79	13.20
TSPL	12000.00	8895.57	51.29
UPCL	4000.00	1712.43	16.29
VEDANTA	1000.00	2276.82	30.52
WPCL	11000.00	11264.69	54.95
TOTAL PVT SECTOR IPP	**382450.00**	**346207.99**	**53.12**
PVT. SEC. IMP			
GIPCL	180.00	61.72	
ICCL	150.00	288.82	
NALCO	100.00	53.56	
TOTAL PVT SECTOR IMP	**430.00**	**404.1**	**0.00**
TOTAL IPP & IMP	**382880.00**	**346612.09**	**53.12**
TOTAL PVT. SECTOR	**400365.00**	**363574.81**	**53.62**
THERMAL TOTAL	**1155200.00**	**1114714.48**	**58.87**
NUCLEAR			
CENTRAL SECTOR			
DAE	0.00	0	0.00
NPCIL	43020.00	47112.06	80.51
CENTRAL TOTAL	**43020.00**	**47112.06**	**79.32**
NUCLEAR TOTAL	**43020.00**	**47112.06**	**79.32**
HYDRO			
CENTRAL SECTOR			
BBMB	9650.00	9794.82	
DVC	215.00	466.89	
NEEPCO.	4908.00	4674.39	
NHDC	3900.00	2645.41	
NHPC	26000.00	24382.6	
NHPC	0.00	0	
NTPC Ltd.	3100.00	3120.14	
SJVNL	9111.00	9048.61	
THDC	4160.00	4288.75	
CENTRAL SECTOR TOTAL	**61044.00**	**58421.61**	
STATE SECTOR			
HPPCL	821.00	649.55	
HPSEB	1603.00	1768.66	

JKSPDC	4887.00	5116.09	
PSPCL	3969.00	3007.86	
RRVUNL	370.00	481.84	
UJVNL	4612.00	4987.18	
UPJVNL	1519.00	1402.68	
CSPGCL	280.00	404.13	
GSECL	889.00	873.5	
MAHAGENCO	4109.00	4078.97	
MPPGCL	2526.00	2345.79	
SSNNL	2832.00	1748.01	
APGENCO	3024.00	3318.81	
KPCL	12409.00	13731.48	
KSEB	6505.00	9317.44	
TANGEDCO	4483.00	5212.07	
TSGENCO	4018.00	5626.63	
APGENCO	612.00	718.51	
JUUNL	110.00	302.49	
OHPC	5959.00	4512.12	
TUL	5652.00	6315.53	
WBSEDCL	1578.00	1630.14	
APGCL	380.00	401.12	
MeECL	1051.00	841.82	
STATE SECTOR TOTAL	**74198.00**	**78792.42**	
PVT SECTOR UTL			
BHIRA HPS	900.00	397.19	
BHIRA PSS HPS	0.00	627.39	
BHIVPURI HPS	285.00	272.27	
KHOPOLI HPS	285.00	293.14	
TOTAL PVT SECTOR UTL.	**1470.00**	**1589.99**	
PVT SEC. IPP			
ALLAIN DUHANGAN	676.00	637.44	
BAJOLI HOLI HPS	273.00	0	
BASPA HPS	1300.00	1320.35	
BHANDARDHARA HPS	36.00	33.94	
BUDHIL HPS	270.00	251.37	
CHANJU-I HPS	158.00	146.54	
CHUZACHEN HPS	500.00	514.21	
DIKCHU HPS	460.00	481.45	
JORETHANG LOOP	408.00	424.69	
KARCHAM WANGTOO	4131.00	4243.45	
MALANA HPS	344.00	314.96	
MALANA-II HPS	367.00	345.66	
RONGNICHU HPS	256.00	295.43	
SHRINAGAR HPS	1310.00	1421.89	
SINGOLI BHATWARI	293.00	80.44	
SORANG HPS	39.00	57.18	
TASHIDING HPS	421.00	453.07	
VISHNU PRAYAG HPS	1590.00	1801.24	
TOTAL PVT SEC. IPP	**12832.00**	**12823.31**	
TOTAL PVT. SEC.	**14302.00**	**14413.3**	
HYDRO TOTAL	**149544.00**	**151627.33**	

PLF is calculated for Coal & Lignite based power station only.

**** Gas Based Station**

 # diesel Based Station

Annexure – 10B
Item (10.4)

ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS LOCATED IN THE REGIONS OF MAIN LAND AND ISLANDS

(As on 31.03.2022)

(UTILITIES)

Region	Ownership/ Sector	Mode wise breakup									Grand Total
		Thermal					Nuclear	Renewable			
		Coal	Lignite	Gas	Diesel	Total		Hydro	RES*(MNRE)	Total	
Northern Region	State	17979.00	250.00	2879.20	0.00	21108.20	0.00	5888.25	735.85	6624.10	27732.30
	Private	22425.83	1080.00	558.00	0.00	24063.83	0.00	3241.00	25955.85	29196.85	53260.68
	Central	15732.18	250.00	2344.06	0.00	18326.24	1620.00	11502.52	379.00	11881.52	31827.76
	Sub Total	**56137.01**	**1580.00**	**5781.26**	**0.00**	**63498.27**	**1620.00**	**20631.77**	**27070.70**	**47702.47**	**112820.74**
Western Region	State	21290.00	900.00	2849.82	0.00	25039.82	0.00	5446.50	575.98	6022.48	31062.30
	Private	31947.17	500.00	4676.00	0.00	37123.17	0.00	481.00	32407.18	32888.18	70011.35
	Central	20479.10	0.00	3280.67	0.00	23759.77	1840.00	1635.00	666.30	2301.30	27901.07
	Sub Total	**73716.27**	**1400.00**	**10806.49**	**0.00**	**85922.76**	**1840.00**	**7562.50**	**33649.46**	**41211.96**	**128974.72**
Southern Region	State	20592.50	0.00	791.98	159.96	21544.44	0.00	11819.83	597.88	12417.71	33962.15
	Private	13272.00	250.00	5340.24	273.70	19135.95	0.00	0.00	45768.56	45768.56	64904.51
	Central	11835.02	3390.00	359.58	0.00	15584.60	3320.00	0.00	541.90	541.90	19446.50
	Sub Total	**45699.52**	**3640.00**	**6491.80**	**433.66**	**56264.99**	**3320.00**	**11819.83**	**46908.34**	**58728.17**	**118313.16**
Eastern Region	State	6970.00	0.00	100.00	0.00	7070.00	0.00	3550.22	275.11	3825.33	10895.33
	Private	5553.00	0.00	0.00	0.00	5553.00	0.00	209.00	1460.21	1669.21	7222.21
	Central	15233.68	0.00	0.00	0.00	15233.68	0.00	1005.20	10.00	1015.20	16248.88
	Sub Total	**27756.68**	**0.00**	**100.00**	**0.00**	**27856.68**	**0.00**	**4764.42**	**1745.32**	**6509.74**	**34366.42**
North Eastern Region	State	0.00	0.00	466.36	36.00	502.36	0.00	422.00	233.25	655.25	1157.60
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	210.30	210.30	210.30
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1522.00	30.00	1552.00	3575.62
	Sub Total	**770.02**	**0.00**	**1719.96**	**36.00**	**2525.98**	**0.00**	**1944.00**	**473.55**	**2417.55**	**4943.52**
Islands	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.66	27.66	27.66
	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**	**40.05**	**40.05**	**0.00**	**0.00**	**38.01**	**38.01**	**78.06**
ALL INDIA	State	66831.50	1150.00	7087.36	236.01	75304.86	0.00	27126.80	2423.31	29550.11	104854.98
	Private	73198.00	1830.00	10574.24	273.70	85875.95	0.00	3931.00	105829.76	109760.76	195636.71
	Central	64050.00	3640.00	7237.91	0.00	74927.91	6780.00	15664.72	1632.30	17297.02	99004.93
	Total	**204079.50**	**6620.00**	**24899.51**	**509.71**	**236108.72**	**6780.00**	**46722.52**	**109885.38**	**156607.90**	**399496.61**

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 31.03.2022 (As per latest information available with MNRE)

***Break up of RES all India as on 31.03.2022 is given below (in MW) :**

Small Hydro Power	Wind Power	Bio-Power		Solar Power	Total Capacity
		BM Power/Cogen.	Waste to Energy		
4848.90	40357.58	10205.61	476.75	53996.54	109885.38

A. **Capacity Added during March., 2022 — 840 MW**

1. Unit-3 (660 MW) of NABINAGAR STPP has been commissioned and added to central sector of ER & NR states as per their allocation.
2. Unit-1,2&3 (3x60 = 180 MW) of BAJOLI HOLI HPS has been commissioned and added to private sector of Himachal Pradesh.

B. **Capacity Retired during March., 2022 — 480 MW**

1. Unit-1 (60 MW) of BANDEL TPS has been retired from state sector of West Bengal.
2. Unit-1&2 (2x210 = 420 MW) of KOLAGHAT TPS has been retired from state sector of West Bengal.

C. **Capacity Uprated during March., 2022 — 18 MW**

1. BHAKRA LEFT HPS U-3 uprated from 108 MW to 126 MW.

D.	**Net Conv. Capacity Added during**	**March., 2022**	**A-B+C**	**378 MW**
E.	**Net RES Capacity Added during**	**March., 2022**		**3510.75 MW**
F.	**Net Capacity Added during**	**March., 2022**	**D+E**	**3888.75 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 28.02.2022.

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 31.03.2022)

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	270.12	270.12	1256.34
	Central	3527.29	0.00	207.01	0.00	3734.31	102.83	723.09	0.00	723.09	4560.23
	Sub-Total	**4405.51**	**0.00**	**2115.41**	**0.00**	**6520.93**	**102.83**	**723.09**	**270.12**	**993.21**	**7616.97**
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	1167.83	1706.83	6268.61
	Central	1564.80	0.00	535.61	0.00	2100.41	100.94	1585.62	5.00	1590.62	3791.97
	Sub-Total	**8636.58**	**0.00**	**685.61**	**0.00**	**9322.19**	**100.94**	**2324.62**	**1242.13**	**3566.75**	**12989.88**
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	783.86	2003.26	2003.26
	Central	151.69	0.00	62.01	0.00	213.70	28.95	1223.88	0.00	1223.88	1466.53
	Sub-Total	**151.69**	**0.00**	**62.01**	**0.00**	**213.70**	**28.95**	**3248.88**	**1040.47**	**4289.35**	**4532.00**
Jammu & Kashmir and Ladakh	State	0.00	0.00	175.00	0.00	175.00	0.00	1230.00	136.82	1366.82	1541.82
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.23	102.23	102.23
	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**	**239.05**	**2560.93**	**3510.13**
Punjab	State	1760.00	0.00	150.00	0.00	1910.00	0.00	1243.40	127.80	1371.20	3281.20
	Private	5115.50	0.00	0.00	0.00	5115.50	0.00	288.00	1640.02	1928.02	7043.52
	Central	1440.00	0.00	264.01	0.00	1704.01	196.81	2286.88	0.00	2286.88	4187.70
	Sub-Total	**8315.50**	**0.00**	**414.01**	**0.00**	**8729.51**	**196.81**	**3818.28**	**1767.82**	**5586.10**	**14512.42**
Rajasthan	State	7580.00	250.00	603.80	0.00	8433.80	0.00	433.00	23.85	456.85	8890.65
	Private	2957.00	1080.00	0.00	0.00	4037.00	0.00	104.00	16672.77	16776.77	20813.77
	Central	1062.59	250.00	221.10	0.00	1533.69	556.74	1404.93	344.00	1748.93	3839.36
	Sub-Total	**11599.59**	**1580.00**	**824.90**	**0.00**	**14004.49**	**556.74**	**1941.93**	**17040.62**	**18982.55**	**33543.78**
Uttar Pradesh	State	6129.00	0.00	0.00	0.00	6129.00	0.00	724.10	49.10	773.20	6902.20
	Private	8814.33	0.00	0.00	0.00	8814.33	0.00	842.40	4404.42	5246.82	14061.15
	Central	5540.21	0.00	549.49	0.00	6089.70	289.48	1857.53	30.00	1887.53	8266.71
	Sub-Total	**20483.54**	**0.00**	**549.49**	**0.00**	**21033.03**	**289.48**	**3424.03**	**4483.52**	**7907.55**	**29230.06**
Uttarakhand	State	0.00	0.00	0.00	0.00	0.00	0.00	1252.15	72.37	1324.52	1324.52
	Private	99.00	0.00	450.00	0.00	549.00	0.00	248.20	859.43	1107.63	1656.63
	Central	392.60	0.00	69.66	0.00	462.26	31.24	475.54	0.00	475.54	969.04
	Sub-Total	**491.60**	**0.00**	**519.66**	**0.00**	**1011.26**	**31.24**	**1975.89**	**931.80**	**2907.69**	**3950.19**
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	55.17	55.17	55.17
	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**	**55.17**	**156.88**	**224.74**
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	17979.00	250.00	2879.20	0.00	21108.20	0.00	5888.25	735.85	6624.10	27732.30
	Private	22425.83	1080.00	558.00	0.00	24063.83	0.00	3241.00	25955.85	29196.85	53260.68
	Central	15732.18	250.00	2344.06	0.00	18326.24	1620.00	11502.52	379.00	11881.52	31827.76
	Grand Total	**56137.01**	**1580.00**	**5781.26**	**0.00**	**63498.27**	**1620.00**	**20631.77**	**27070.70**	**47702.47**	**112820.74**

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 31.03.2022)

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	20.29	20.29	68.29
	Central	492.27	0.00	19.67	0.00	511.94	26.00	2.00	0.00	2.00	539.94
	Sub-Total	**492.27**	**0.00**	**67.67**	**0.00**	**559.94**	**26.00**	**2.00**	**20.34**	**22.34**	**608.28**
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	40.72	40.72	40.72
	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**	**40.72**	**40.72**	**255.80**
Gujarat	State	4510.00	900.00	2177.82	0.00	7587.82	0.00	772.00	92.79	864.79	8452.61
	Private	7144.67	500.00	3985.00	0.00	11629.67	0.00	0.00	16251.81	16251.81	27881.48
	Central	4647.60	0.00	424.00	0.00	5071.60	559.00	0.00	243.30	243.30	5873.90
	Sub-Total	**16302.27**	**1400.00**	**6586.82**	**0.00**	**24289.09**	**559.00**	**772.00**	**16587.90**	**17359.90**	**42207.99**
Madhya Pradesh	State	5400.00	0.00	0.00	0.00	5400.00	0.00	1703.66	83.96	1787.62	7187.62
	Private	6079.00	0.00	75.00	0.00	6154.00	0.00	0.00	5084.92	5084.92	11238.92
	Central	4608.48	0.00	257.00	0.00	4865.48	273.00	1520.00	300.00	1820.00	6958.48
	Sub-Total	**16087.48**	**0.00**	**332.00**	**0.00**	**16419.48**	**273.00**	**3223.66**	**5468.88**	**8692.54**	**25385.02**
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	858.03	858.03	8525.53
	Central	2714.39	0.00	0.00	0.00	2714.39	48.00	113.00	0.00	113.00	2875.39
	Sub-Total	**12221.89**	**0.00**	**0.00**	**0.00**	**12221.89**	**48.00**	**233.00**	**869.08**	**1102.08**	**13371.97**
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	10145.95	10626.95	22050.95
	Central	4858.18	0.00	2272.73	0.00	7130.91	690.00	0.00	123.00	123.00	7943.91
	Sub-Total	**25254.18**	**0.00**	**3512.73**	**0.00**	**28766.91**	**690.00**	**3331.84**	**10657.08**	**13988.92**	**43445.83**
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	222.44	0.00	66.34	0.00	288.78	9.00	0.00	0.00	0.00	297.78
	Sub-Total	**422.44**	**0.00**	**66.34**	**0.00**	**488.78**	**9.00**	**0.00**	**5.46**	**5.46**	**503.24**
Central - Unallocated		2771.00	0.00	197.59	0.00	2968.59	228.00	0.00	0.00	0.00	3196.59
Total (Western Region)	State	21290.00	900.00	2849.82	0.00	25039.82	0.00	5446.50	575.98	6022.48	31062.30
	Private	31947.17	500.00	4676.00	0.00	37123.17	0.00	481.00	32407.18	32888.18	70011.35
	Central	20479.10	0.00	3280.67	0.00	23759.77	1840.00	1635.00	666.30	2301.30	27901.07
	Grand Total	**73716.27**	**1400.00**	**10806.49**	**0.00**	**85922.76**	**1840.00**	**7562.50**	**33649.46**	**41211.96**	**128974.72**

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 31.03.2022)

State	Ownership/ Sector	Mode wise breakup									Grand Total
		Thermal					Nuclear	Renewable			
		Coal	Lignite	Gas	Diesel	Total		Hydro	RES*(MNRE)	Total	
Andhra Pradesh	State	5010.00	0.00	235.40	0.00	5245.40	0.00	1673.60	56.18	1729.78	6975.18
	Private	3873.88	0.00	3831.32	36.80	7742.00	0.00	0.00	8905.38	8905.38	16647.39
	Central	1546.83	180.23	0.00	0.00	1727.06	127.27	0.00	250.00	250.00	2104.33
	Sub-Total	**10430.71**	**180.23**	**4066.72**	**36.80**	**14714.46**	**127.27**	**1673.60**	**9211.56**	**10885.16**	**25726.89**
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	4907.97	4907.97	7129.24
	Central	1806.85	210.57	0.00	0.00	2017.42	148.73	0.00	10.00	10.00	2176.15
	Sub-Total	**9438.80**	**210.57**	**831.82**	**0.00**	**10481.19**	**148.73**	**2479.93**	**4959.19**	**7439.12**	**18069.04**
Karnataka	State	5020.00	0.00	0.00	0.00	5020.00	0.00	3631.60	193.89	3825.49	8845.49
	Private	1948.50	0.00	0.00	25.20	1973.70	0.00	0.00	15710.71	15710.71	17684.41
	Central	2877.80	471.90	0.00	0.00	3349.70	698.00	0.00	0.00	0.00	4047.70
	Sub-Total	**9846.30**	**471.90**	**0.00**	**25.20**	**10343.40**	**698.00**	**3631.60**	**15904.59**	**19536.19**	**30577.59**
Kerala	State	0.00	0.00	0.00	159.96	159.96	0.00	1856.50	183.90	2040.40	2200.36
	Private	1047.50	0.00	174.00	0.00	1221.50	0.00	0.00	436.80	436.80	1658.30
	Central	1011.42	314.20	359.58	0.00	1685.20	362.00	0.00	50.00	50.00	2097.20
	Sub-Total	**2058.92**	**314.20**	**533.58**	**159.96**	**3066.66**	**362.00**	**1856.50**	**670.70**	**2527.20**	**5955.86**
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	15794.01	15794.01	21771.48
	Central	3025.32	1517.30	0.00	0.00	4542.62	1448.00	0.00	231.90	231.90	6222.52
	Sub-Total	**12357.99**	**1767.30**	**1027.18**	**211.70**	**15364.17**	**1448.00**	**2178.20**	**16148.61**	**18326.81**	**35138.98**
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	13.69	13.69	13.69
	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**	**13.69**	**13.69**	**384.79**
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	20592.50	0.00	791.98	159.96	21544.44	0.00	11819.83	597.88	12417.71	33962.15
	Private	13272.00	250.00	5340.24	273.70	19135.95	0.00	0.00	45768.56	45768.56	64904.51
	Central	11835.02	3390.00	359.58	0.00	15584.60	3320.00	0.00	541.90	541.90	19446.50
	Grand Total	**45699.52**	**3640.00**	**6491.80**	**433.66**	**56264.99**	**3320.00**	**11819.83**	**46908.34**	**58728.17**	**118313.16**

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 31.03.2022)

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	316.65	316.65	1016.65
	Central	6125.71	0.00	0.00	0.00	6125.71	0.00	110.00	0.00	110.00	6235.71
	Sub-Total	**6825.71**	**0.00**	**0.00**	**0.00**	**6825.71**	**0.00**	**110.00**	**387.35**	**497.35**	**7323.06**
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	93.09	93.09	673.09
	Central	1446.50	0.00	0.00	0.00	1446.50	0.00	61.00	0.00	61.00	1507.50
	Sub-Total	**2446.50**	**0.00**	**0.00**	**0.00**	**2446.50**	**0.00**	**191.00**	**97.14**	**288.14**	**2734.64**
West Bengal	State	4810.00	0.00	100.00	0.00	4910.00	0.00	986.00	121.95	1107.95	6017.95
	Private	2437.00	0.00	0.00	0.00	2437.00	0.00	0.00	465.00	465.00	2902.00
	Central	1370.34	0.00	0.00	0.00	1370.34	0.00	410.00	0.00	410.00	1780.34
	Sub-Total	**8617.34**	**0.00**	**100.00**	**0.00**	**8717.34**	**0.00**	**1396.00**	**586.95**	**1982.95**	**10700.29**
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	3097.02	0.00	0.00	0.00	3097.02	0.00	186.20	0.00	186.20	3283.21
	Sub-Total	**3247.02**	**0.00**	**0.00**	**0.00**	**3247.02**	**0.00**	**186.20**	**0.00**	**186.20**	**3433.21**
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	580.79	580.79	2266.79
	Central	1601.21	0.00	0.00	0.00	1601.21	0.00	89.00	10.00	99.00	1700.21
	Sub-Total	**5027.21**	**0.00**	**0.00**	**0.00**	**5027.21**	**0.00**	**2163.22**	**617.09**	**2780.31**	**7807.52**
Sikkim	State	0.00	0.00	0.00	0.00	0.00	0.00	360.00	52.11	412.11	412.11
	Private	0.00	0.00	0.00	0.00	0.00	0.00	209.00	4.68	213.68	213.68
	Central	53.57	0.00	0.00	0.00	53.57	0.00	64.00	0.00	64.00	117.57
	Sub-Total	**53.57**	**0.00**	**0.00**	**0.00**	**53.57**	**0.00**	**633.00**	**56.79**	**689.79**	**743.36**
Central - Unallocated		1539.33	0.00	0.00	0.00	1539.33	0.00	85.01	0.00	85.01	1624.34
Total (Eastern Region)	State	6970.00	0.00	100.00	0.00	7070.00	0.00	3550.22	275.11	3825.33	10895.33
	Private	5553.00	0.00	0.00	0.00	5553.00	0.00	209.00	1460.21	1669.21	7222.21
	Central	15233.68	0.00	0.00	0.00	15233.68	0.00	1005.20	10.00	1015.20	16248.88
	Grand Total	**27756.68**	**0.00**	**100.00**	**0.00**	**27856.68**	**0.00**	**4764.42**	**1745.32**	**6509.74**	**34366.42**

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 31.03.2022)

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	329.36	0.00	329.36	0.00	100.00	5.01	105.01	434.37
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	124.04	124.04	124.04
	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**	**764.92**	**0.00**	**1167.44**	**0.00**	**522.08**	**154.05**	**676.13**	**1843.57**
Arunachal Pradesh	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	107.11	107.11	107.11
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.23	35.23	35.23
	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**	**142.34**	**686.89**	**770.76**
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	51.60	0.00	109.69	0.00	161.29	0.00	87.27	0.00	87.27	248.56
	Sub-Total	**51.60**	**0.00**	**109.69**	**0.00**	**161.29**	**0.00**	**409.27**	**50.48**	**459.75**	**621.04**
Tripura	State	0.00	0.00	137.00	0.00	137.00	0.00	0.00	16.01	16.01	153.01
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.89	9.89	9.89
	Central	56.10	0.00	381.94	0.00	438.04	0.00	68.49	5.00	73.49	511.53
	Sub-Total	**56.10**	**0.00**	**518.94**	**0.00**	**575.04**	**0.00**	**68.49**	**30.90**	**99.39**	**674.43**
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	12.25	12.25	12.25
	Central	47.10	0.00	81.58	0.00	128.68	0.00	95.34	0.00	95.34	224.02
	Sub-Total	**47.10**	**0.00**	**81.58**	**36.00**	**164.68**	**0.00**	**95.34**	**17.70**	**113.04**	**277.72**
Nagaland	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.67	30.67	30.67
	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**	**33.71**	**100.04**	**206.07**
Mizoram	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.47	36.47	36.47
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.90	7.90	7.90
	Central	31.05	0.00	60.46	0.00	91.51	0.00	97.94	0.00	97.94	189.45
	Sub-Total	**31.05**	**0.00**	**60.46**	**0.00**	**91.51**	**0.00**	**97.94**	**44.37**	**142.31**	**233.82**
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	466.36	36.00	502.36	0.00	422.00	233.25	655.25	1157.60
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	210.30	210.30	210.30
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1522.00	30.00	1552.00	3575.62
	Grand Total	**770.02**	**0.00**	**1719.96**	**36.00**	**2525.98**	**0.00**	**1944.00**	**473.55**	**2417.55**	**4943.52**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN ISLANDS

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.03.2022)

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	40.05	40.05	0.00	0.00	5.25	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.39	24.39	24.39
	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**	**40.05**	**40.05**	**0.00**	**0.00**	**34.74**	**34.74**	**74.79**
Lakshadweep	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	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**	**0.00**	**0.00**	**0.00**	**0.00**	**3.27**	**3.27**	**3.27**
Total (Islands)	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.66	27.66	27.66
	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**	**40.05**	**40.05**	**0.00**	**0.00**	**38.01**	**38.01**	**78.06**