GOVERNMENT OF INDIA
भारत सरकार
CENTRAL ELECTRICITY AUTHORITY
केन्द्रीय विद्युत प्राधिकरण
PROTOCOL OFFICE
प्रोटोकोल कार्यालय
SEWA BHAWAN, R.K. PURAM,
सेवा भवन ,आर.के .पुरम,
NEW DELHI-110066
नई दिल्ली-110066

No. CEA/Protocol/Annual Report/2019-20/235 dated: 27.10.2020

Subject: Annual Report of CEA for the year 2019-20 – reg.

The draft Annual Report 2019-20 has been prepared based on inputs received from various constituents of CEA. The draft Report is ready to go for printing job and uploaded herewith for review and last minute minor corrections/suggestions, if any. The same please be intimated to Protocol Unit latest by 02.11.2020 positively on e-mail:protocol.cea@nic.in/ protocolofficercea@gmail.com.

This issues with the approval of competent authority.

Encl: As above.

(Ajay Kr Arya)
Dy. Director & Protocol Officer
Intercom: 2213 / 2216 Mobile: 9911373455

1. SA to Chairperson, CEA
2. SA to Member (Plg.)/(Hydro)/(PS)/(GO&D)/(Thermal)/(E&C) of CEA
3. PPS to PCE(I)/(PCE-II), CEA.
4. Secretary, CEA.
5. All Chief Engineers and Heads of Divisions/Sections of CEA.

Copy to : Director (IT), with the request to upload the same on CEA website and Intranet.

CEA
ANNUAL REPORT
2019-20

CENTRAL ELECTRICITY AUTHORITY

GOVERNMENT OF INDIA

MINISTRY OF POWER

The AUTHORITY
(As on 31.03.2020)

Sh. Prakash Mhaske
Chairperson &
Addl. Charge of Member (Power System)

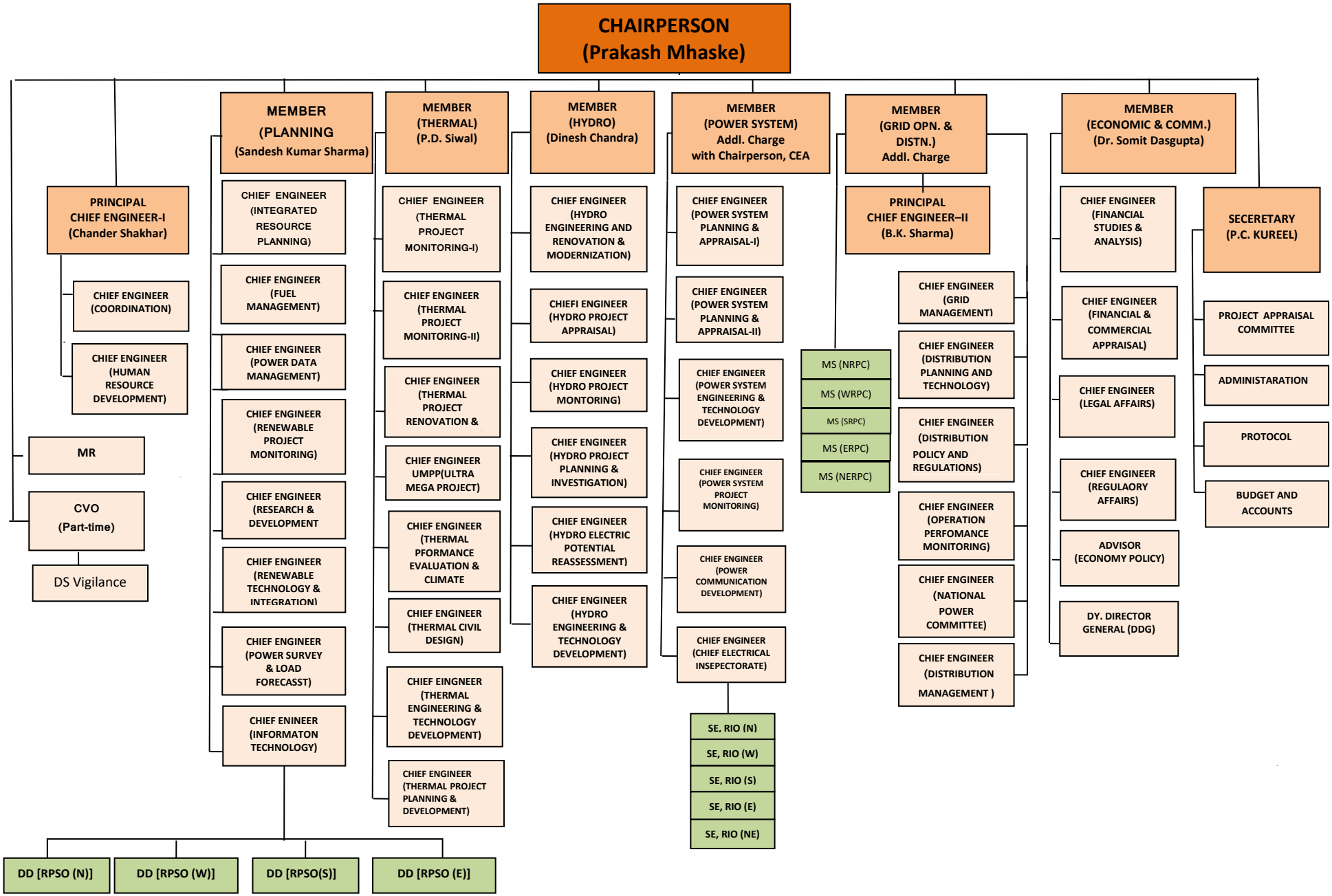
Dr. Somit Dasgupta
Member (E&C)
(upto 31.12.2019)

Sh. P.D. Siwal
Member (Thermal)
(upto 29.02.2020)

Sh.Sandesh Kumar Sharma
Member (Planning)
Addl.charge Member(E&C)

Sh. Dinesh Chandra
Member (Hydro)
Addl.Charge of Member (GO&D)

ORGANIZATION CHART OF CEA
(AS ON 31.03.2020)



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,** 14 Golf Club Road, Tollygunge, Kolkata – 700033.
2. **Member Secretary**, **Northern Regional Power Committee,** 18-A, Shaheed Jeet Singh Marg, New Delhi – 110016.
3. **ember 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. **Dy. Director,** **Regional Power Survey Office (East),** Room No. 201, C.G.O. Complex, 'DF'- Block, Salt Lake City, Kolkata – 700064.
2. **Dy. Director,** **Regional Power Survey Office (North),** 224, 2nd Floor, Sewa Bhawan, R.K. Puram, New Delhi– 110066.
3. **Dy. Director,** **Regional Power Survey Office (South),** Post Box No. – 38, 6th Floor, 'F' – Wing, Kendriya Sadan, Koramamgala, Bangaluru – 560034.
4. **Dy. 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),** 14 Golf Club Road, Tollygunge, Kolkata – 700033.
2. **Superintending Engineer,** **Regional Inspectorial Organisation (North),** 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, Lapulang, 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 2019-20 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 2019-20. The Report gives an insight into the organisation structure, functions and activities of CEA highlighting the contributions made in the development of power sector in the country during the year 2019-20.

As per mandate of Electricity Act, 2003, Central Electricity Authority has notified various technical Regulations like Technical Standards for Communication System in Power System Operations, Regulations, 2020, Measures relating to Safety and Electric Supply (Amendment) Regulations, 2019 and Installation and Operation of Meters (Amendment) Regulations, 2019. To facilitate installation of equipment for implementation of new environmental norms in the country, guidelines for technology selection, technical specifications and indicative cost for FGD installation have been specified by CEA. Keeping in view the large scale RE integration CEA has carried out study on energy mix for the year 2029-30. In order to help the DISCOMs to evolve integrated approach for strengthening of Distribution sector in the country, the revised Distribution Perspective Plan 2022 and the draft Manual on Distribution Planning Criteria was prepared. Report on the issue of delayed payments by DISCOMS to GENCOs/IPPs was also prepared. Some recommendations of this report have already been implemented. CEA had carried out various other activities also 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.

(Prakash Mhaske)
Chairperson, CEA

CHAPTER – 1

CEA AS AN ORGANIZATION

1.1 Organization of CEA

1.1.1 The Central Electricity Authority (CEA) is a statutory organization originally constituted under Section 3(1) of the repealed Electricity (Supply) Act, 1948 since substituted by Section 70 of the Electricity Act, 2003. 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 Organizations and five (5) Regional Power Committees located in various parts of the country.

A) Regional Inspectorial Organi-zation (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 Organization (RPSO)

Four (4) Regional Power Survey Organisation (RPSO) offices, each headed by an officer of the rank of Deputy Director, function at New Delhi, Mumbai, Bangalore 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.

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

(2) 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, modernisation and life extension programmes 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 neighbouring 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. 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 31.03.2020 was 743 as against the sanctioned strength of 1292 leaving 549 posts vacant. The summarized position of staff strength is shown in the table below:

Category	Sanctioned Strength			Filled Strength		
	Head-Quarters	Sub-Office	Total	Head-Quarters	Sub-Office	Total Strength
Chairperson/Members	07	-	07	04	-	04
CPES GROUP-A	348	84	432	244	72	316
CPES GROUP-B	90	19	109	51	09	60
Non CPES Group						
Group-A	71	01	72	41	00	41
Group-B	252	38	290	104	09	113
Group-C	110	70	180	58	46	104
Group-C(MTS)	145	57	202	71	34	105
Total	**1023**	**269**	**1292**	**573**	**170**	**743**

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	06	-	-
CPES GROUP-A	432	316	32	10%
CPES GROUP-B	109	60	05	8.33%
Non CPES Group				
Group-A	72	41	21	51.2%
Group-B	290	113	47	41.59%
Group-C	180	104	17	16.3%
Group-C(MTS)	202	105	10	.95%
Total	**1292**	**743**	**132**	**17.76%**

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	-	-	-
CPES GROUP-A	432	316	54	21	43	05
CPES GROUP-B	109	60	07	03	10	02
Non CPES Group						
Group-A	72	41	07	04	00	01
Group-B	290	113	20	05	09	04
Group-C	180	104	20	05	24	03
Group-C(MTS)	202	105	43	04	13	04
Total	**1292**	**743**	**154**	**42**	**99**	**19**

1.4.4 Representation of Physically Challengedemployees

Group	Total employees as on 31.03.2018	Physically Challenged Employees				Percentage of Physically Challenged
		VH	HH	OH	Total	
Group A (CPES+NON-CPES)	357	00	01	05	06	1.68
Group B	173	00	01	04	05	2.89%
Group C	104	02	00	01	03	2.88%
Group –C(MTS)	105	00	00	03	03	2.85%
Total	**739**	**02**	**02**	**13**	**17**	**2.30%**

1.5 Annual Budget

1.5.1 During the year 2019-20, budgetary allocation of Rs. 125.57 Crores (Revised Estimates) wa made for CEA. Out of this, Rs. 98.10 Crores was allocated under Salary Head and Rs. 27.47 Crores under Non Salary Head. Against this, during the FY 2019-20 an expenditure of Rs. 93.82 Crores was booked under Salary Head and expenditure of Rs. 22.79 Crores was booked under Non Salary Head upto 31.3.2020. The total expenditure incurred in respect of RE during the year was 92.86%.

1.5.2 Revenue Recovered for Consultancy Services by CEA and Recovery of expenses by RPCs from constituents

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 2019-20 is Rs. 2.82 Crores.

Payments received by Department / Organisations towards the consultancy services rendered by CEA for the Financial Year 2019-20 and outstanding of previous years is Rs. 3.12 Crores.

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. Quarterly Meetings of Official Language Implementation Committee:

During the year (up to 31 December,2019) following three meetings of Official Language Implementation Committee were held:

- 1st meeting -25th June , 2019
- 2nd meeting -29th August, 2019
- 3rd meeting - 17th Dec, 2019

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

i. 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 the 33 designated Divisions/Sections out of 53 Divisions/Sections

ii. Efforts were also made to do maximum work of all the remaining Divisions/Sections in Hindi.

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

2. Letters sent in Hindi during the financial year 2019-20:

Quarterly percentage of Letters sent in Hindi during the year 2019-20 (up to 31 December, 2019) is as follows-

	Letters sent in Hindi	% of Hindi letters
1st Quarter	13295	93%
2nd Quarter	16271	95%
3rd Quarter	12645	95%

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

1. Annual Report of CEA
2. Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2019.

4. Hindi Pakhwada Celebration:

Hindi Pakhwada was organized in the Central Electricity Authority from 11/09/2019 to 25/09/2019. On 11.9.2019, 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. On this occasion, a cultural programme including workshop on "Cyber Security" was also organized. During the Hindi Pakhwada, 4 competitions, namely; Hindi Essay Writing, Hindi Noting and Drafting, Hindi Paragraph Writing (for MTS only) and General Language Competition of Official Language Rules / Act and Hindi Language / Literature. 94 officers and employees took part enthusiastically in these competitions.

Award distribution ceremony was celebrated on 25/09/2019. In this ceremony, 12 winners were given cash prizes and citations. 10 personnel who done noting and drafting originally in Hindi during 2018-19 were rewarded under the Incentive Scheme. Under the Incentive Scheme for officers for giving dictation in Hindi, an officer was awarded cash prize and a citation. 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, DP & R Division and PDM Division were awarded ''ChalVaijayanti'' Shield.

5. Conducting Hindi Workshop:

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. Three such workshops were organized up to 31st December, 2019. Officers and employees, at large, actively participated in these workshops.

6. Purchase of Hindi Books/publication:

This office has a library. Hindi Books are purchased regularly in the library during each financial year. Hindi Newspapers & Hindi magazines are also purchased regularly in the library.

7. Facility to work in bilingual on PC:

At present all computers installed in this office has facility to work bilingually.

1.7 Hiring of Consultants

CEA has acute shortage of technical manpower as well as non-technical staff and to cope up with this situation 13 Consultants were hired in CEA during the year 2019-20.

1.8 Welfare Activities in CEA

1.8.1 Welfare of SC /ST /OBC

Shri K.S.Babu, Director (IRP 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 are actively participating in the Sports & Cultural Tournaments/ Competitions at All India Civil Services (A National Status), Inter Ministry and Inter CPSU levels every year regularly. For the year 2019-20, the following Sports Team/Individual of CEA are participated in the AICS/Inter-Ministry/ Inter-CPSU Tournaments and brings the laurels to CEA by winning the medals. The achievements of these Sports/Individuals are as under:-

1. CEA Carom Team for men participated in the Inter-CPSU Carom Tournament organized by NHPC held at Jalpaiguri (West Bengal) from 16.12.2019-20.12.2019. The Team won the Runners-up Trophy in Men Team Championship and won the Siler Medal in Men Doubles Event.
2. CEA represented Central Secretariat Volleyball Team in the All India Civil Service Volleyball Tournament 2019-20 **(A National Status)** held at Ranchi from 22.02.2020 to 25.02.2020 and won the Bronze Medal.
3. CEA represented as Coach in the Central Secretariat Badminton Team in the All India Civil Service Badminton Tournament 2019-20 **(ANational Status)** held at Gandhinagar (Gujarat) from 27.12.2019 to 02.01.2020. The team won the Silver Medal. CEA represented as Badminton Convenor by Central Civil Services Cultural and Sports Boad, DoPT for the year 2019-2021.
4. Shri Gurujit Medhi, Deputy Director, NERPC, Shillong won the Gold Medal in the Inter-CPSU Chess Tournament 2019-20 held at Bangalore from 25-27 September,2019 and Shri Lalrinsanga, NERPC, Shillong won the Bronze Medal.

1.8.4 Associations/ Unions in CEA

The Drawing Staff Association is recognized for three years under CCS (RSA) Rules, 1993.

1.8.5 Pension Cases

36 superannuation cases, one death and one Voluntary cases has been settled for pension during the year 2019-20. In addition, nearly 250 cases were dealt in the Section. Further, 3 CAT/Court cases are under process.

1.9 Vigilance Activities/Disciplinary Cases in CEA

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 exercises.

As part of preventive vigilance, the Vigilance Division facilitates in ensuring job rotation in sensitive posts. The Vigilance Division has also taken steps to ensure that website of CEA plays an important role in increasing transparency in its functions. Vigilance Awareness Week-2019 was observed in Central Electricity Authority and its Subordinate Offices from 28.10.2019 to 02.11.2019. The Vigilance Awareness week was celebrated to highlight the theme "Integrity – A way of life".

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 31.03.2020, disciplinary case against one Data Entry Operator (since retired) is under process and sent to Ministry of Power for onward transmission to the Union Service Public Commission for seeking advice of the Commission as per Rule 9 of the Central Civil Services (Pension) Rule 1972. 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

In accordance with the instructions of Department of Administrative Reforms and Public Grievances (DAR&PG), Shri Mangal Hembram, Chief Engineer (Distribution Monitoring), is functioning (w.e.f. 28th February, 2020) as Grievance Officer for CEA. The Grievances dealt by CEA are mainly service matters (pension, promotion, administrative etc.) and technical/policy matters related to power sector. Further, the Grievances on matters of public /individual concerns, issues of Research and Development/Inventions /suggestions for Power Sector Development are also dealt with.

During the year 2019-20, 102 Nos. of Grievances were received and 12 Nos. were pending as on 31.03.2020. Out of this, a total of 65 Nos. Grievances were settled/disposed off during the period 01.04.2019 to 31.03.2020.

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. 1073 applications were received during the year 2019-2020 (i.e. up to 31.03.2020), under the Act and were disposed off by various CPIOs in CEA. Further, 64 applicants filed appeal to the Appellate Authority which were also decided.

The RTI Act under section 4 provides a comprehensive framework for promoting openness in the functioning of the public authorities. RTI Suo-motu disclosure in the format specified by CIC and approved by Chairperson, CEA was uploaded on website of CEA. The details as per above format was also sent to CIC for carrying out 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.The Audit was conducted on 11.03.2020 in CEA Head Quarter by 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 2019-20
9. Major Achievements in Power Sector
10. Annual Report of the MOP for 2019-20
11. Material for interview of Power Minister and Secretary (power) to various press media
12. Monitorable targets for the year 2019-20 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 2019-2020(till 31.03.2020) there were three Parliament Sessions and the Admitted version of Questions were dealt with as follows:

Sr.	Session	Starred	Un-starred
1.	Budget Session	11	78
2.	Monsoon Session	16	149
3.	Winter Session	5	87
4.	Budget Session 2020	13	117

1.14 Monthly Reports

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:

- Report on important developments during the month for Prime Minister's Office
- Summary report for Council of Ministers on important developments in Power Sector during the month.
- Monthly Executive Summary
- DO letter from Chairperson, CEA to Secretary (Power)
- Inputs for DO letter from Secretary (Power) to Cabinet Secretary on important developments in Power Sector

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, West Block-II and NRPC building are interconnected through wired or wireless net work. 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 website has been designed, developed and maintained in-house by IT Division, CEA. The content of this website is updated on daily basis. A state of the art Data Center is running at Sewa Bhawan building since 2011 for collecting and scrutinizing on line data from various power sector utilities/organizations.

1.15.1 Hardware Facilities

The IT hardware facilities in CEA consist of 5 Rack Servers, Router, Firewall, Core-Switch etc. And various office automation equipment like Multi functional Printers, Plotters, Workstations, etc. All officials of CEA have been provided with latest desktop computers/laptops with internet facility and associated peripheral under the Plan Scheme "Upgradation of IT facilities in CEA–Phase II" approved by Ministry of Power in July,2015.

1.15.2 Software facilities

- System Soft ware like Red Hat Linux, Oracle, Windows Server, Web Sphere are being used for maintaining the Data-Centre and Internet connectivity in CEA.
- Application Software like MS Office, Comp DDO are available to facilitate daily official works in CEA. Apart from these, there are a few scientific Application Software like Auto CAD, STAAD. Pro, i-Tower, Power System Analysis Package (PSAP), Integrated System Planning Model (ISPLAN), STATA, etc. being used by different divisions for carrying out specification function of designing, study, analysis and planning etc.
- Specific software have also been developed in-house by IT Division like IT (Inventory/Complaint/Bill) Management, Canteen Management, Hindi Data Management, etc.

1.15.3 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) on14.11.2017. 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 analyzed 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 analyzed information about the sector through GIS enabled navigation and visualization chart windows on capacity, generation, transmission, 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 Dashboard also act as single point interface for all Power Sector Apps launched by the Ministry like TARANG, UJALA, VIDYUT-PRAVAH, GARV, URJA, MERIT, etc.
- 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).

1.15.4 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.

1.15.4 Cyber Security in Power Sector:

Chief Engineer(IT), CEA is nominated Chief Information Security Officer (CISO) of Ministry of Power to co-ordinate the activities related to cyber security in Power Sector. IT Division, CEA in collaboration with four Power Sector Computer Emergency Response Teams (CERTs), i.e., CERT-Distribution, CERT-Thermal, CERT-Hydro and CERT-Transmission is actively monitoring and taking necessary steps to protect the power sector from any kind of cyber attacks. At the Centre, Information Sharing and Analysis Centre (ISAC-Power) has been hosted on the website of CEA as the Information resource pooling and sharing platform on cyber security in power sector. Sectoral CERTs have already formulated/finalized Cyber Crisis Management Plan (CCMP) for each sector like Generation, Transmission and Distribution. These CCMPs are at various stages of implementation. Most of the

utilities (government or private) have nominated CISO in their organization. IT Division, CEA is continuously in contact of sectoral CERTs and its constituent for the identification of their Critical Information Infrastructure (CII) with the support of NCIIPC.

1.15.6 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 by NIC:

- Online Application for Inspection of Electrical Installations
- DPR Approval Process Monitoring System for Hydro Projects
- Online Application for prior approvalof ElectricityAct,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 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 has been uploaded on Central Public Procurement (CPP) Portal.
- Process of e-HRMS has been initiated.

1.16 ISO 9001:2008 Quality Management System Certification (QMS)

In order to improve quality of services rendered and competency of the personnel of CEA, the Quality Management System (QMS) as per ISO 9001:2000 was adopted by CEA in February-March 2004 which was subsequently renewed in year 2007. CEA has adopted ISO 9001:2008 Quality Management System in February, 2010 which was renewed in February, 2013 and November, 2016.

Now after successful completion of Surveillance cum transition audit of CEA for transition from ISO: 9001:2008 to ISO 9001:2015, Bureau of Indian Standards has provided CEA with the latest version of ISO 9001 QMS certification i.e. ISO 9001:2015 Quality Management System.

1.17 Market monitoring Cell.

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, a Market Monitoring Cell (MMC) was created in Regulatory Affairs Division of CEA with the objective of analysis of movement of prices and total volume of electricity transacted on both the power exchanges of India in the Day Ahead Market (DAM) and Term Ahead Market (TAM) and also analysis of international markets to explore opportunities for learning for Indian Markets. File No.CEA-EC-15-26/1/2018-RA Division The MMC has started preparing reports since April, 2019. The activities performed by MMC till 31.03.2020 are mentioned below.

1. The officers of Regulatory Affairs Division visited Indian Energy Exchange (IEX) to understand the bidding and Market clearing price

evaluation process in the Indian electricity market.

2. Analyzed the data for transactions happened in both the power exchanges in India [i.e. IEX and Power Exchange India Limited (PXIL)] for the period April, 2019 to March, 2020 and prepared the monthly Market Monitoring Reports for the period April, 2019 to March, 2020, which are available on CEA's website. The salient points from these reports are as under:

(i) The total volume of electricity transacted on both the power exchanges in Day Ahead Market (DAM) during the period April, 2019 to March, 2020 was 49,159.02 MU. The volume of electricity traded on both the power exchanges in DAM during the period April, 2019 to March, 2020 represents 3.83 % of the total energy supplied in the country [1,284,444 MU]. Total scheduled volume of electricity transacted in Day Ahead Market(DAM) in IEX constituted more than 99% of total transacted volume of electricity on both the power exchanges (i.e. IEX and PXIL) during the period April, 2019 to March, 2020.

(ii) The monthly average Market Clearing Price (MCP) on IEX in Day Ahead Market varied from Rs 2.46/ kWh to Rs 3.38/ kWh for the months April, 2019 to March, 2020 and this lowest and highest value was observed in the months of March, 2020 and July, 2019 respectively. The Area Clearing Price (ACP) on IEX for a particular time block varied from minimum of Rs 0.60/ kWh to maximum of Rs 11.84/ kWh during the months April, 2019 to March, 2020 and the maximum ACP of Rs 11.84/ kWh was observed in southern region in April, 2019.

iii) Similarly, the monthly average Market Clearing Price on PXIL in Day Ahead Market varied from Rs 2.62/ kWh to Rs 3.75/ kWh for the months April, 2019 to March, 2020 and this lowest and highest value was observed in the months of October, 2019 and April, 2019 respectively.

(iv) The cumulative real time curtailment happened on IEX in the Day Ahead Market during the period April, 2019 to March, 2020 was 13.714 MU. There was no real time curtailment on PXIL during the above period.

(v) The regression analysis results using double log function carried out for Market Clearing Price w.r.t. purchase Bid and other independent variables on IEX for the period April, 2019 to March, 2020 shows that the purchase bid is most significant variable, which determines market clearing price on IEX.

(vi) The total volume of energy transacted on both the power exchanges in Term Ahead Market(TAM) during the period April, 2019 to March, 2020 was 7,432.32 MU. The volume of electricity traded on the power exchanges in TAM represents 0.58 % of the total energy supplied in the country.

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CHAPTER-2

PLANNING FOR POWER DEVELOPMENT

2. Power Planning

2.1.1 Generation Planning Studies

Generation Expansion Planning Studies are carried out using State of the art, sophisticated ORDENA Software modeling tool.

2.1.2 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. National Electricity Plan, Volume1 (Generation)has been Notified vide Extra Ordinary Gazette No.1871, Sl. No. 121 under part-III, Section IV dated 28.03.2018.

The major highlights of the National Electricity Plan (Vol-I- Generation) are as follows:

a. The actual capacity addition during 12th Plan from conventional sources as on 31st March,2017 is 99,209.6 MW (Coal 83,560 MW, Lignite 1,290 MW, Gas 6,880.5 MW, Hydro 5,479 MW, Nuclear 2,000 MW) against a target of 88,537 MW. This is about 112% of the target.
b. As per the 19th Electric Power Survey, the projected Peak Demand is 226 GW and Energy requirement is 1,566 BU at the end of year 2021-22.
c. By 2021-22, the Renewable Energy capacity target has been set to 175 GW.
d. Considering the demand projections for the year 2021-22 as per the 19th EPS,
e. capacity addition from Gas 406 MW, Hydro 6,823 MW, Nuclear 3,300 MW, RES 1,17,756 MW and likely retirement of 22,716 MW (5,927 MW-old and inefficient units + 16,789 MW-completing 25 years by 2022 and without FGD space) of coal based capacity during 2017-22, a coal based capacity addition of 6,445 MW is required during the period 2017-22. However, a total capacity of 47,855 MW coal based power projects are currently under different stages of construction and are likely to yield benefits during the period 2017-22.
f. The Renewable Energy Generation will contribute about 20.1 % of the total energy requirement in 2021-22.
g. The total coal requirement in the year 2021-22 has been estimated as 735 MT.
h. The average CO2 emission factor is estimated at 0.721 kg CO2/kWh during 2015-16 (including renewables). It is expected that this average CO2 emission factor may reduce to 0.604 kg CO2/kWh by the end of year 2021-22.

2.1.3 Optimal Generation Mix studies for the year 2029-30.

Studies have been carried out on All India basis to assess the optimal generation mix by the year 2029-30 using the software modelling tool considering possible / feasible technology options, fuel constraints if any, intermittency associated with Renewable Energy sources etc. Draft report on the optimal generation mix for the year 2029-30 has been circulated for comments, final report has been prepared taking into consideration the stakeholder comments and submitted to the

Ministry of Power for approval. Regional/ State specific studies are also initiated to assess capacity addition required to meet the future electricity Demand.

2.1.4 Capacity addition during the Year 2018-19 and 2019-20 (As on 31.03.2020)

i) For the Year 2018-19, against a schedule of capacity addition of 8106.15MW, Capacity addition of 5921.755 MW was achieved during 2019-20 comprising of 140 MW Hydro, 5781.755 MW Thermal, 0 MW Nuclear.

ii) For the Year 2019-20, against a schedule of capacity addition of 12186.14MW, Capacity addition of 7065 MW was achieved as on 31.03.2020 comprising of 300 MW Hydro, 6765 MW Thermal, 0 MW Nuclear.

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

Chief Engineer (IRP) was requested to assess and revise the Long Term Power Demand in the State of Madhya Pradesh and to prepare a capacity addition programme for Madhya Pradesh GENCO (MPGENCO) up to FY 2031-32. Report has been prepared by the committee and submitted.

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, National Level Data Registry System for all electricity generating units in the country of 0.5 MW and above capacity has been developed so that the generating capacity data of all electricity generating units of the country including the Renewables and Captive power plants and their other details are captured in CEA's database. The registration system consists of a provision of mandatory registration of all the electricity generating units by assigning each of them a unique registration number.

The e-registration portal for registration of all electricity generating units was prepared by CEA with the help of NTPC. The formalities for operationalization of e-registration portal is under way.

2.3 Electricity Demand Forecasts

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, 18 such exercises viz. Electric Power Survey (EPS) have already been conducted and its 19th edition is in progress. The 19thEPS Committee, constituted by the CEA in June 2015, decided that it's reports would be brought out in four volumes, as detailed below:

Volume I: Discom-wise, state/UT-wise, region-wise and all-India electricity demand projection by partial end use method (PEUM).
Volume II: Electricity demand projection of National Capital Region (NCR).

Volume III: Electricity demand projection of Mega Cities.

Volume IV: Electricity demand projection by econometric method.

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

The electricity demand projection of National Capital Region (Vol. II of EPS) has been prepared in December 2019.

The Volume-III of 19th EPS Report covering electricity demand forecasts electricity demand forecasts of 45 Mega Cities is under preparation.

The year wise projections of 19 Mega Cities namely Agartala, Aizwal, Allahabad, Amritsar, Bhopal, Bhubaneswar, Chennai, Coimbatore, Dehradun, Guwahati, Gwalior, Indore, Jabalpur, Jaipur, Madurai, Raipur, Shillong, Tiruchirappalli, Thiruvanantha- puram, has been completed. The electricity demand forecast for the remaining Mega Cities is under preparation.
The Report titled "Report on Nineteenth Electric Power Survey of India (Econometric Method)", i.e. Vol-IV of EPS Report, covering electricity demand projection upto the year 2036-37 has been prepared in August 2019.The Report contains electricity demand projection by two econometric models (i) Partial Adjustment Model and (ii) Seemingly Unrelated Regression (SUR) model. Both the model consists of demand projections under three different GDP growth rate of 6.5 %, 7.3 % and 8 %. The independent variablesused for carrying out the electricity demand projections comprises of gross domestic product (GDP), electricity pricing, population, temperature and rainfall data etc.

2.4 Crisis and Disaster Management plan

Central Electricity Authority (CEA) prepares the "Crisis and Disaster Management Plan for the power sector" on behalf of Ministry of Power to fulfil its obligations under the provisions of section 37 of the Disaster Management Act, 2005. CEA also prepares sector wise crisis and disaster management plans for Hydro, Thermal, Distribution, Transmission, and Renewables.

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

In fulfilment 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-2019, 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-2019 also contains information about the Installed Capacity and generation of captive power plants of about 4702 Nos.

General Review-2019 containing the data for the year 2017-18 was published in May,2019.

General Review-2020 containing data for the year 2018-19 is under finalization.

2.5.2 Growth of Electricity Sector in India

Publication titled "Growth of Electricity Sector in India from 1947-2019" was published in May, 2019 containing data for the year 2017-18 and provisional /estimated data for the year 2018-19 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.

2.5.3 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.

2.6 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 15604.24 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 7422.30 MW after 12th Plan (out of which 2550.38 MW during the year 2017- 18, 2409 MW during the year 2018-19 and 2462.92MW during the year 2019-20)was retired.

During the year 2019-20, 27 Nos. of thermal generating units with aggregate capacity of 2462.92 MW have been retired. The list of the generating units retired during the year 2019-20 is given below:-

Sl. No.	Name of Station/Plant	State	Unit No.	Retired (MW)	Retired on
1.	Yelhanka DG	Karnataka	1,2,3,4,5,6	127.92	02.08.2019
2.	Korba-II	Chhattisgarh	1,2,3,4	200.00	13.08.2019
3.	Trombay TPS	Maharashtra	6	500.00	12.09.2019
4.	Sabarmati (C Station)	Gujarat	15,16	60.00	13.09.2019
5.	Rajghat TPS	Delhi	1,2	135.00	23.09.2019
6.	Parli TPS	Maharashtra	4,5	420.00	23.01.2020
7.	D.P.L. TPS	West Bengal	6	110.00	28.01.2020
8.	Kothagudem TPS	Telangana	2	60.00	03.03.2020
9.	Chandrapura(DVC) TPS	Jharkhand	3	130.00	19.03.2020
10.	Kothagudem TPS	Telangana	5	120.00	30.03.2020
11.	Kothagudem TPS	Telangana	1,4,7	240.00	31.03.2020
12.	Neyveli TPS-I	Tamil Nadu	1,9	150.00	31.03.2020
13.	Panipat TPS	Haryana	5	210.00	31.03.2020
	Total		**27**	**2462.92**	

The Plan wise and Fuel wise summary of retired unit wise capacity details are given below:-

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	**68**	6635.38	3	250.00	5	209.00	10	327.92	**86**	**7422.30**
Total	**164**	**14121.38**	**3**	**250.00**	**25**	**747.00**	**24**	**485.86**	**216**	**15604.24**

2.7 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 Indian Power Sector is facing multiple challenges,some of them being the increasing penetration of Renewable power sources leading to variability and intermittency in generation and related issues. There is a shift of generation mix from conventional resource based projects which have environmental impacts. In the transport sector there is a

transformation and move is towards replacement of conventional fuel based transport system by pollution free electric vehicles etc.

India is a fast growing economy and power has to grow at a faster pace to sustain the growth of various core sectors. It is the need of the hour that many grey areas of generation, transmission, distribution and trading of power may be explored and addressed through R&D initiatives in these fields which may yield sizeable benefits to the power sector.

CEA oversees and promotes the activities of research and development in the Power Sector. Chairperson, CEA is the Chairman of the Standing Committee on Research & Development (SCRD). Currently, following are the research schemes for the power sector facilitated by the CEA:

(i) **National Perspective Plant (NPP)**- Under this scheme, the research projects are undertaken on the topics chosen from the identified thrust areas for R&D in various subsections of power sector viz. Generation, Transmission & Distribution. The R&D under this is 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)-** The projects under this are taken up for need based research in power sector including solving of operational problems encountered in the power system.The RSoP projects are undertaken by organizations including academia such as IITs, NITs and utilities etc.

(iii) **In-house Research and Development (IHRD)** scheme for Central Power Research Institute (CPRI)- Under this scheme, Various Divisions and Units of the CPRI take up Research Projects for which the funds are provided by the Ministry of Power, Government of India and the research is conducted in-house by CPRI.

(iv) **UchhatarAvishkarYojana(UAY)**: Based on the application of the research projects to the power sector, CEA supports UchhatarAvishkarYojana (UAY), an initiative of Ministry of Human Resource Development (MHRD) 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. Under this scheme, the Indian Institutes of Technology (IITs) have partnered with industry for research projects that would result in innovative solutions for their problems. IIT, Madras is the National Coordinator for this scheme.

(v) **Impacting Research Innovation & Technology (IMPRINT):-**IMPRINT scheme which is a national initiative of Ministry of Human Resource Development (MHRD) 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. In respect of Energy Domain of IMPRINT, CEA facilities through its representation on Projects Advisory Committees (PAC) in evaluation and recommendation of the projects. IMPRINT aims to translate knowledge into viable technology (products or processes) and through that, achieve inclusive growth and self- reliance.

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

An outlay of Rs. 45 crores for R&D schemes under National Perspective Plan (NPP), Rs. 20 crores for Research Scheme on Power (RSoP) and Rs. 15 crores for In-house Research and Development Scheme (IHRD) of CPRI, totalling to Rs. 80 crores were approved under 12th Plan (2014-17).
Total 87projects with an outlay of Rs.59.3597 crores were approved during 12th Five Year Plan. Further, R&D schemes were approved for continuation for another 3 years' period entailing total budgetary support of Rs. 90.8284 crores for the years 2017-18, 2018-19 and 2019-20 respectively.

One hundred and nineteen (119) R&D projects (including projects under UAY and IMPRINT) have been taken up during the 12th Plan period and three-year action plan (2017-18 to 2019-20) period. The summary of the projects completed and those going on are as follows:

Scheme Compo-nent	Com-pleted	Completed & to be reviewed by Technical Committee	On-going	Total
NPP	2	3	5	10
RSoP	17	15	30	62
IHRD	19	12	7	38
Total	38	30	42	110

Apart from projects mentioned under above Schemes Ministry of Power is supporting projects under UAY and IMPRINT Schemes of MHRD. Eight (8) projects under IMPRINT Scheme are ongoing and one (1) project under UAY-I which has been closed in 2019-20. UAY and IMPRINT projects fall under NPP. Contribution from Ministry of Power is 25% of the total cost of project under UAY and 50% under IMPRINT.

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.

2.7.3 Works related to Electrical Energy Storage (EES) Systems

Electrical Energy Storage (EES) Systems Sectional Committee ETD 52 on Standardization in the field of grid integrated Electrical Energy Storage (EES) Systems headed by Member (Planning), CEA has participated in preparation of the standards on Electrical Energy Storage (EES) Systems. The Indian Standard was adopted by the BIS after the draft, finalized by Energy Storage System Sectional Committee (ETD 52) had been approved by Electro Technical Division Council. The standards as notified include:

IS 17092:2019-Electrical Energy Storage System: Safety Requirements

IS 17067: 2019-Part 2 Unit Parameters and Testing Methods
Section 1 General Specification

Part 4 Guidance on Environmental Issues
Section 1 General Specification

2.7.4 Works related to Electric Vehicles

In line with the recommendations of the Committee on Technical Aspects of Charging Infrastructure for Electric Vehicles following action are carried out by CEA-

I. Central Electricity Authority (Measures Relating to Safety and

Electric Supply) Amendment Regulations, 2019 have been published on 28.06.2019. These addresses the safety issues for charging stations of EVs.

II. Further, Bureau of Indian Standards (BIS) in its ETD 51 Committee is working on the development of Indian Standards related to EVs and EV Charging infrastructure. This also has representation from CEA. This will ensure harmonious adoption of the EVs in the country with least challenges. Some of the standards as notified include:

(a) IS/ISO 15118 (Part 1, 2, 3, 4, 5 and 8) - These are related to Road Vehicles, Vehicle-to-Grid Communication Interface. These correspond to High Level communication between Electric Vehicle and Electric Vehicle Supply Equipment. Of these, Part 1 & 2 are published.

(b) IS 17017 - These relate to Electric Vehicle Conductive Charging System.

i. IS 17017 - (Part 1) – General Requirements
ii. IS 17017 – (Part 21) Electromagnetic Compatibility
iii. (EMC) Requirements Section 1 On-board chargers
iv. IS 17017 – (Part 21) Electromagnetic Compatibility (EMC) Requirements Section 2 Off-board chargers.

Of these, Part 1 is published.

III. The Positive impact which can come up in the electricity system with higher absorption of EVs include better demand management, efficient usage of renewable energy in daytime, better renewable integration with commensurate demand management, lesser requirement of high ramping rates, increased electricity demand.

As on 31st March, 2020, 904 number of Electrical Vehicle charging stations installed under jurisdiction of discoms/licencee.

2.7.5 Giga Scale Battery manufacturing Programme

NITI Aayog has brought out the SFC memo and draft cabinet note on Giga Scale Battery manufacturing Programme in the country. This Division has examined and provided opinion on the same. This division is representing in NITI Aayog's and BEE's Committees on Advanced Chemistry Cell(ACC).

2.7.6 Fuel Cell Initiatives

Ministry of New & Renewable Energy (MNRE) formed a Committee to explore the current status, development and application of Fuel Cell in India and internationally. This division provided its views on the challenges involved in the fuel cell development in the country.

A meeting of R&D institutions and stakeholders on Fuel Cells was also held under the chairmanship of Member (Planning), CEA in January, 2020. CEA listened to the views of the institutions and stakeholders on current R&D status in India and abroad, development, applications and challenges involved in the development of fuel cell and provided its opinion in the matter.

2.7.7 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 R&D exposure.

An MoU was signed between MoP / CEA & IIT Delhi to develop R&D projects in Power Sector and for development of Human Resources

relevant to the need of Power Sector to further strengthen R&D initiatives in CEA.

Under the obligation of MoU, one officer has completed an M.Tech course and another an M.B.A. course. Further, two officers are currently pursuing M.Tech course.

2.7.8 Make in India initiative of Government of India

Prime Minister of India launched the Make in India initiative on September 25, 2014, with the primary goal of making India a global manufacturing hub, by encouraging both multinational as well as domestic companies to manufacture their products within the country. Make in India has introduced multiple new initiatives, promoting foreign direct investment, implementing intellectual property rights and developing the manufacturing sector.

It also seeks to facilitate job creation, foster innovation, enhance skill development and protect intellectual property.

Chief Engineer (R&D), CEA as the Nodal Officer for Make in India inititatives (MII):

With respect to Power Sector, Chief Engineer (R&D), CEA has been designated as the Nodal Officer to assist 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 initiative. Chief Engineer (R&D), CEA is acting as a communication channel between the Ministry of Power and the PSUs/Organizations/Autonomous Bodies under the administrative control of the Ministry as well as the industry associations. Some of the major activities undertaken in the R&D Division in this regard are given as under:

- Identified the equipment/material which have local sufficiency and adequate competition. These are to be mandatorily procured locally.
- General conditions to form part of the tenders were identified, the same can be invoked against the companies from the countries, which impose such restrictive conditions in their tenders against foreign countries including India.
- To act as interface between MOP and DPIIT and Coordinate the MII issues with Power utilities and other stakeholders.
- Analyses of the Public Procurement (Preference to Make in India) Order, 2017 issued by the DPIIT and provide suggestions/inputs thereon to enable Ministry in issuance of Order regarding purchase preference to be given to local suppliers in procurements done by departments or attached or subordinate office of, or autonomous body controlled by, the Ministry of Power.
- Preparation/compilation of list of items/equipment, from time to time, to provide for purchase preference (linked with local content) in public procurement in respect of Generation, Transmission and Distribution segments of the power sector and assistance to the MoP in issuance of the same.
- Assistance to the MoP in preparation of action taken report, pertinent to the power sector, on the Recommendations of the Committee of Secretaries (Cos) related to implementation of various provisions of the PPP-MII Order.
- Assisting MoP in preparation of guidelines for purchase preference to Make in India, to be selectively incorporated in the tender documents by the procuring entity.
- Organizing meetings related to implementation of various provisions

of Public Procurement (Preference to Make in India) Order, 2017 with different stakeholders of the power sector.

- Attending meetings taken by the DPIIT to review the progress made in the power sector under the PPP-MII Order.
- Facilitating stakeholders by seeking clarifications from MoP/DPIIT on various issues related to implementation of the PPP-MII Order.
- Preparation/compilation of procurement projections in Generation/Transmission/Distribution segments of power sector for next 3-5 years with an objective to enable domestic industry to suitably increase manufacturing capacity and reduce import dependence.

2.8 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 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 the coal supply to power plants. With the concerted efforts of all stakeholders, the coal supply to power utilities is maintained to meet their coal requirements. As on 31March 2020, the total coal stock available with the 169 number of plants reached 51.7 Million Tonnes (MT).

2.9.1 Monitoring Mechanism

The coal stock position of all the power plants in the country having coal linkages is monitored by CEA on a daily basis and daily coal stock report is published on National Power Portal (*npp.gov.in*). Moreover, on monthly basis, the power plants designed on imported coal, plants having dedicated coal block, plants getting coal through e-auctions apart from the plants having coal linkages are monitored and monthly coal report is published which is uploaded on CEA website.

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, Coal India Limited and NTPC Limited. The subgroup reviews and monitors coal supply and related infrastructural constraints, if any, on day-to-day basis for adequate supply of coal to power plants.

2.9.2 Coal Scenario for the Power Sector during 2019-20

2.9.2.1 Estimation of coal requirement for the year 2019-20.

The break-up of coal requirement during 2019-20 is given as under:

(Figs in Million Tonnes)

Coal Requirement	**2019-20**
	651
Imported Coal based Plants	47
Total Requirement	**698**

During 2019-20, the total coal requirement was estimated to be about 698 MT, which included coal requirement for the plants designed on domestic coal and imported coal to be about 651 MT and 47 MT respectively.

2.9.2.2. Coal Supply Position for the year 2019-20

For the year 2019-20, the total receipt of coal (domestic + imported) was about 638.7 MT against the estimated coal requirement of 698 MT. However, the coal consumption was about 622.2 MT during the period.
Details of coal receipt and consumption during the year 2019-20 are given as under:

(Figures in MT)

Estimated Requirement (Domestic + Imported)	698 (651 + 47)
Receipt- Domestic coal (Actual)	569.5
Receipt- Imported coal for blending (Actual)	23.8
Receipt- Imported coal for plants designed on imported coal (Actual)	45.4
Total Imported coal Receipt (Actual)	69.2 (23.8 + 45.4)
Total Receipt (including Imported Coal)	638.7 (569.5 + 69.2)
Consumption (Actual) (includes Imported coal)	622.2

During the year 2019-20, the receipt of coal by the power plants from domestic sources was 569.5 MT as against 582.1 MT during the same period last year with reduction in receipt of about 12.6 MT. Total coal consumption for the year 2019-20was 622.2 MT as against 628.9 MT during the same period last year. Plant-wise details of coal receipt and coal consumption during 2019-20 is enclosed at **Annex-2A.**

2.9.2.3 Source-wise Receipt of coal during 2019-20

The source-wise break-up of coal receipt at the power stations during the year 2019-20 is given below:

Source	Receipt (MT)
CIL	438.5
SCCL	54.3
Captive Mines	43.5
E-Auction	33.1
Total Domestic receipt	**569.5**

Total Imported receipt 69.2
Total receipt 638.7

2.9.2.4 Import of coal during the year 2019-20

Power Utilities are importing coal to bridge the shortfall in the availability of domestic coal as well as to meet the requirement of coal for the power plants designed on imported coal. Under the guidance of Ministry of Coal, Coal India Ltd. (CIL) has taken initiative for substitution of imported with domestic coal. Coal India, in this pursuit, has started the process of substitution of imported coal with domestic coal in many power plants.

During 2019-20, the coal imported by the power plants for blending was 23.8 MT vis-à-vis 21.4 MT during the same period last year resulting in increase of 2.4 MT (11.2%).

In addition to above, power plants designed on imported coal have imported 45.4 MT coal during 2019-20 vis-à- vis 40.3 MT during same period last year resulting in increase of 5.1 MT (12.7%).

2.9.2.5 Generation Loss due to shortage coal

During the year 2019-20, the power utilities have reported generation loss of about 30.0 Billion Units (BU) (Provisional) due to shortage of coal.

2.9.2.6 Specific Coal Consumption

During the year 2019-20, the Specific Coal Consumption (Spcc) of the power plants designed on domestic coal was 0.668 kg/kWh and for the plants designed on imported coal, it was 0.481 kg/kWh.

2.9.2.7 Coal Quality

In order to address quality concern 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 namely Central Institute of Mining and Fuel Research (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 analyzed 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 (Energy Charge Rate), thus benefitig the end consumers of electricity.

2.9.2.8 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 aggregated as consolidated ACQ (AACQ) 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 Power plants of other State/Central Gencos for generation of cheaper power. The

methodology provides for utilizing coal amongst State/Central Generating Stations through 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.

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.

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 (aggregated ACQ).
- 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 has 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. – Bela TPS) 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 has again tied up 185 MW with Dhariwal
- Infrastructure Ltd. from November 2019 to October 2020.
- Based on the experience gained, Ministry of power vide letter dated 15.06.2018 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 issued 2nd amendment in the methodology by considering moisture correction while reconciliation of coal.
- 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. Modifications in the portal are carried out from time to time as per requirement.

2.9.2.9 Gas Requirement and Supply Position during 2019-20

As on 31st March 2020, out of total 24955 MW of Gas and Liquid based installed generating capacity in the country, CEA monitors 63 Nos. of gas based power stations with a total capacity of about 23901 MW using gas as primary fuel. The production and supply of gas has not been keeping pace with the growing demand of gas in the country including power sector. Even gas allocations committed for power stations were not fulfilled due to shortage of gas supply in the country. The gas supply during 2019-20 was about 29.51 MMSMMD only against allocation of 94.14 MMSCMD resulting into a PLF of about 23% only. The gas supply position to gas based power plants during 2019-20 is as under:

(Figures in MMSCMD)

Category	Domestic Gas			RLNG (Imported)		TOTAL	PLF (%)
		KGD-6	Total	Long Term Contract*	SPOT		
Gas Allotted (Domestic)	54.28	32.37	86.66	7.48	-	94.14	23.0%
Gas Supplied	19.20	0.00	19.20	4.18	6.12	29.51	
% Gas Supplied w.r.t Gas Allotted	35.4%	0%	22.2%	55.9%	-	31.3%	

(*contracted quantity)

(MMSCMD: Million Metric Standard Cubic Meter per Day)

Gas supply to gas based power plants since 2014-15 is as under:

Sl. No.	Years	Capacity at the end of year (MW)	Gas Required* (MMSCMD)	Domestic Gas Allocation	Average Domestic Gas Supplied * (MMSCMD)	Total Average Gas Supplied (including RLNG) (MMSCMD)	Shortfall in Supply (%)
	(2)	(3)	(4)	(5)	(6)	(7)	(8)=(4)-(7)
1.	2014-15	21665.57	104.0	84.31	23.61	25.2	75.8%
2.	2015-16	23075.57	113.6	87.09	21.63	28.26	75.1%
3.	2016-17	24037.17	118.2	87.05	22.66	30.32	74.3%
4.	2017-18	23842.17	114.5	87.12	22.80	30.72	73.2%
5.	2018-19	23882.68	115.0	86.86	22.42	30.99	73.3%
6.	2019-20	23900.82	115	86.66	19.20	29.51	74.3%

*Normative gas requirement at 90% PLF taking GCV of gas= 9000 kCal/SCM, Station Heat Rate= 2900 kCal/kWh for open cycle and 2000 kCal/kWh for combined cycle.

MMSCMD – Million Metric Standard Cubic Metres per Day

2.10. Progress of Grid connected Renewable Energy Projects:

For sustainable development and economic growth focus of the Government of India is shifting from the fossil fuels to the renewable sources of energy, which are more sustainable.

Government of India has set a target of achieving 175 GW of Renewable Energy (RE) capacity by 2022 comprising of 100 GW of solar, 60 GW of wind, 10 GW of biomass and 5 GW of small hydro. Since March, 2019 the hydro power plants having a capacity above 25 MW have been declared as renewable sources, providing further boost to RE sector. However, this increasing penetration of renewables especially solar and wind power sources with inherent variability and intermittency have caused the issues of grid stability and security.

The Renewable Technology and Integration (RT&I) Division in the Planning Wing of the CEA has been entrusted with responsibility to promote renewable and clean technologies, to develop the standards, regulations and guidelines for the smooth integration of RE with the grid and for planned development of RE sources. Related to this, the following tasks were accomplished during 2019-20:

2.10.1Formulation of Technical standards/ regulations in RE sector

The RT&I Division examined the Indian Wind Turbine Certification Scheme (IWTCS) document and provided valuable opinion for the finalization of the Scheme of Ministry of New and Renewable Energy (MNRE).finalize a revised Indian Wind Turbine Certification IWTCS is a comprehensive certification scheme which provides the complete technical requirement in terms of various national and international standards, guidelines and technical regulations to be complied with by the wind turbine manufacturers for the safe and reliable operation of the wind turbines and its interconnection with the grid.

RT&I Division has also provided its advice on various standards / guidelines including those related to Grid-tie Inverter, Guidelines for Tariff Based Competitive Bidding (TBCB) for procurement of power from Wind and Solar, DC AC ratio in solar PV systems, KERC Regulations on Renewable Purchase, BIS standards etc.

2.10.2Evaluation of various Technologies for RE sector:

RT&I Division, examined various new technologies in the field of renewable energy like waste heat from industries, Dry Sorbent Injection (DSI) method for desulphurization in thermal power plants, three in one fuel station, hydrogen and fuel cell etc. CEA has received representations from industries for classification and promotion of power produced from waste heat in cement industry, biomass-based co-firing and exothermic reaction of sulphuric acid. CEA examined all these references and gave its opinion to MNRE/ concerned agencies.

RT&I division has provided its view to MoP on the clarification sought for considering power generated from Co-firing of Biomass in Thermal power plants as renewable.

2.10.3 Integration issues for renewable:

RT&I Division, CEA received representation from Indian Wind

Power Association (IWPA) on curtailment of RE power. A meeting under chairmanship of Member (Planning) was held with the power developers and associations of RE sector, wherein CEA listened the issues being confronted by the RE Power Developer Associations / Developers and provided its guidance and advice on the issues of curtailment of RE power.

Opinion was rendered on the issues of balancing power by flexibilisation of thermal plants, roping in gas plants, energy storage with pumped storage plant, battery energy storage etc.

2.10.4 Advice on technological and engineering issue

RT&I Division, CEA provided advice on technological and engineering issue to external agencies including Central and State Govt. It has examined the feasibility of the proposal from Gujarat Power Corporation limited on renewable energy projects in border areas of Kutch district of Gujarat and provided its views on techno-economic and environmental aspects of the project.

Some of the other studies in which RT&I Division carried out and provided its opinion are NRPC-TPDDL study on flattening of load curve in TATA Power Delhi Distribution area, National Institute of Wind Energy's (NIWE) Grid Emulator Test Facility, World Bank Technical Assistance for demand creation of Energy Storage etc.
RTI Division has provided its views to MNRE on feasibility of application of Renewable Generation Obligation (RGO) for conventional generators.

RT&I Division has examined the reference received from MNRE/MoP and provided its opinion on:

- Draft scheme for supply of round-the-clock (RTC) power from Renewable Energy (RE) projects complemented with thermal power projects. This scheme will offer benefits like tackling intermittency and variability of RE and providing round the clock power to Discoms.
- MNRE Draft Guidelines for Tariff Based Competitive Bidding Process for procurement of Round the Clock power from Grid Connected Renewable Energy Power Projects complemented with Power from Coal Based Thermal Power Projects.
- Concept Note on Aggregated supply of bundled power to utilities through Solar and Thermal Power Projects (Coal and Gas)

2.10.5 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 renewable energy sector. To evaluate the progress, RT&I Division, CEA regularly monitors and compiles the status of R&D projects in RE sector in the area of Advanced Solar Thermal, Solar Photo voltaic (SPV), Biogas, Wind, Wind-Hybrid, Storage, Small Hydro Power, Hydrogen and Fuel Cells etc. being undertaken by educational institutes and various organizations working in the field of Renewable power.

2.10.6 Commercial matter: Payment Dues of RE Generators

Renewable Energy (RE) is the key thrust area of India and achieving its target of 175 GW by 2022 will require significant investment in the

RE sector. However, it is observed that there are mounting payment dues of RE generators with Discoms which is unhealthy for the sector and efforts need to be made for resolving the issue.

2.10.7 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 of the country requires to be fulfilled with cooperation among the countries. To enhance the external cooperation, RT&I Division, CEA has provided its opinion to Ministry of Power (MoP) and MNRE for technology transfer, mobilizing investment, sharing experiences, regulatory and policy frameworks and best practices in RE sector through collaborative approach. Some of the external cooperation references in which CEA has provided its advice to MNRE and MoP are: India China strategic Economic Dialogue, 9th India-Kenya Joint Trade Committee (JTC) for energy sector, India Japan Energy Dialogue, BRICS Energy Minister Meeting, India Sweden Joint Economic Cooperation, The Shanghai Cooperation Organization (SCO), 9th session of India-Oman Joint commission Meeting (JCM),1st Meeting of the Committee of BRICS Senior Energy Officials etc.

2.10.8 Evaluation of Renewable Energy Management Centres (REMC):

Recently, 11 REMC's have been commissioned in which 7 are in the State of Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh, Gujarat and Rajasthan; 3 are in RLDCs at Bengaluru, Mumbai and New Delhi; and one REMC at the NLDC.CEA has been entrusted to conduct third party audit for assessment of REMC's performance after commissioning. Accordingly, RT&I Division, CEA has visited the REMC centre at NRLDC/NLDC to evaluate its functioning and performance and based on its observations, it is preparing evaluation/audit report on the performance of REMC to be submitted to MoP.

2.10.9 Miscellaneous Work:

- RT&I division evaluated various references and provided its opinion on the matters like Standing Committee on Energy (2019-20) examination of the Demand for Grants of MOP 2020-21, recommendations for Indian Economy in OECDs 2019, Economic Survey of India etc.
- RT&I Division examined and provided its view on various grievances received in the field of renewable energy and innovative clean energy technology.

2.11 Generation from Renewable Sources:

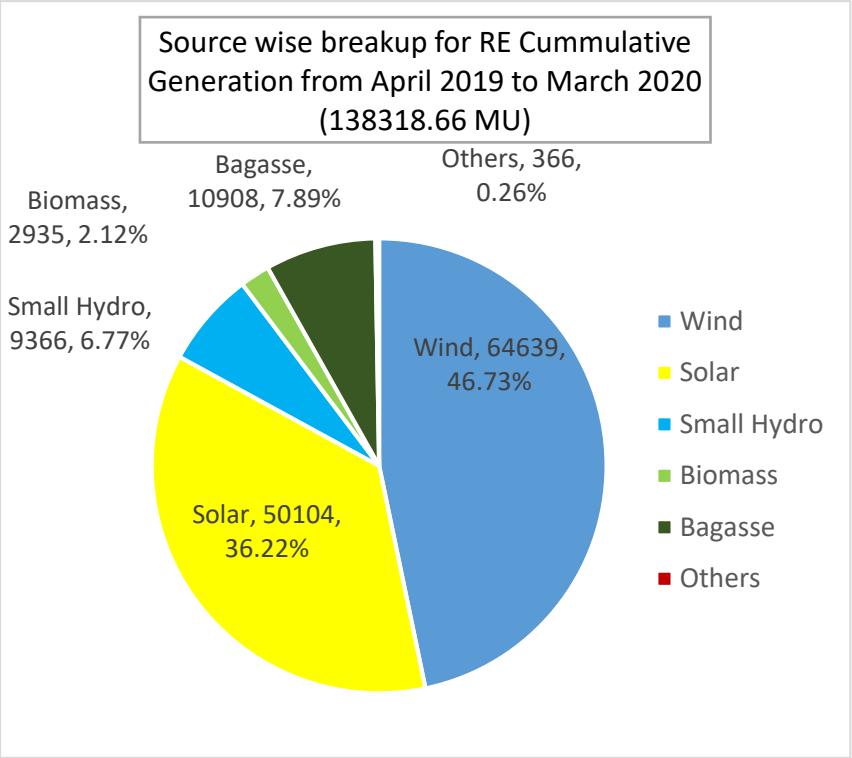
Generation from Renewable Energy Sources and conventional sources for the years 2014-15, 2015-16, 2016-17,2017-18, 2018-19 & 2019-20 and the percentage of RE to total generation for the above period are given below:

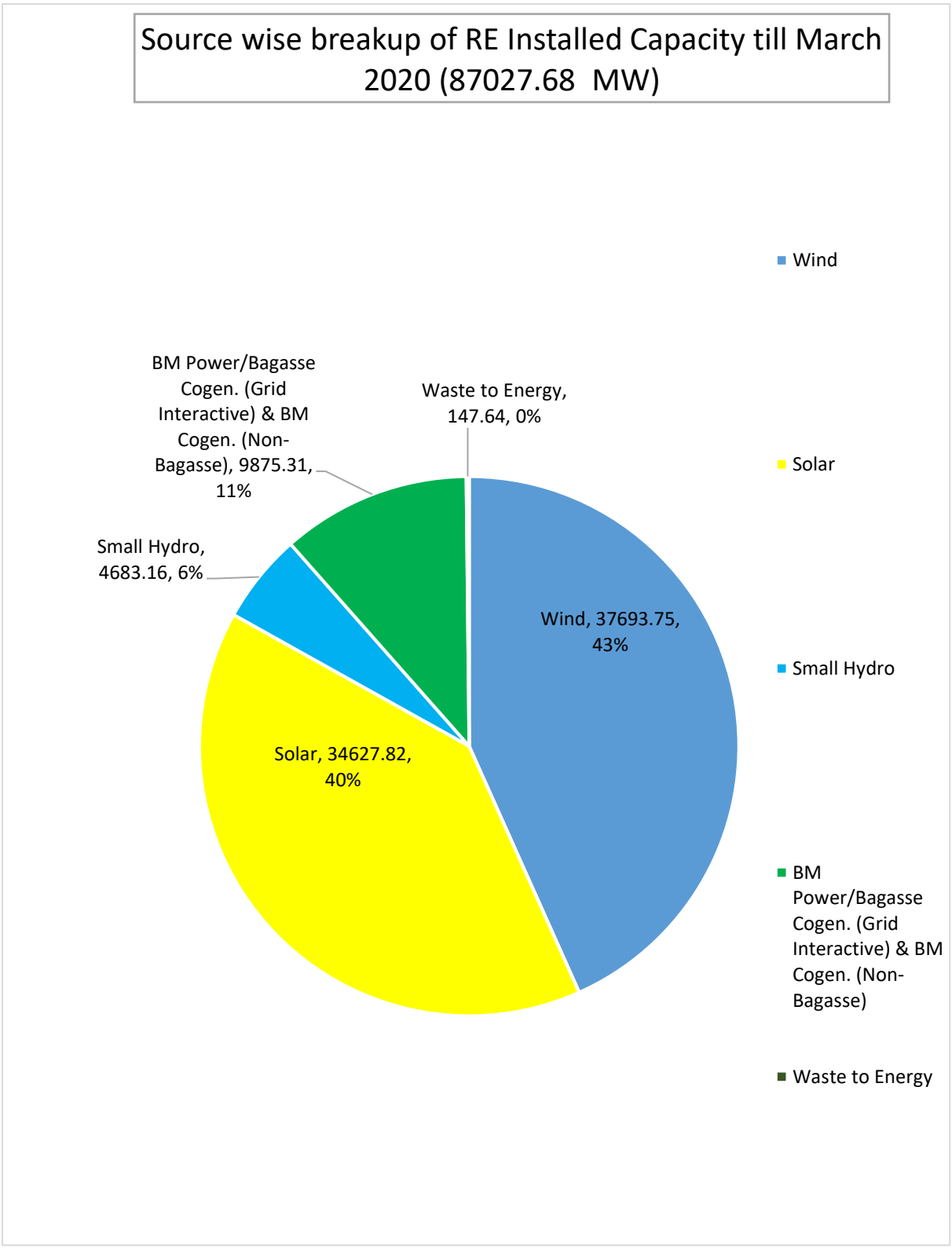
Years	Non RES Generation (MU)	RES Generation (MU)	Total Generation (MU)	% of RE w.r.t. total generation
2014-15	1048672.90	61719.25	1110392.15	5.56
2015-16	1107822.28	65780.86	1173603.14	5.61
2016-17	1160140.90	81548.21	1241689.11	6.57
2017-18	1206306.20	101839.48	1308145.68	7.79
2018-19	1249336.70	126759.09	1376095.79	9.21
2019-20	1250783.91	138318.66	1389102.57	9.96

Renewable energy generation was about 9.96% of total energy generation in the country during 2019-20. Year wise generation from renewable energy sources (RES) indicating the 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	138.32	9.12

The charts indicating source-wise generation from RE sources for the years 2019-20 and source-wise RE installed capacity till March, 2020 are given below:.




Source wise breakup of RE Installed Capacity till March 2020 (87027.68 MW)
BM Power/Bagasse Cogen. (Grid Interactive) & BM Cogen. (Non-Bagasse), 9875.31, 11%
Waste to Energy, 147.64, 0%
Small Hydro, 4683.16, 6%
Wind, 37693.75, 43%
Solar, 34627.82, 40%
Wind
Solar
Small Hydro
BM Power/Bagasse Cogen. (Grid Interactive) & BM Cogen. (Non-Bagasse)
Waste to Energy

CHAPTER-3
PLANNING FOR POWER 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. In addition, the Power System Planning Division in 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.

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 14,050 MW by the end of 10th plan and to 27,750 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'2020) is 27,000 MW. As on 31.03.2020, inter-regional transmission capacity in the country is 102,050 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 Standing Committee on Transmission / Regional Power Committee (Transmission planning)

3.3.1 Brief Introduction:

The Regional Standing Committees on Power System Planning constituted by CEA have representation of CEA, Transmission Utilities of constituent States of the region, Central Transmission Utility (i.e. POWERGRID), POSOCO, representative of Central Sector Generating companies and Regional Power Committee. The interstate transmission system for evacuation of generation & system strengthening schemes and some of the major intra-state transmission schemes are firmed up through discussion in the meetings of the Regional Standing Committee of power system planning.

MoP vide letter dated 13th April, 2018, had constituted Regional Standing Committees on Transmission for NR, WR, SR , ER and NER, under the chairmanship of Member (Power System), CEA.

In supersession of MoP order dated 13th April, 2018 , MoP vide letter dated 4th November, 2019, constituted five Regional Power Committees (Transmission Planning) [RPC(TPs)] viz. Eastern Regional Power Committee (Transmission Planning) [ERPC(TP)], Western Regional Power Committee (Transmission Planning) [WRPC(TP)], Northern Regional Power Committee (Transmission Planning) [NRPC(TP)], Southern Regional Power Committee (Transmission Planning) [SRPC(TP)] and North Eastern Regional Power Committee (Transmission Planning) [NERPC(TP)] under the chairmanship of Member (Power System), CEA, with Chief Operating Officer (CTU), Director (System Operation), POSOCO, Heads of State Transmission Utilities (STUs) of the states of respective regions, Member Secretary of Regional Power Committee of respective region, CMD/ MD/ Chairman of NTPC/ NHPC/SECI/DVC/NEEPCO as members andChief Engineer (Power System Wing), CEA, as Member Secretary. Terms of Reference (ToR) of the Committee are as follows:

i. Carry out a quarterly review of the Transmission System in the region; assess the growth in generation capacity and the demand in various parts of the region; and draw up proposals for strengthening inter-Regional transmission system. The transmission planning is required to keep in mind the areas where the generation is likely to grow and areas where load demand will grow so that the transmission system at any point of time is capable to meet the demand in every corner of the country and comply with the mandate under the Tariff Policy of developing transmission system ahead of the generation for ensuring smooth operation of the grid .
ii. Assess the transmission system requirements in the near, medium and long term and draw up transmission schemes to meet these requirements. While doing this a perspective plan for the next 15-20 years may also be kept in mind and accordingly the requisite allowance/margin may be factored in the system during planning process.
iii. Examine applications for connectivity and access and ensure that these are granted speedily, provided that the requisite fees/charges are paid.
iv. Review the upstream and downstream network associated with transmission schemes.
v. Examine and evaluate the intra-state transmission proposals.
vi. Review and facilitate the construction of the inter-regional grid strengthening schemes.

3.3.2 Following Standing Committee Meetings/meetings of RPC(TP) were held during 2019-20:

Northern Region:

- 3rd meeting of Northern Region Standing Committee on Transmission held on 24th May, 2019 at NRPC, Katwaria Sarai, New Delhi.
- 4th meeting of Northern Region Standing Committee on Transmission (NRSCT) held on 25th July, 2019 at NRPC, Katwaria Sarai, New Delhi.

- 5th meeting of Northern Region Standing Committee on Transmission held on 13th September, 2019 at NRPC, Katwaria Sarai, New Delhi.
- 1st meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP) held on 24th January 2020 at Jaisalmer, Rajasthan.

Western Region:

- 2nd meeting of Western Region Standing Committee on Transmission held on 21st May, 2019 at Indore.
- 1st meeting of Western Region Power Committee (Transmission Planning) (WRPCTP) held on 11th January, 2020 at Ahmedabad.

Eastern Region:

- 2nd meeting of Eastern Region Standing Committee on Transmission (ERSCT) was held on 5th July 2019.
- 1st meeting of Eastern Region Power Committee (Transmission Planning) (ERPCTP) was held on 14th Feb 2020.

Southern Region:

- 2nd meeting of Southern Region Standing Committee on Transmission (SRSCT) was held on 10th June, 2019
- 1st meeting of Southern Regional Power Committee (Transmission Planning) [(SRPC(TP)] was held on 16th December, 2019

North Eastern Region:

- 01st meeting of North Eastern Regional Power Committee (Transmission Planning) [NERPC(TP)] was held on 08.11.2019

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

3.4 Private Sector participaction 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 aim 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 constituted an Empowered Committee on Transmission to identify inter-state transmission projects to be developed through competitive bidding and to oversee the process of competitive bidding. Ministry of Power has also 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.

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".*

Recently, MoP in supersession of its earlier order dated 13th April, 2018 and vide its order dated 04th November, 2019 has reconstituted the National Committee on Transmission" (NCT) with following Terms of the reference (ToR):

Terms of Reference (ToR) for the NCT:

i. Evaluate the functioning of the National Grid on quarterly basis.
ii. Consider the review / recommendations of the RPCTP for system expansion / strengthening of the transmission system to be presented before the NCT at the end of every quarter i.e. by 15th July, 15th October, 15th January and 15th April.
iii. CTU, as mandated under the Electricity Act, 2003, is to carry out periodic assessment of transmission requirement under ISTS. The CTU shall also make a comprehensive presentation before the National Committee every quarter for ensuring development of an efficient, co-ordinated and economical inter – State transmission system for smooth flow of electricity. CTU, in the process, may also take inputs from the markets to identify constraints and congestion in the transmission system.
iv. After considering the recommendations of the CTU and the Regional Committees, the NCT shall assess the trend of growth in demand and generation in various regions; identify the constraints, if any, in the inter – Region transfer system and propose construction of transmission lines, grid stations and other infrastructures in order to meet the requirements, which are likely to arise in the near term / medium

term, so that transmission does not constrain growth. The NCT will also draw up perspective plans, keeping the 10 to 15 years' the horizon in mind.

3.4.2 Status of the Transmission schemes notified through TBCB:

Projects awarded through TBCB	**54**
Projects commissioned so far	28
Projects under implementation	22
Stalled projects	4
Projects under bidding	14

Stalled projects	**4**
Project cancelled by CERC	1
Projects not taken up & CERC cancelled license	1
Projects under litigation	2

The schemes notified through TBCB during 2019-20 are given at **Annexure – 3C.**

3.4.3 Following meetings of the National Committee on Transmission (NCT) were held during 2019-20:

In the year 2019-20, total 5 nos. of meetings of National Committee on Transmission has been held which are given below:

- 4th Meeting of the National Committee on Transmission (NCT) was held on 31st July, 2019 in CEA.
- 5th Meeting of the National Committee on Transmission (NCT) was held on 21st August, 2019 in CEA.
- 6th Meeting of the National Committee on Transmission (NCT) was held on 30th September, 2019 in CEA.
- 1st Meeting of the reconstituted "National Committee on Transmission" (NCT) was held on 3rd January, 2020 in CEA.
- 2nd Meeting of the reconstituted "National Committee on Transmission" (NCT) was held on 22nd January, 2020 in CEA.

The transmission schemes and relevant issues taken up in these meetings 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

Following DPRs / FRs of hydropower projects examined for processing of concurrence by CEA

(i) DPR examination of Sunni Dam (382 MW) by M/s SJVNL.
(ii) MoC examination of Vyasi HEP (120 MW) by M/s UJVNL.
(iii) MoC examination of Luhri HEP (210 MW) by M/s SJVNL.
(iv) MoC examination of Singoli Bhatwari HEP (99 MW) by M/s L&T Uttaranchal Hydropower Limited.
(v) Wah Umiam Stage-III HEP (Erstwhile Mawphu HEP, Stage-II (85 MW) in Meghalaya by NEEPCO Ltd-Vetting of Salient Features.
(vi) Examination and vetting of Updated cost estimates of Dibang Multi-Purpose Project (2880 MW) in Arunachal Pradesh by M/s. NHPC Ltd

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

i) DPR for Transmission System regarding Uprating, Upgrading and Strengthening of Intra-State Transmission Schemes for

Renewable Energy Evacuation in Western Rajasthan to be implemented by RRVPNL with an estimated cost of Rs. 4813.89 Cr.

ii) DPR for the issue of certificate for projects awarded under Green Energy Corridors in Rajasthan-KfW Financial Assistance-Regarding NCEF Grant from MNRE for packages ICB-8 & 10, with an estimated cost of Rs. 18.71 Cr.

iii) DPR for Intra-state Transmission system in Himachal Pradesh under Green Energy Corridor-I – Grant from MNRE – Claim no. 5, with an estimated cost of Rs. 20.60 Cr.

iv) DPR for Intra-state Transmission system in Himachal Pradesh under Green Energy Corridor-I – Grant from MNRE – Claim no. 6, with an estimated cost of Rs. 21.64 Cr.

v) DPR for Intra- State Green Energy Corridor in Himachal Pradesh, with an estimated cost of Rs. 28.462 Cr.

vi) Detailed Projects Report for the EHV component of projects for funding from World Bank under Himachal Hydropower and Renewable Power Sector Development Program (scheme submitted by Government of Himachal Pradesh).

vii) DPR of Green Energy Corridor-II of Gujarat.

viii) DPR of Green Energy Corridor-II (Part B) of Maharashtra.

3.7 Grant of prior approval of Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2019-20.

The list of transmission proposals examined for approval of the Government of India under Section 68(1) of Electricity Act, 2003 is given below:

(i) M/s Hero Solar Energy Private Limited for 250 MW solar power plant in Jodhpur, Rajasthan.

(ii) M/s Mahindra Susten Private Limited for its 250 MW solar project in Jodhpur, Rajasthan.

(iii) M/s Avaada Energy Private Limited for 350 MW solar power plant in Bikaner, Rajasthan.

(iv) M/s Azure Power India Private Limited for 600 MW solar power plant in Bikaner, Rajasthan.

(v) M/s Eden Renewable Cite Private Limited (ERCPL) for 300 MW Solar power plant in village Lakhasar, Jaisalmer, Rajasthan.

(vi) M/s Mahoba Solar (UP) Private Limited for 390 MW Hybrid power plant in Jaisalmer, Rajasthan.

(vii) Power Transmission Corporation of Uttarakhand Ltd. (PTCUL) for the transmission scheme "400 kV Khandukhal- Rampura transmission D/c (Quad) line (Srinagar- Kashipur 400 kV D/c (Quad) line earlier)".

(viii) M/s SB Energy Renewables Ten Private Ltd for its 450 MW Wind-Solar Hybrid project in Jaisalmer, Rajasthan.

(ix) M/s PGCIL for Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part F1.

(x) M/s PGCIL for Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part G1.

(xi) M/s SBSRPCEPL for Connectivity system of M/s SBSR Power Cleantech Eleven Private Ltd (SBSRPCEPL) for its 300 MW solar generation project in Hapasar near Bikaner, Rajasthan.

(xii) M/s Azure Power India Private Limited for Connectivity system to M/s Azure 130 MW plant

connected at PGCIL 765/400/220 kV substation located at NurekiBhurj, Bhadla, Jodhpur, Rajasthan.

(xiii) M/s PGCIL for Transmission system associated with LTA applications from Rajasthan SEZ Part-A.

(xiv) Scheme to control Fault level at Wardha substation.

(xv) WRSS-21 (Part B) – Transmission System Strengthening for relieving overloading observed in Gujarat Intra-state system due to RE injections in Bhuj PS.

(xvi) Western Region Strengthening Scheme – 21 (WRSS-21) Part-A – Transmission system Strengthening for relieving overloading observed in Gujarat Intra-State System due to RE injections in Bhuj PS.

(xvii) Transmission System for providing connectivity to RE projects at Bhuj-II (2000 MW) in Gujarat.

(xviii) Additional Connectivity to M/s ACB (India) Limited (Lead Generator) for 1x63 MW TPS of M/s SV Power Ltd. at Korba, Chhattisgarh.

(xix) Connectivity to M/s SitacKabini Renewables Private Limited for its proposed 300 MW wind farms in Bhuj, Gujarat.

(xx) Connectivity for 200 MW wind farms to M/s Sprng Vayu Vidyut Private Limited in Dhar, Madhya Pradesh.

(xxi) Connectivity system for 50.6 MW wind farms to M/s Powerica Limited in Jam Khambhaliya, Dev Bhoomi Dwarka, Gujarat.

(xxii) Connectivity System for M/s CLP India Private Limited for its proposed 250.8 MW wind farms in Dwarka, Gujarat.

(xxiii) Connectivity system of M/s Srijan Energy Systems Private Limited for its 600 MW (300 MW + 300 MW) wind farms in Kutch, Gujarat.

(xxiv) Transmission system associated with RE generations at Bhuj-II, Dwarka &Lakadia.

(xxv) Connectivity system of M/s Vaayu Renewables Energy (Mevasa) Private Limited for its 300 MW wind farms in Jamnagar, Gujarat.

(xxvi) 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 M/s CGPL Switchyard.

(xxvii) Connectivity for 300 MW wind farms to M/s Netra Wind Private Limited in Kutch, Gujarat.

(xxviii) Additional Connectivity to M/s ACB (India) Limited (Lead Generator) for 1x63 MW TPS of M/s SV Power Ltd. at Korba, Chhattisgarh.

(xxix) Western Region System Strengthening Scheme (WRSS)-22.

(xxx) Connectivity system for M/s SBESS Services Projectco Two Private Limited for 324.4 MW Generation Wind project in Dhar, MP.

(xxxi) DVC for construction of 220 kV transmission line-regarding.

(xxxii) POWERGRID for "Eastern Region System Strengthening Scheme- XXIII".

(xxxiii) M/s ReNew Power Limited for laying of "220 kV single circuit Transmission line on Double Circuit Towers from ReNew Power Limited windfarm generation switchyard to 400/220 kV Hiriyur (PowerGrid) Sub Station"

(xxxiv) M/s SBE Renewables Ten Private Limited for "400 kV single circuit dedicated

transmission line from SBE Renewables Ten Private Limited to 400/230 kV Trichy Sub-Station (existing)"

(xxxv) M/s Shapoorji Pallonji Infrastructure Capital Company Private Limited (SPICCPL) for "230 kV Transmission line from Tuticorin-II GIS (PGCIL) to 500 MW Solar Power Plant in Tuticorin, Tamil Nadu of Shapoorji Pallonji Infrastructure Capital Company Private Limited"

(xxxvi) PFC consulting limited, for implementation of the Transmission system "Evacuation of power from RE Source in Koppal Wind Energy Zone (Karnataka)".

(xxxvii) POWERGRID Corporation of India Ltd. (PGCIL) for "Transmission system for Kurnool Wind Energy Zone/Solar Energy Zone AP, Part (A) and Part(B)".

(xxxviii) POWERGRID Corporation of India Ltd. (PGCIL) through Regulated Tariff Mechanism for "North Eastern Region Strengthening Scheme-X (NERSS-X)"

3.8 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2019-20.

- M/s Fatehgarh - Bhadla Transmission Limited (FBTL) for Transmission System for Ultra Mega Solar Park in Fatehgarh, District Jaisalmer, Rajasthan.
- M/s Azure 130 MW plant connected to PGCIL 765/400/220 kV substation at Bhadla, Jodhpur, Rajasthan.
- M/s Renew Solar Power Private Limited for its 250 MW solar plant in Bikaner, Rajasthan.
- M/s Mahoba Solar (UP) Private Limited (MSUPPL) for 250MW solar plant in Jodhpur
- M/s Tata Power Renewable Energy Limited (TPREL)-150 MW solar power plant in village Chhayan, Jaisalmer
- M/s Green Infra Wind EnergyLtd (GIWEL) for 300 MW wind farms in Kutch (Gujarat).
- Connectivity system to M/s Adani Green Energy (MP) Ltd. (AGEMPL) for its wind power projects in Kutch, Gujarat.
- Connectivity system to M/s Renew Wind Energy Pvt. Ltd for its 300 MW wind power project in Kutch, Gujarat.
- Connectivity to M/s SitacKabini Renewables Private Limited for its proposed 300 MW wind farms in Bhuj, Gujarat.
- Connectivity system of M/s AvikiranSolar India Private Limited (ASIPL) for its 285 MW wind farms in Kutch, Gujarat.
- M/s Adani Power (Jharkhand) Limited (APJL) for Laying of "Immediate Evacuation for North Karanpura (3x660 MW) generation project of NTPC along with creation of 400/220 kV sub-station at Dhanbad- Proposal of JUSNL (ERSS-XIX)".

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) AC link with 1000MW HVDC back-to-back station at Bheramara, and

- 160 MW through Surajmaninagar (India) to South Comilla (Bangladesh) interconnection.

In addition, following elements are under implementation:

- 2nd Baharampur - Bheramara 400 kV D/c line.

3.9.2 India-Bhutan Cross Border Interconnections & Power Trade

India and Bhutan already are connected through various 400kV, 220kV and 132kV lines, mainly for import of about 2000 MW power from Tala HEP (1020MW), Chukha HEP (336MW), Kurichu HEP (60MW) and Mangdechu HEP (720 MW) in Bhutan to India.

Further, Punatsangchu-I (1200 MW) and Punatsangchu-II (1020 MW) HEPs in Bhutan, are expected to be commissioned by 2024-25. The transmission system for transfer of this power from these projects to India is already in place. With the commissioning of these HEPs the power transfer between Bhutan and India would be enhanced to about 4200 MW.

3.9.3 India-Nepal Cross Border interconnection and Power Trade

Nepal is interconnected with India at various places through 11kV, 33kV, 132kV and 220kV lines. For transfer of bulk power, interconnection between India and Nepal through Dhalkebar (Nepal) - Muzaffarpur (India) 400kV D/C transmission line has been constructedwhich is presently operating at 220kV voltage level. A total of about 600 MW of power is being supplied to Nepal through these interconnections. With the operation of Muzaffarpur – Dhalkebar link at 400kV voltage level, about 1000 MW power can be transferred to Nepal.

Further, 400kV D/C Gorakhpur (India) – fprivateButwal (Nepal) line, 400kV D/C Dhalkebar (Nepal) – Sitamarhi (India) line, 132kV D/C Nanpara, Bihar (India) –Kohalpur (Nepal), stringing of second circuit of 132kV line Kataiya (India) – Kushaha (Nepal) and 132 kV Raxaul (India) – Parwanipur (Nepal) lines have been agreed.

3.9.4 India-Myanmar Cross Border Interconnections & Power Trade

India is providing up to 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.

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.

Process for facilitating approval and other matters related to Import/Export (Cross Border) of Electricity between India and neighbouring countries by the Designated Authority (i.e. Member (Power system), CEA) is under approval of MoP.

3.11 Green Energy Corridor:

a) Transmission Works under Green Energy Corridors-I

Green Energy Corridor is 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. To evacuate the proposed capacity addition in these States, transmission system, both Intra State and inter State, have been proposed along with the setting up of Renewable Energy Management Centre (REMC) and the control infrastructure like, reactive compensation, storage systems, etc. Ministry of Power, GOI vide their Office Memorandum dated 11.09.2017 has conveyed their sanction of Rs. 409 Cr. For establishment of REMC. POWERGRID has been appointed as Project Management Consultant (PMC). PMC charges @10% are also included in the sanctioned cost Rs. 409 Cr. Following Packages are envisaged for REMC Project for 11 locations:

1. REMC-SR (Tamil Nadu, Andhra Pradesh, Karnataka SLDCs & SRLDC).
2. REMC-WR (Gujarat, Maharashtra, Madhya Pradesh SLDCs and WRLDC),
3. REMC-NR (Rajasthan SLDC, NRLDC and NLDC)

The current estimated cost of intra State and inter State transmission systems required to evacuate RE power is Rs. 12693.94 Crore and Rs. 15455 Crore (revised figures), respectively. Intra State transmission schemes are being 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 being 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 and Further, for implementation of transmission schemes under Green Energy Corridor-Part D, PGCIL has taken loan from ADB. These projects 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. Some of the intra state transmission schemes by the States have been completed and remaining schemes are at various stages of tendering and award process and likely to be implemented by June, 2020 progressively.

b) Transmission Works under Green Energy Corridor – II

GoI has an ambitious plan to establish total 100 GW Solar, 60 GW Wind, 10 GW Biomass and 5 GW of small Hydro generation

capacity by 2022. Out of above, Solar capacity targets includes

- 20GW through 34 nos. solar power parks in 21 States
- 40GW through Roof Top Solar PV
- 40GW through distributed solar generation.

To evolve plan for Grid integration of solar power parks in Twenty-one (21) states, comprehensive transmission plan was evolved for evacuation of about 20,000 MW capacity envisaged through Intra state & Interstate system. MoP vide letter no.11/64/2014-PG dated 8-01-2015 has assigned works related Transmission schemes for the solar parks viz. N P Kunta (1500 MW),Pavagada (2000 MW), Rewa (750 MW), Bhadla-III (500 MW), Bhadla-IV (250 MW), Essel (750 MW) &Banaskantha (700MW) to be implemented by POWERGRID. The transmission works for the above solar parks have been completed.

The status of award of inter-State and intra-State transmission works during the financial year 2019-20 is attached at **Annexure-3E**.

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

Long Term Planning Studies:

Transmission system planning studies were carried out to evolve a composite system for evacuation of power from generation projects envisaged during 13th and 14th Five Year Plans. Studies were carried out to identify long-term system strengthening requirements in various regions/states. A list of studies carried out to evolve long term perspective plan are as below:

i. System studies for evacuation of 8.1 GW power from Solar Energy Zones in Rajasthan (Phase-II).
ii. System studies for development of infrastructure at EHV level in UT of Jammu and Kashmir during 13th and 14th Five Year Plans.
iii. System studies for Evacuation of 10 GW RE power from Khavda region, Gujarat.
iv. Transmission System for evacuation of power from Dholera UMSP - Phase I (2 GW)
v. Study to identify high voltage nodes in WR

3.12 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.

(a) Completion of work assigned for revision/amendment in IS 5613 (Part 3 Sec 1 & 2) as convener of Sub Committee 3 of ETD 37 of BIS.

3.13 Formulation / review of Regulations, Guidelines and audit.

(i) 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 were put up to Authority after scrutinizing public comments.
(ii) "Guidelines for Rationalized use of High Performance Conductor" was published.
(iii) Audit of transmission towers of 400 kV Jabalpur-Vindhayachal D/C Transmission line & 400 kV Jaipur(Bassi)-Agra S/C Transmission line of PGCIL, 765

kV Jabalpur-Bina D/C transmission line of M/s Sterlite Power Transmission Ltd.; 400 kV Seoni-Sarni D/C Transmission Line of MPPTCL, 220 kV Bharatpur-Agra S/C Transmission line of RVPNL and 400 kV Jhajjar- Mundka D/C Transmission line of NTPC.

(iv) 'Guidelines for the Validity Period of Type Test(s) conducted on Major Electrical Equipment in Power Transmission System' prepared and circulated to all stakeholders for comments.

(v) 'Guidelines for Availability of Spares and Inventory Management for equipment in transmission system for use during natural disasters' was prepared &circulated to all stakeholder for comments.

(vi) Draft of Standard Specifications of Transformers and Reactors (66 kV & above voltage class) was circulated to all stakeholders for comments and is under finalization.

(vii) Meeting with stakeholders conducted to discuss about measures to mitigate the danger to Great Indian Bustard from Power Transmission lines and Wind Energy Farms.

3.14 Representation/ Nomination in the Committees

Power System wing officer(s) are represented in:

(i) Convener/Member of Task force for review of Regulations of CEA.

(ii) 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.

(iii) 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.).

(iv) Member of Sub group for technoeconomic appraisal of DPRs for PSDF funding.

(v) Member of Cost Committee and Bid Evaluation Committee for projects being awarded through Tariff Based Competitive Bidding (TBCB).

(vi) Member of Audit teams for assessment of health of Transmission lines.

(vii) Joint Steering Committee (JSC) for cooperation in power sector with Nepal, Bangladesh and Myanmar.

(viii) India Working Group (JWG) for cooperation in power sector with Nepal, Bangladesh, Sri Lanka and Myanmar.

(ix) Joint Technical Team-Transmission (JTT-T) with Nepal, Bangladesh, Sri Lanka and Myanmar

(x) Committee on Large Scale Integration of Renewable Energy and other associated issues, constituted by Ministry of Power.

(xi) Committee to Study the system of Transmission Charges, constituted by Ministry of Power.

(xii) Representation in BIMSTEC, SAARC, SASEC, BBIN group meetings.

3.15 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 along with other members and investigation was carried out.

(ii) Meeting of Standing Committee was held to discuss failures of various transmission line towers reported to CEA during April, 2018 to March, 2019. The details of failed transmission lines reported to CEA during above period is enclosed at **Annexure3F.**

(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 many failure sites along with owner members and investigation was carried out.

(ii) Meeting of Standing Committee was held to discuss failures of various Substation Equipment reported to CEA during April, 2018 to March, 2019. The details of failure of transformers and reactors reported to CEA during above period is enclosed at **Annexure-3G**.

3.16 Training on various softwares

The training on CDEGS and CYMCAP software (procured by PSE&TD Division) for Substation Earthing and Calculation of ampacity and temperature related to Power Cables was conducted.

3.17 Miscellaneous Works

1. Monitoring Progress of left over work relating to 220kV & 132kV Transmission system covered under Hon'ble PMRP-2004, which involve number of Transmission lines and Substations of 220kV & 132kV levels.
2. Examination of Revised cost estimate for NERPSIP & Comprehensive Scheme for development of Transmission & Distribution system in NER and Sikkim.
3. Examination of various proposals/DPRs submitted for grant under PSDF Funding.
4. Inputs relating to Specific Technical Requirements for transmission lines and sub-stations in Request for Proposal (RfP) documents of the projects to be awarded through TBCB.
5. Examination of Proposal from the Government of Sierra Leone (GoSL) for 'Power Projects on Construction of 225kV double circuit and 132 kV single circuit transmission lines and associated substations under GoI Line of Credit of US $ 78 million extended to Govt. of Sierra Leone
6. Recommendations for prevention of accidents during construction of transmission lines w.r.t. Fatal accident on 06.12.2018 at Loc No. 89/2 of 765 kV Chilakaluripeta-Vemagiri D/C line being executed by M/s. KPTL.
7. Draft Test Protocol for Transformer Fire Protection System as per the Order dated 25.10.2018 of the Hon'ble High Court of Bombay was prepared and circulated to various national/ international laboratories and other stakeholders for comments/inputs.
8. Reply to various Parliament questions & RTI was addressed.

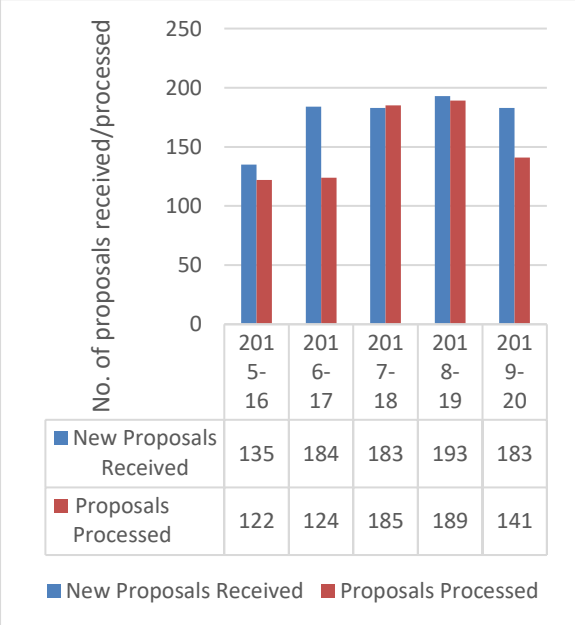
3.18 Power & Telecommunication Co-ordination Committee (PTCC)

PCD Division, CEA 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.

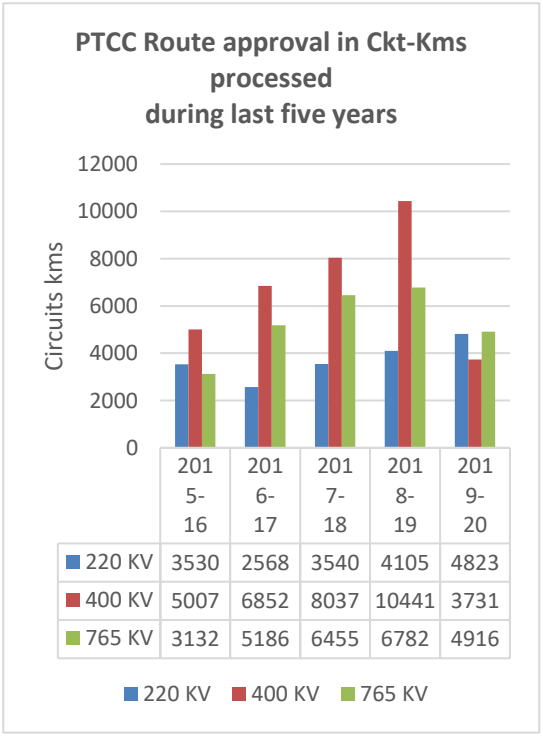
To achieve the objectives of PTCC, two Central PTCC meetings were held viz.108th Central PTCC meetings was held at Guwahati on 10thJune, 2019 and 109th Central PTCC meeting was held in Jaisalmer, Rajasthan on 24th January, 2020. The meetings were attended by the senior officers of CEA, Central/State Power Utilities, Bharat Sanchar Nigam Ltd. (BSNL), Railways and Defense. In the meetings, many contentious and important issues, which are in the interest of Power as well as Communication sector, were discussed and decisions were taken.

During the year 2019-20 (up to 31.03.2020), 183 nos. of new cases of EHV power lines (220 kV and above) were received and Induced Voltage Calculation for 141 nos. of cases have been 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 2019-20 (up to 31.03.2020), Induced Voltage Calculation for about 4823 Circuit kilometers of 220 kV lines, 3731 Circuit kilometers of 400 kV lines and 4916 Circuit kilometers of 765 kV lines have been done. It is pertinent to mention that during 2019-20, 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:



3.18Frequency Allocation Co-ordination for Microwave and Power Line Carrier Communication (PLCC)

PCD Division coordinated and followed 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.

3.20 Framing of Regulation for Communication Standards for power system operations

The size and complexity of the grid has been increasing day by day with huge renewable energy integration, increase in demand, and demand of quality power etc. Communication system in power sector plays a critical function in managing the grid in a secure, reliable and economic manner. Communication system, acts as nervous system for power sector, is an important prerequisite for the efficient monitoring, operation and control of power system and is vital to take care of the emerging requirements of Smart Grid applications, PMUs, RE sources etc. for proper forecasting, scheduling, operation and control.

Authority envisaged to frame Standards for Communication system in Power system namely "Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2019". The Regulation includes standards for various communication technologies used in power sector.

Accordingly, a Committee under the Chairmanship of Member (Power System), CEA was constituted to frame the draft regulations. After due process, the "Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020" were published in the Official Gazette on 27th February, 2020.

3.21 Preparation of Manual of Communication Planning in Power System Operation

It was observed that phenomenal growth of private sector generation and creation of open market for electricity has led to large scale development of transmission system. To cater to the requirement of fast communication for the transmission system, though OPGW is being installed but there is no communication planning being carried out in a consolidated manner. It is desired that communication system should be planned in a consolidated manner to achieve the desired performance and with sufficient reliability. Presently there are no widely adopted guidelines which could meet the need of communication planning with reliability. To prepare the Manual for Communication System in Power System Operation, a sub-group was formed under the chairmanship of Member (PS), CEA. The sub-group has representation from Powergrid, POSOCO, OPTCL, HVPNL, GETCO, TS Transco, Bihar SLDC and MPPTCL. The draft Manual has been prepared and public comments were sought. The comments received are being examined for appropriate inclusion and finalization of the Manual.

3.22 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 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, Headquartered at New Delhi and is assisted by the officers of Chief Electrical Inspectorate Division and Electrical Inspectors and the officers from five Regional Inspectorial Organizations (RIOs) located at 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 of voltage exceeding notified voltage.
(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 suggesting 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.
(f) Issue of Electrical Contractor licenses and competency certificates to Supervisors and wireman through the Licensing Board in respect of Union Territory of Puducherry & Chandigarh.

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

(a) The 3rd amendment of the abovementioned regulations regarding Safety Provisions of Electric Vehicle charging stations was notified in Gazette of Government of India on 28th June, 2019.

(b) Comprehensive review of the abovementioned regulations is in process.

3.23 Major achievement in terms of inspections during the year 2019-20 (Important installations inspected)

3.23.1New Electrical Installations/ Apparatus under Regulation 43 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended): -

A) **Substations**:

RIOs	NR	SR	WR	ER	NER	Total
No. of Inspections	35	36	197	60	14	342

(i) **765kV Substations**: Dharamjaygarh, Korba, Champa, Indore, Nirona, Vindhyachal, Bikaner, Ajmer, Bhadla, Rajasthan, Aligarh, Darlipalli, Sundargarh (GIS), Vemagiri, Kurnool, Maheshwaram, Bhuj (Nirona), Wardha, Vindhyachal, Padge, Khandwa, Agra

(ii) **400kV Substations:** Nirona, Lara, Khargone ,Gadarwara, SJVNL Jhakri, Dadri, Prithla (GIS), Kadarpur (GIS), Sohna (GIS), Bikaner, Ranchi, Durgapur, Purnea, Patna, Gaya, Kishanganj, Daltonganj, Biharsharif, Chandwa(GIS), ENICL Purnea, Kahalgaon, Misa, Palatana, Tumkur, Chilakaluripeta, Udumulpet, Mysore, Tuticorin, Ghatakesar, Warangal, Bhuj (Nirona), Maithon, Berhampore, Ramagundam (GIS), NJHPS, Faizabad

(iii) **220kV Substations**: Rewa, Bhachau, BairaSiul Power Station (NHPC), Rajarhat, Malda, Biharsharif, Purnea, Bokaro (DVC), Tandwa, Bongaigaon, Kopili, Tuticorin, Neyveli, HAL Bengaluru, Khadoli, Bhuj, Mulanur, Bhadla, Chandigarh

(iv) **132kV Substations:** Tandwa, Karanpura, Panchet, Dhanbad, Bokaro, Burdwan, Panchgram, Khliehriat, Kumarghat, Khupi.

(v) **HVDC Substations:** Raigarh, Vindhyachal, Kurukshetra, Pugalur.

The details of electrical apparatus inspected at different voltage levels during the year 2019-20 is as follow: -

Apparatus / Voltage Level	Transformer / ICT (MVA)	Reactors (MVAr)	Capacitors (MVAr)	Bays (no.)	Bus (no.)	Statcom (no.)
765 kV	11560	4175	NIL	49	6	2
400 kV	8316.2	2047	310	140	8	1
220 Kv	905	NIL	NIL	45	2	NIL
132 kV	287	NIL	NIL	16	NIL	NIL
66 kV	35	NIL	NIL	NIL	NIL	NIL
33 kV	191.6	100	NIL	23	8	NIL
HVDC 800 kV	NIL	NIL	NIL	10	NIL	NIL

The data above are based on the cumulative inspections carried out

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

RIOs	NR	SR	WR	ER	NER	Total
No. of Inspec-tions	2	2	3	0	0	**7**
Gen. Cap (MW)	400	34.8	1601	0	0	**2035.8**

Parbati HEP stage-II, NTPC Gadarwara, Lara, Kawas Indian Oil LNG Pvt Ltd, CTS, Chennai

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

RIOs	NR	SR	WR	ER	NER	Total
No. of Inspe-ctions	19	38	24	28	3	**112**

(i) **765 kV Lines:** Aurangabad-Padghe (LILO), Ajmer-Bikaner, Vemagiri-Chilakaluripeta, Khandwa Pool - Indore, Bikaner-Moga

(ii) **400 kV Lines**: Prithala – Kadarpur, Aligarh – Prithala, Singrauli-Allahabad, Bhadla (RVPNL)-Bikaner(RVPNL) (LILO), Bikaner Substation of PGCIL to ReNew Pooling SubStation, Nabhinagr II – Patna, Rajarhat-Purnea, OTPC Palatana, Silchar-Imphal, Tumkur (Vasanthanarasapur) – Yelahanka Pavagada PS – Devanahalli (Part line), Udumulpet – Salem (LILO), Khargone – Khandwa, Banaskatha (Radhanesada), Behrampore-Beramara, DMTCL Barh-Gorakhpur (LILO), NTPC Ramagundam, Alipurduar-Siliguri

(iii) **220 kV Lines**: Bhuvad – Bhachau AGEMPL Bhuj, Nevyeli Tx. Line, Betam Wind Energy – PGCIL GIS SS, Vapi-Khadoli

(iv) **132 kV Lines:** Dhanbad-Gobindpur **(**DVC**),** DVC Jamuria (LILO), Nirjuli-Dikrong (LILO)

(v) **800 kV HVDC Lines:** Raigarh-Puglur

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

by all RIOs

RIOs / kV	NR	SR	WR	ER	NER
765 kV	630.17	559	309	Nil	Nil
400 kV	256.95	904	180	736	7.46
220 kV	80.31	25.5	210	Nil	Nil
132 kV	0.38	Nil	Nil	61	7.2
110 kV	NIL	76	Nil	Nil	Nil
66 kV	NIL	36	47	Nil	Nil
33 kV	NIL	115	894	13	Nil
11kV	NIL	Nil	30	8	Nil
800 kV HVDC	NIL	1202	562	Nil	Nil

D) Electrical installations of the following organisations were inspected during the year 2019-20: PGCIL, SAIL, GAIL, IOCL, HPCL, BPCL, ONGC, NPCIL, AAI, NALCO, BALCO, NMDC, CGPL, AIR, CPWD, Port Trust-JNPT, Mumbai Airport, RCFL, Mazagon Dock, BMCTPL, NEEPCO, BARC, NBCC, SAIL, LIC, NHPC, SBI, ESIC, AIIMS, NIT, IIT, IIM, NIFT, DOAE, Saha Institute Of Nuclear Physics, Dr. B.C.Roy Hospital, Chittranjan Cancer Institute, NBCC, Balmer Lawrie etc.

3.23.2 Inspections done for Renewables:

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

RIOs	NR	SR	WR	ER	NER
No. of Inspections	24	73	64	10	5

Major installations inspected:

Wind Renergy Private Limited, ReNew Power Limited, Green Infra Wind Energy Limited, Hindustan Aeronautics Limited, Hindustan Aeronautics Limited, Adani Green Energy (MP) Limited, Ostro Kutch Wind Private Limited, NTPC Kawas, PWD Buildings, ACME Solar Holding Ltd., MSPL, Ara (HPCL), Bokaro Power Supply Company, Balasore (IOCL), NIT, Rourkela, BEL, Nalanda, Jorhat (ONGC), Nazira (ONGC), Monarchak (NEEPCO), Lakwa (ONGC), Neyveli (NLC), Pavagada Solar Park, Windmills at Tuticorin, National Aerospace (HPCL), CDFD Hyderabad, CFTRI Mysore, JIPMER Puducherry, Cochin port trust, Tumkur, AAI Gaya

Summary of Generation capacity of Renewable Energy Sources inspected:

RIOs	NR	SR	WR	ER	NER
Gen.Capacity (MW)	1612	948.27	610	4.64	5.628

3.23.3 Cinemas/Theatres installations inspected:

Summary of Cinemas/Theatres installations inspected during the year 2019-20 is given below:

RIOs	NR	SR	WR	ER	NER
No. of Inspections	Nil	1	7	Nil	Nil

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

Major installations inspected:

a) **Generating plants** - a) Generating plants Adani Mundra, Seoni (JPL), Chattisgarh (GMR), Jaypee Nigrie , Ksk Mahanadi Power, Jhabua, DB Power, NTPC, Koteshwar HEP (THDC), NTPC Faridabad Gas Power station, BRBCL Nabhinagar, NTPC Barh, NSPCL Rourkela, HEP Dikchu, NHPC Teesta, Chinakuri Power Plant, Agartala,Turial HEP (AGTPP), MonarchakHEP,Palatana (OTPC), ONGC, Rajahmundry, NLC, Neyveli, Hyderabad (GMR), Visakhapatnam Port Trust, Hyderabad (BDL), Essar, Jindal Power Ltd., Bokaro Thermal Power Station DVC, NTPC-SAIL Durgapur, HEP,Monarchak HEP, Palatana (OTPC), Lepetkata (BCPL)

b) **Substations**: Champa, Raigarh, Jabalpur, Kotra,Tamnar,Indore, Korba, Bina, Seoni, Mundra,Tamnar, Damoh, janjgirChampa,Kutch, Shajapur, Bharuch, NRSS, Amritsar, Ludhiana, DVC- Bokaro, Raghunathpur, Kumaaardhubi, Hazaribagh Bokaro Power Supply Company, Dharbhanga (DMTCL), NTPC Barh, NSTPP- Nabhinagar, Misa Laboratories, Vijayawada (AAI), Devangonthi & Mangalore (Petronet MHB Ltd.), Bangalore (IOCL), Chennai Bongaigaon, Monarchak, Umrangso. Moran, Loktak, Udumulpet, Pavgada, Mysore, Tumkur, Tuticorin, Mundra, Solhapur, Kolhapur, NSPCL-Durgapur , Rourkela, Mysore, Vijaywada, Misa, Nirjuli, Khlehriat, Jiribam, Monarchak (NEEPCO), Umrangso (NEEPCO) Loktak (NHPC)

c) Electrical installations of PGCIL, NTPC, SAIL, GAIL, IOCL, HPCL, BPCL, NPCIL,NIFT, ONGC, AAI, NALCO, BALCO, AIR, CPWD, PGCIL, BBMB, NIL, DOAE, SBI, BHARATIYA RESERVE BANK NOTE MUDRAN, ISRPL etc.

d) **HVDC:** Mundra, Vindhyachal, Bhadrawati

3.24. Self-certifications approval issued by RIOs: -

No. of self-certifications issued during the year 2019-20 is given below: -

RIOs	NR	SR	WR	ER	NER
No.	Nil	65	34	13	5

3.25 Inspections done in UTs: -

Details of inspections done in UTs during the year 2019-20 is given below: -

UTs	AN	DNH	DD	PDY
No. of Inspections	3	203	75	53

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

3.26 Investigation of Electrical Accidents:

1. Fatal Electrical Accident happened at North Zone-Il, Main Road Athal, DNHPDCL
2. Fatal Electrical Accident of Goats near Maruti Apartment, Teen Batti, Nani Daman, Daman
3. Fatal Electrical Accident happened at 11KV AthalNaroli rural feeder near M/S. Param Packaging, DNH
4. Fatal Electrical Accident happened at Goa Shipyard Ltd., Goa.

3.27 Electrical safety Awareness Conferences:

1. Joint CEA-ICAI Conference on 28.05.2019 at New Delhi
2. Electrical safety Awareness at Warangal on 27.06.2019
3. Electrical safety Awareness at Siliguri on 19.07.2019
4. Electrical Safety Awareness Program at Sivasagar, Assam at 10.09.2019
5. Electrical safety Awareness at Bilaspur on 20.09.2019
6. Electrical safety Awareness at Goa on 21.10.2019
7. Electrical safety Awareness at Jodhpur on 07.11.2019
8. Electrical safety Awareness at Visakhapatnam on 22.11.2019
9. Electrical safety Awareness at Sangli on 26.11.2019
10. Electrical safety Awareness at Bhuj, Gujarat on 10-01-2020
11. Electrical safety Awareness at Uran, Maharashtra on 05-02-2020

3.28 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.

In respect of transmission lines, 23,621 CKm (6019 CKm of 765 kV, 6798 CKm of 400 kV and 10804 CKm of 220 kV) was targeted for the year 2019-20. Out of which 11664 CKm (3044 CKmof 765 kV, 3775 CKm of 400 kV and 4845 CKm of 220 kV) have been commissioned as

on 31st March 2020 resulting in overall achievement of 49.4 %. Details of transmission lines commissioned /completed during 2019-20 (as on 31st March 2020) are given in **Annexure-3H.**

Similarly, in respect of substations, 81,716 MVA of transformation capacity (3000 MW at ±800 kV HVDC, 27000 MVA at 765 kV, 29130 MVA at 400 kV and 22586 MVA at 220 kV level) was targeted for the year 2019-20. Out of which, 68230 MVA (3000 MW at ±800 kV HVDC, 19500 MVA at 765 kV, 24590 MVA at 400 kV and 21140 MVA at 220 kV level) have been commissioned as on 31st March 2020 resulting in overall achievement of 83.50%. Details of substations commissioned/ completed during 2019-20 (as on 31st March 2020) are given in **Annexure-3I.**

Voltage-wise/Sector-wise program vs achievement for the financial year 2019-20 in respect of transmission lines and sub Stations (220kV and above voltage level) are given in **Charts I to VI and VII to XII** respectively.

Total 11,664 Ckms of transmission line and 68,230 MVA of transformation capacity in substations (220kV and above voltage levels) have been added during the financial year 2019-20 resulting in all India transmission network of 425,071 Ckms of transmission lines and 967,893 MVA of the transformation capacity (220kV and above voltage level) as on 31st March 2020.

For the year 2020-21, Program for Transmission Lines and Transformation Capacity (Substations) is as under.

Annual Target for the Year 2020-21

Transmission line (Ckm)	15,791
Substation (MVA)	63,050

Chart-I

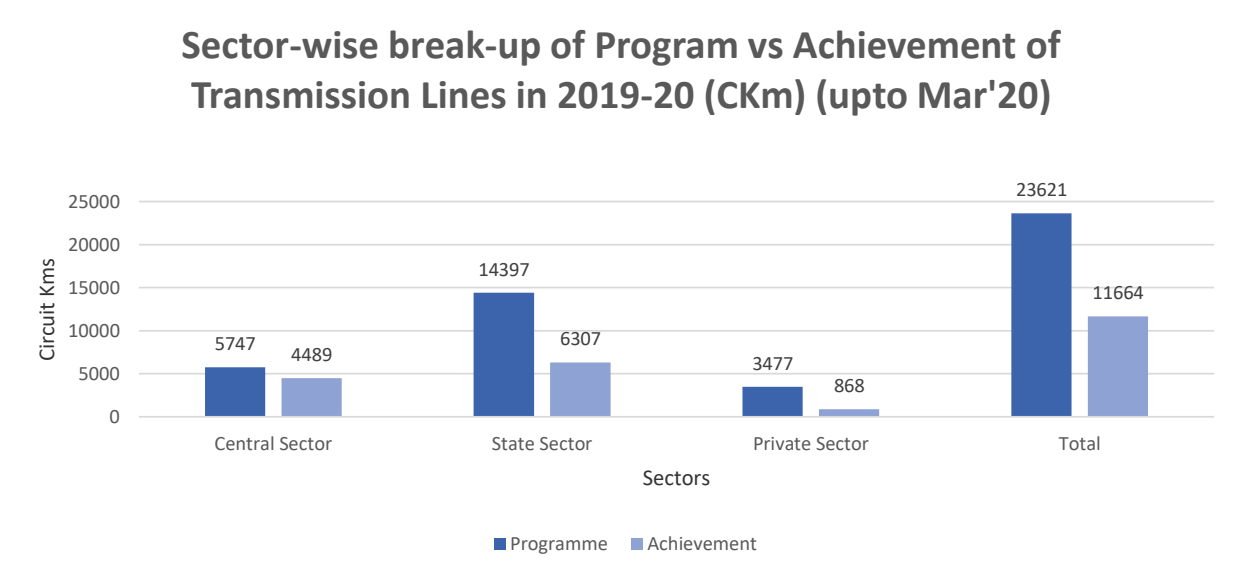


Chart-II

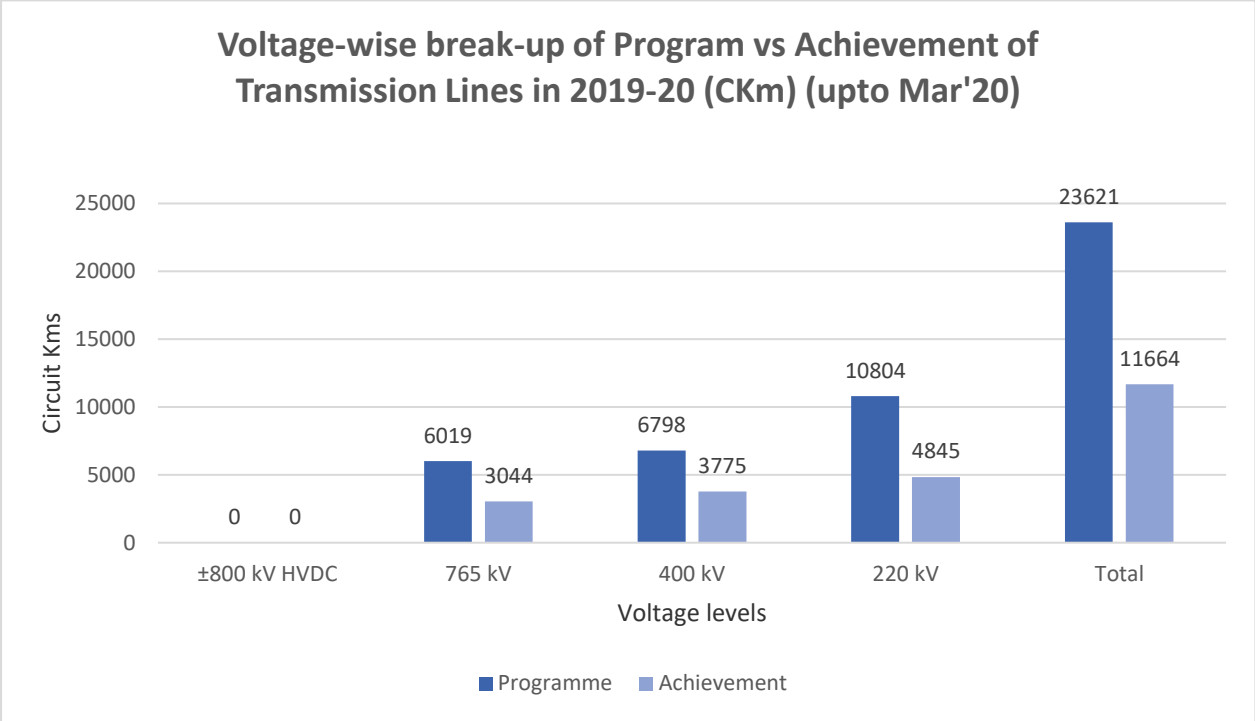


Chart-III

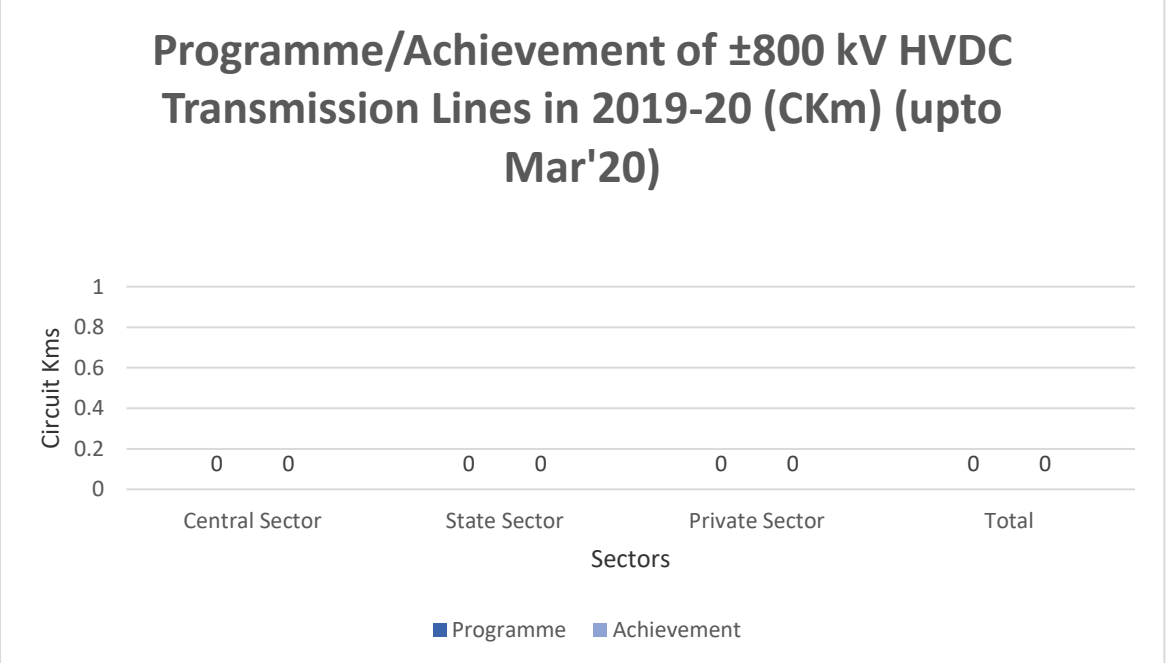


Chart-IV

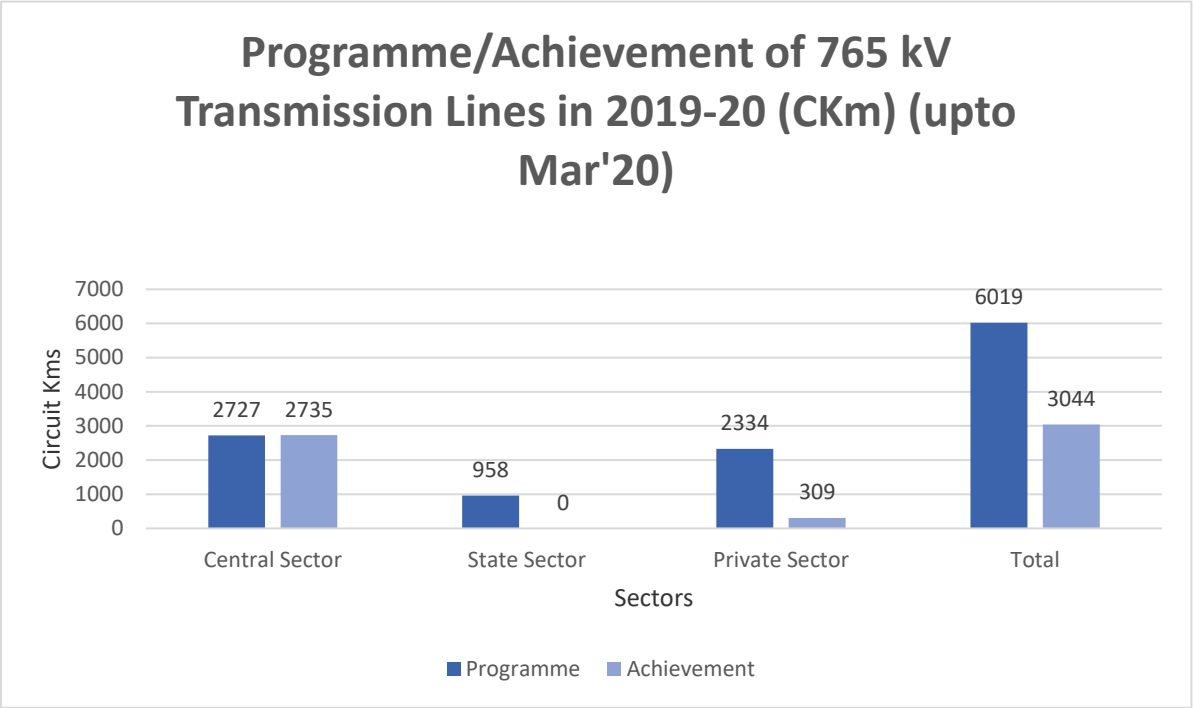


Chart-V

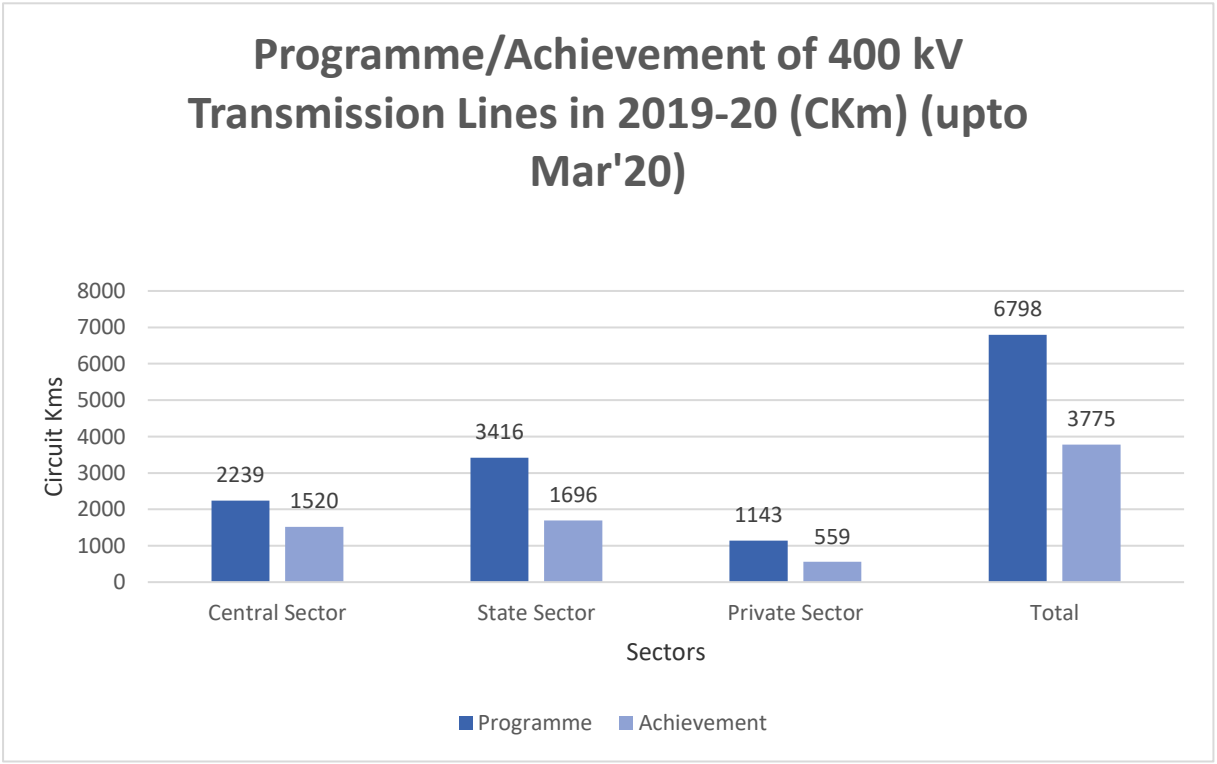


Chart-VI

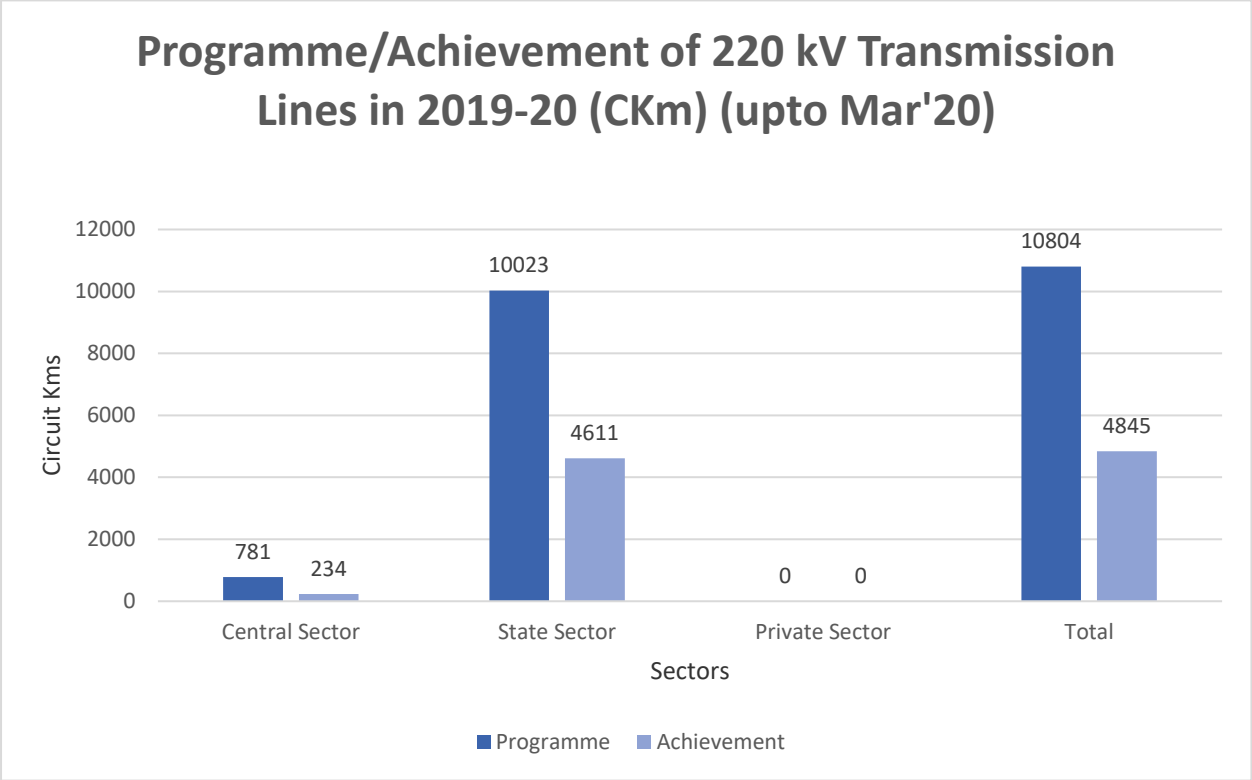


Chart-VII

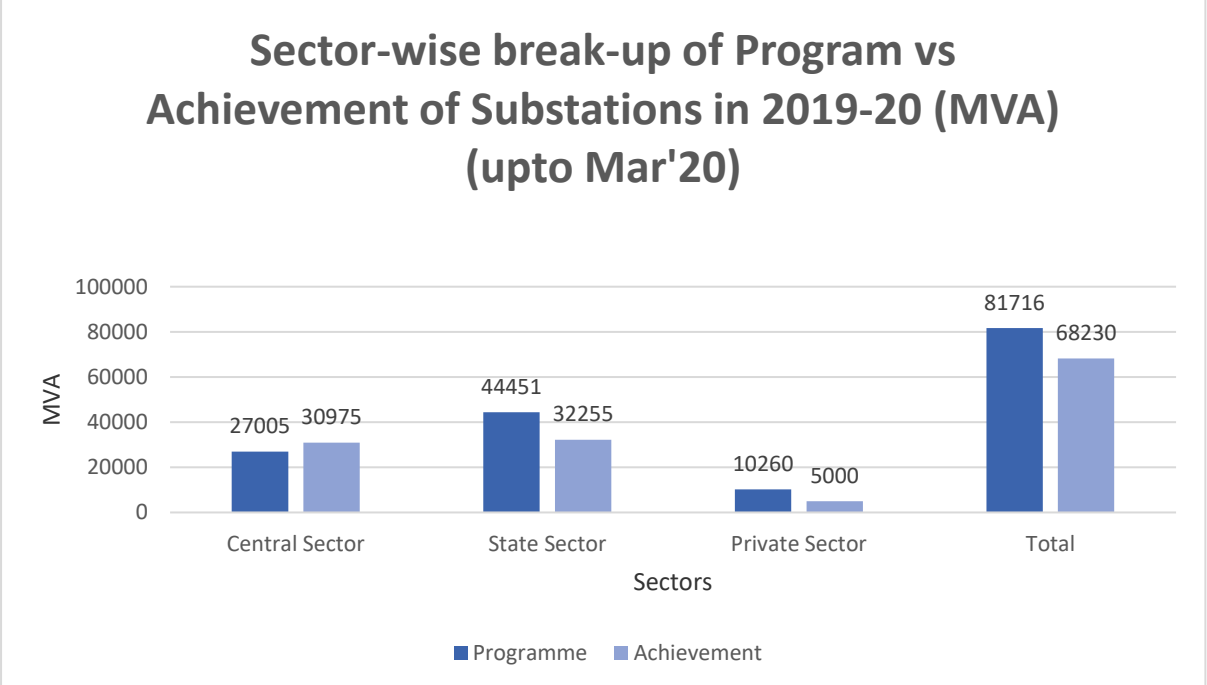


Chart-VIII

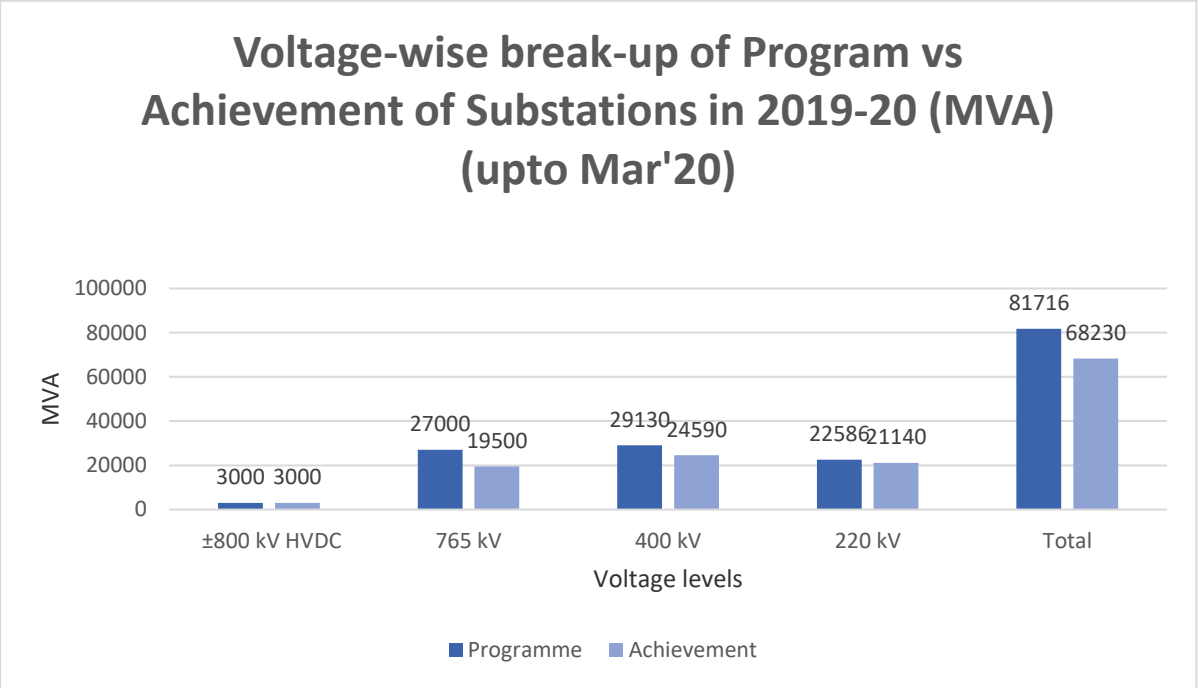


Chart-IX

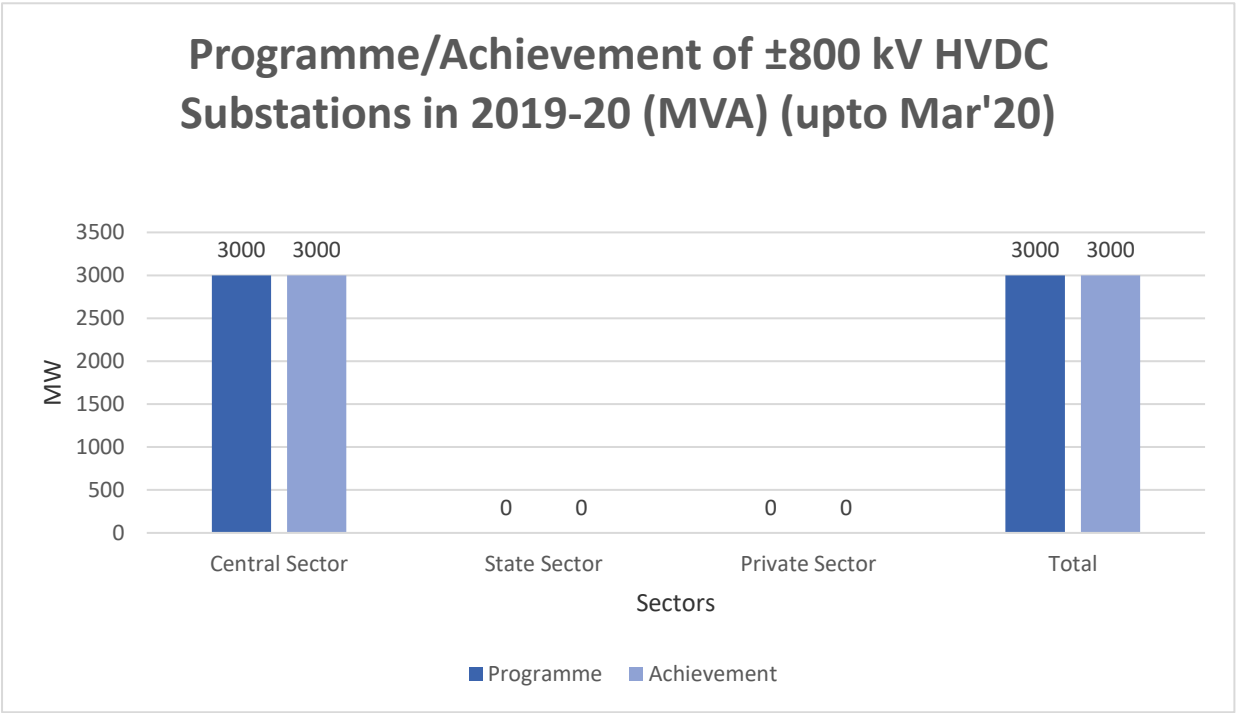


Chart-X

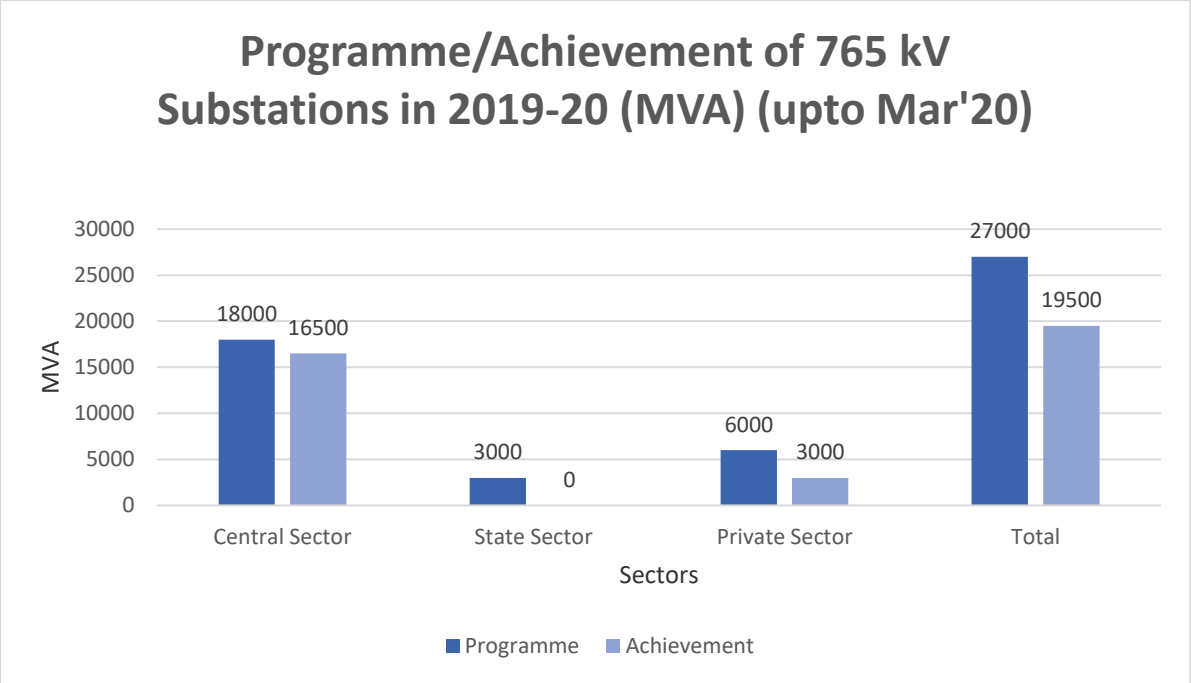


Chart-XI

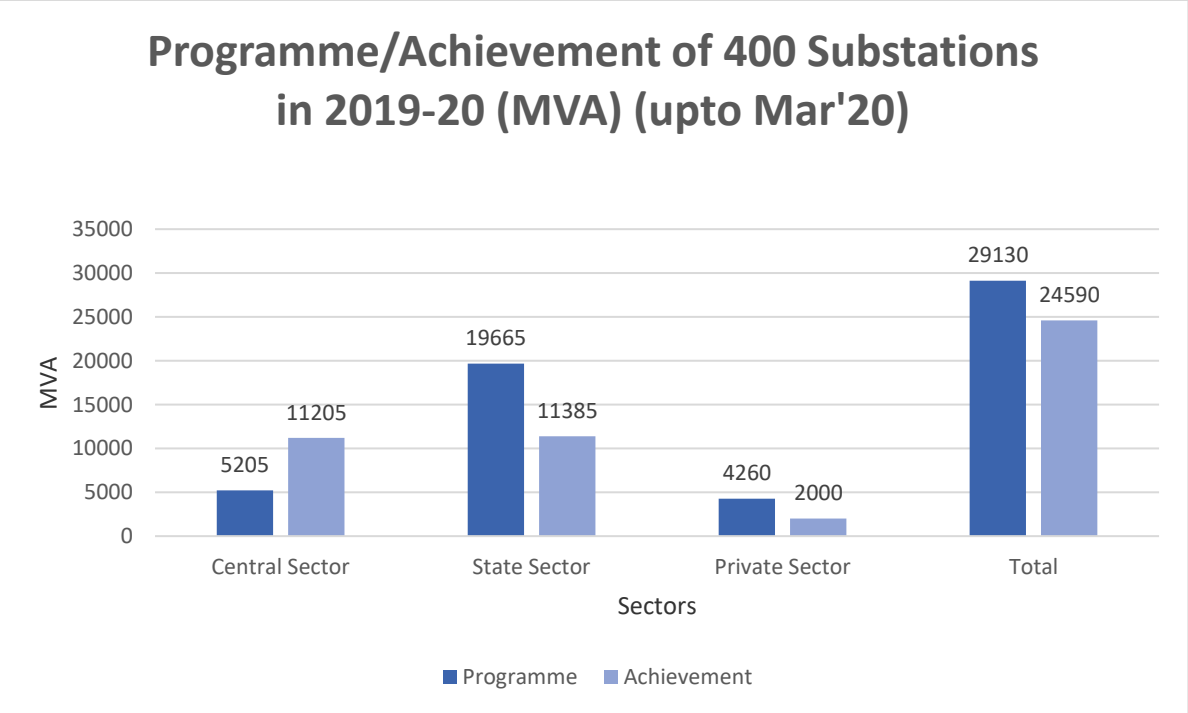
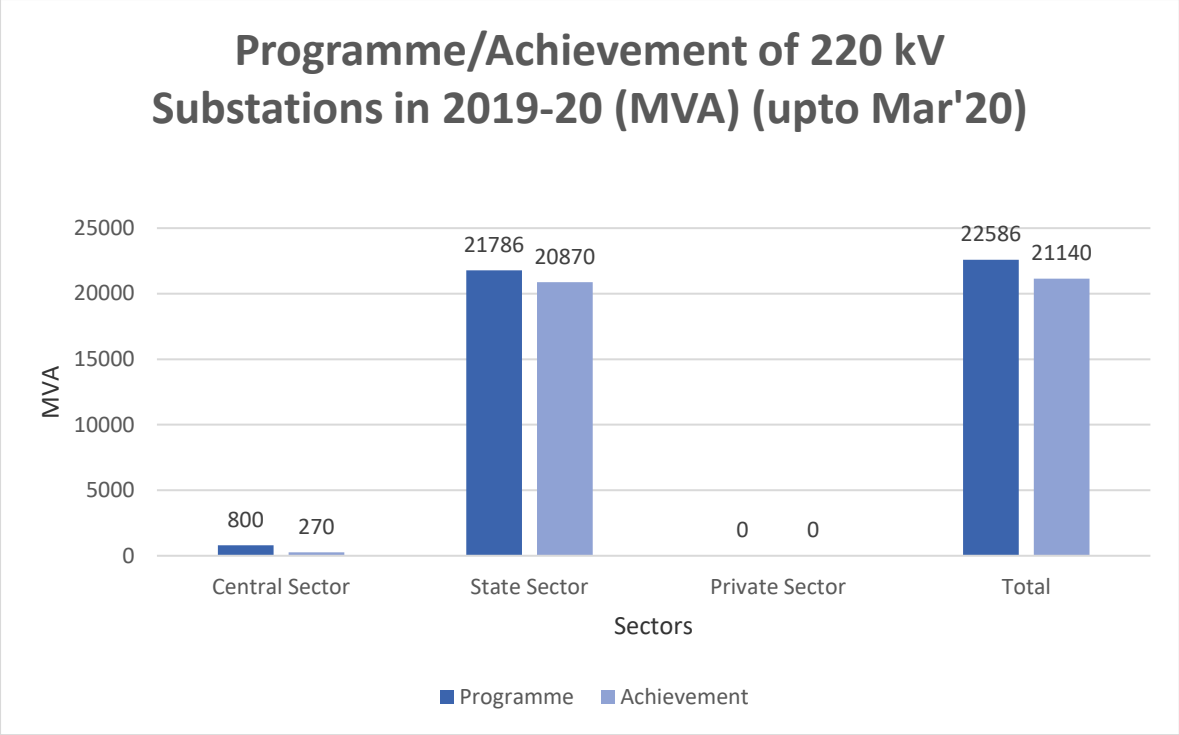


Chart-XII


Programme/Achievement of 220 kV Substations in 2019-20 (MVA) (upto Mar'20)
MVA
25000
20000
15000
10000
5000
0
800
270
21786
20870
0
0
22586
21140
Central Sector
State Sector
Private Sector
Total
Sectors
Programme
Achievement

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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 Despatch Centres (RLDCs) set up in the five Regions and at the national level by National Load Despatch Centre (NLDC). The Regional Power Committee is a conglomerate of all the players partaking in grid operation, i.e. Regional Load Despatch Centre, generating companies, transmission utilities, distribution utilities, power traders, etc. Its Secretariat is manned by the officers of Central Electricity Authority (CEA).

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 reviewthe grid performance in the previous month and plan grid operation for the next month. The Commercial Sub-Committee discusses the commercial issues viz. energy accounting related matters, issues pertaining to Special Energy Meters (SEMs), settlement of dues, etc. The Protection Sub-Committee discusses and analyses the various grid trippings which took place subsequent to the last meeting and recommends / monitors the corrective actions to avoid recurrence of such trippings. It also finalises 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 (RPCs) and guides the RPCs 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 referred to 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 Report on a monthly basis, both in terms of Energy and Peak, giving the Energy Requirement, Energy Supplied and Energy not Supplied in Million Units (MUs) as well as in percentage and the Peak Demand, Peak Met and Demand not Met both in Mega Watt (MW) and percentage. The total Energy Requirement in the country during the year 2019-20 was 1,291,010 MUs as against 1,274,595 MUs during the previous year 2018-19, registering an increase of 1.3%. The total Energy Supplied in the country during the year 2019-20 was 1,284,444 MUs as against 1,267,526 MUs during the previous year 2018-19, registering an increase of 1.3%. The Energy not Supplied during the year 2019-20 was 6,566 MUs (0.5%) against 7,070 MUs (0.6%) during the previous year 2018-19.The Peak Demand during the year 2019-20 was 183,804 MW as against the corresponding figure of 177,022 MW during the previous year 2018-19, registering an increase of 3.8%. The Peak Met during the year 2019-20 was 182,533 MW as against the figure of 175,528 MW during the previous year 2018-19, thereby registering an increase of 4.0%. The Demand not Met during the year 2019-20 was 1,271 MW (0.7%) as against 1,494 MW (0.8%) during the previous year 2018-19.

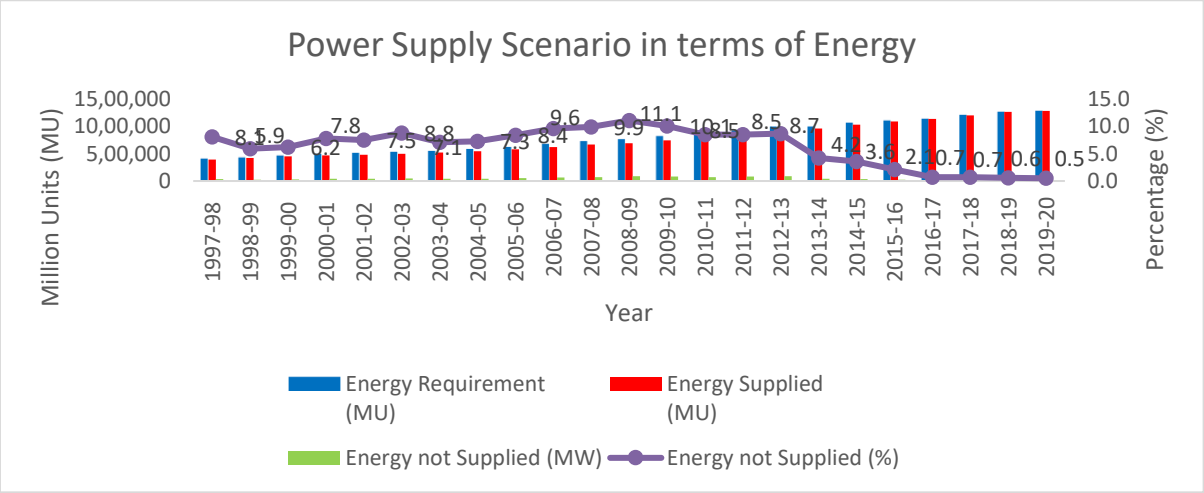
In the context of power supply, it may be mentioned that there is adequate availability of electricity in the country. The marginal gap between demand and supply of electricity is generally on account of factors other than inadequacy of power availability in the country e.g. constraints in distribution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

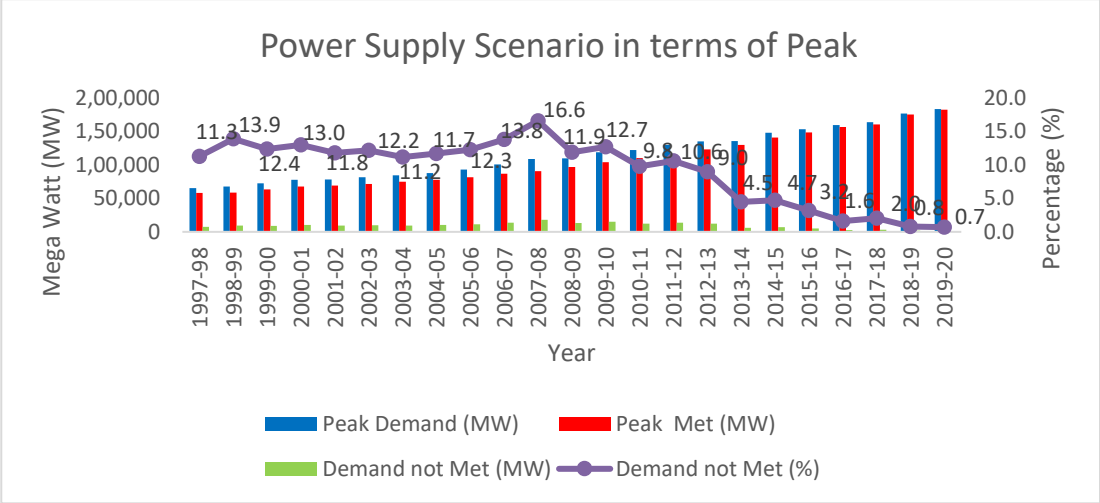
2005-06	631,554	578,819	52,735	8.4
2006-07	690,587	624,495	66,092	9.6
2007-08	739,343	666,007	73,336	9.9
2008-09	777,039	691,038	86,001	11.1
2009-10	830,594	746,644	83,950	10.1
2010-11	861,591	788,355	73,236	8.5
2011-12	937,199	857,886	79,313	8.5
2012-13	995,557	908,652	86,905	8.7
2013-14	1,002,257	959,829	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



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	1,83,804	1,82,533	1,271	0.7



The State/UT/Region-wise Power Supply Position in terms of Energy and Peak during the year 2019-20, is enclosed at **Annexure-4A**.

The details of the State/UT-wise allocation from Conventional Central Generating Stations in the country as on 31.03.2020, 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 99,374.96MW as on 31.03.2020 comprising of 60,801.05MW thermal, 20,085.77MW hydro, 1620.00 MW nuclear and 16,868.14MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 1.4% in the Northern Region during the year 2019-20 as compared to the respective figure of 1.3% during 2018-19. Further, the Northern Region witnessed a gap of 1.0% between Peak Demand and Peak Met during the year 2019-20 as against the corresponding figure of 2.3% during2018-19.

4.3.2 Western Region

The installed capacity in the Western Region was 120,618.00MW as on

31.03.2020comprising of 85,281.61 MW thermal, 7,622.50MW hydro, 1,840.00 MW nuclear and 25,873.89 MW from renewable energy sources.

During the year 2019-20, there was no gap between Energy Requirement and Energy Supplied in the Western Region as compared to the gap of 0.1% during 2018-19. Further, the Western Region was able to meet its Peak Demand completely during the year 2019-20 while there had been a gap of 1.5% between Peak Demand and Peak Met during the year 2018-19.

4.3.3 Southern Region

The installed capacity in Southern Region was 112,011.12MW as on 31.03.2020 comprising of 54,509.99MW thermal, 11,774.83 MW hydro, 3,320 MW nuclear and 42,406.30MW from renewable energy sources.

During the year 2019-20, there was no gap between Energy Requirement and Energy Supplied in the Southern Region as compared to the gap of 0.1% during 2018-19. Further, the Southern Region witnessed a gap of 0.2% between Peak Demand and Peak Met during the year 2019-20 which was same as during 2018-19.

4.3.4 Eastern Region

The installed capacity in Eastern Region was 33,521.13 MW as on 31.03.2020comprising of 27,385.05MW thermal, 4,639.12MW hydro and 1,496.97MW from renewable energy sources. The gap between Energy Requirement and Energy Supplied was 0.2% in the Eastern Region during the year 2019-20 as compared to the respective figure of 0.7% during 2018-19. Further, the Eastern Region witnessed a gap of 0.1% between Peak Demand and Peak Met during the year 2019-20 as against the corresponding figure of 1.8% during 2018-19.

4.3.5 North-Eastern Region

The installed capacity in North-Eastern Region was 4,523.02MW as on 31.03.2020 comprising of 2,581.83MW thermal, 1,577.00MW hydro and 364.20MW from renewable energy sources. The North-Eastern Region faced a gap of 3.7% between Energy Requirement and Energy Supplied during the year 2019-20 as compared to the respective figure of 2.8% during 2018-19. Further, the North-Eastern Region witnessed a gap of 3.7% between Peak Demand and Peak Met during the year 2019-20 as against the corresponding figure of 3.9% during 2018-19.

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 2019-20 as compared to 2018-19, are tabulated below:

Year	% of Time when Frequency was			Maximum Frequency (Hz)	Minimum Frequency (Hz)	Average Frequency (Hz)
	Below 49.90 Hz	Between 49.90-50.05 Hz	Above 50.05 Hz			
2018-19	11.89	76.15	11.96	50.30	49.57	49.98
2019-20	6.53	72.90	20.56	50.34	49.55	50.00

It may be seen from the above that the average grid frequency during the year 2019-20 was precisely at the nominal frequency level of 50 Hz.

4.5 National Power Committee (NPC)

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 (GM&NPC), CEA, as its Member Secretary.

Since its formation, NPC has taken several initiatives on improving defence mechanism (like Under Frequency Relay and rate of change of frequency relay based load shedding scheme and System Protection Scheme) 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.

During the year 2019-20, the ninth (9th) meeting of the NPC was held on 22nd November, 2019, at New Delhi. In the meeting, NPC decided to constitute a Sub-committee under the chairmanship of Member Secretary, WRPC, to study the Automatic Under Frequency Load Shedding (AUFLS) scheme and work out a common approach for df/dt relay settings in all the five regions. The implementation of Protection System Database Management System (PDMS) in all the regions in a timely manner, was also agreed to. The NPC further decided for constitution of a Sub-group comprising of representatives of Protection Sub-committee of respective RPCs, NPC, NLDC, NTPC and NHPC to finalise a common procedure for tuning of Power System Stabilizers (PSS).

4.6 Power System Development Fund (PSDF)

Ministry of Power vide letter No. 29/9/2010-R&R (Vol-II) dated 10th January, 2014 circulated a scheme regarding operationalization of the Power System Development Fund (PSDF) and utilization of funds deposited therein. The total fund transferred from regulatory Pool Accounts to PSDF up to 31.03.2020 was ₹16777.98 Crores.

During the year 2019-20, following meetings related to operation/ implementation of PSDF were held:

(i) Three (3) meetings of the Techno-economic subgroup under Chief Engineer (GM&NPC), CEA, were held on 28.05.2019, 17.09.2019 and 13.03.2020.

(ii) Three (3) meetings of the Project Monitoring Group under Member (GO&D),CEA, were held on 23.07.2019, 18.11.2019 and 25.11.2019.

(iii) One (1) meeting of Appraisal Committee under Chairperson, CEA, was held on 26.07.2019.

(iv) One (1) meeting of Monitoring Committee under Secretary (Power), was held on 30.01.2020.

A total of 160 schemes have been sanctioned till 31.03.2020from PSDF with a total grant amount of ₹ 11,650.65 Crores. During the year 2019-20, 19 numbers of schemes with the grant of ₹357.39 Crores were sanctioned by the 15th Monitoring Committee in its meeting held on 30.01.2020. The details of sanctioned grant under PSDF are as given below:

Project Entity	During FY 2019-20		Previous Years (Up to 31.03.2019)		Total (Upto 31.03.2020)	
	Number of Project Proposals	Sanctioned Grant (₹ crores)	Number of Project Proposals	Sanctioned Grant (₹ crores)	Number of Project Proposals	Sanctioned Grant (₹ crores)
State/UT	19	357.39	124	6595.33	143	6952.72
RPCs	-	-	9	115.61	9	115.61
BBMB	-	-	1	23.27	1	23.27
DVC	-	-	2	166.46	2	166.46
PGCIL	-	-	4	4159.56	4	4159.56
PGCIL/ RECTPCL	-	-	1	233.03	1	233.03
Total	**19**	**357.39**	**141**	**11293.26**	**160**	**11650.65**

An amount of ₹7374.66 Crores has been disbursed to the project entities till 31.03.2020, for implementation of the schemes under PSDF and out of that ₹1283.66 Crores was disbursed during the year 2019-20.

4.7 Grid Study Committee(GSC)

In December 2012, Ministry of Power (MoP) had constituted a "Task Force on Power System Analysis under Contingencies" as a follow up of the recommendations of Enquiry Committee headed by Chairperson, Central Electricity Authority (CEA) in the context of the Grid Disturbances in Indian Grid on 30th&31st July 2012. As per the recommendation of the Task force, MoP had vide Order dated 16th July 2014 advised Power Grid Corporation of India Limited (PGCIL) to appoint a Consultant to conduct study/analysis for ensuring secure and reliable operation of the National Grid. Further, MoP had also constituted a Grid Study Committee (GSC) headed by Member (GO&D), CEA to facilitate the Consultant's study/analysis.

Power Grid Corporation of India Limited (PGCIL) had accordingly appointed two Consultants viz., M/s Tractebel, Romania and M/s

Powertech Labs Inc. (PLI), Canada for the stated study/analysis. In its 4th& 5thmeeting held on 16th January 2018 & 18th June 2018 respectively, the Grid Study Committee (GSC) had accepted the reports of both the Consultants. It was also decided that an Action Plan for implementation of the recommendations of the Consultants (Package B) be firmed up and the same was finalized in the meeting of officials from CEA, CERC, CTU and NLDC (POSOCO) held on 22nd March 2019.During the year 2019-20, the Action Plan was approved by Member (GO&D), CEA and the same was circulated on 15th May 2019 to all the concerned organizations for necessary action.

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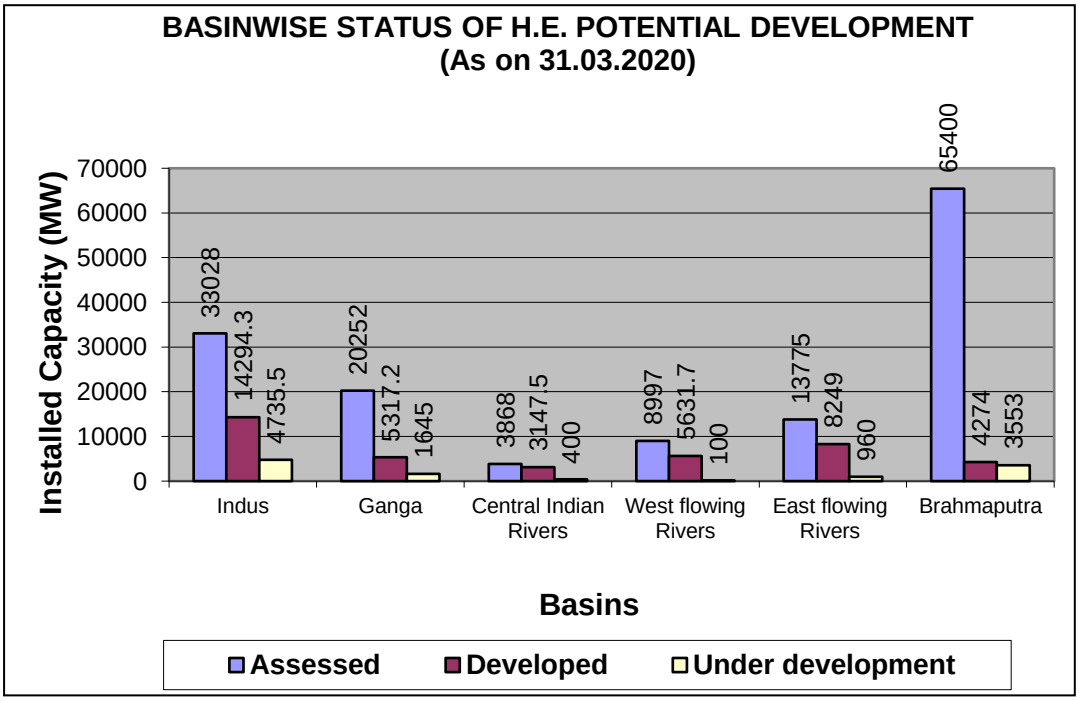
CHAPTER – 5

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 31.03.2020, the hydroelectric schemes in operation account for only 28.15% (40913.6 MW) and those under execution for 7.84% (11393.5 MW) of the total potential in terms of installed capacity. Thus, the bulk of the potential (64.01%) 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, 9 Nos. Pumped Storage Projects (above 25 MW) having total installed capacity of 4785.60 MW are constructed 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 **Annex -5A**.

Out of 162 schemes (47930 MW), DPRs in respect of 37 schemes (20435 MW) have already been prepared. Out of these 37 schemes, 1 scheme (105 MW) has been commissioned while 8 schemes (1968 MW) are under construction in the country. A total of 15 schemes (8251 MW) have been concurred by CEA while 3 schemes (510 MW) are under examination in CEA/CWC. A total of 7 schemes (2935 MW) are under Survey & Investigation (S&I) for preparation of DPRs while DPR in respect of remaining 118 schemes (24560 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 2018-19

Hydro capacity addition of 140 MW was achieved against the targets of 840 MW for the year 2018-19. Project-wise details are given at **Annex-5B**.

5.4.1 Hydro capacity programme during 2019-20

Hydro capacity addition of 300 MW was achieved against the targets of 1190 MW for the year 2019-20. Project-wise details are given at **Annex- 5C.**

5.4.2 Hydro capacity programme during 2020-21

Hydro Capacity Addition Monitorable Targets planned for the Year 2020-21 is 1146 MW (300 MW in Central Sector, 371 MW in State Sector, and 475 MW in Private Sector.). Project-wise details are given at Annex- 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 Rs.1000 crs.

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 Jangi Thopan Powari HEP and Sunni dam HEP in Himachal Pradesh, Pinnapuram PSP in Andhra Pradesh and Saundatti PSP in Karnataka.

DPRs of 10 nos. of HEPs with aggregate installed capacity of 4377 MW have so far been prepared in consultation with appraising agencies and submitted for further examination in CEA/ CWC and out of which DPRs of 4 HEPs with aggregate installed capacity of 2339 MW have been concurred by CEA. DPR of Sunni Dam HEP (382 MW) has been prepared and submitted to CEA during the period of 2019-20. In addition, a total of 14 HEPs including 7 Pumped Storage Schemes with aggregate capacity of 9645 MW (having cost of more than Rs.1000 Crores) are presently under Survey & Investigation in the country and DPRs of which is 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.
- Work relating to finalization of installed capacity and energy benefits under the studies for review/ reassessment of hydro-electric potential of the country was carried out.
- Rendering of Consultancy Services for carrying out Power Potential Study and preparation of chapters of DPR for Tlawng H.E. Project, Mizoram.
- Power Potential Studies of Sharavathy HE Project (2000 MW) in Karnataka, Teesta-IV (520 MW) HE Project in Sikkim, Pinnapuram PSP (1200 MW) in Andhra Pradesh, Hirong HE Project (500 MW) in Arunachal Pradesh, Devsari HE Project (210 MW) in Uttarakhand and were carried out.
- Rendering of consultancy services for preparation of E&M chapter for Kalez Khola HE project (52 MW) in Sikkim and Par Tapi Narmada Link Project in Gujrat & Maharashtra (21 MW).

5.7 Studies & Other Activities Related to Hydro Power Planning

- A Draft report for operationalizing the measures announced by the Govt. in March, 2019 to promote Hydro Power Sector has been prepared by the Committee constituted under the chairmanship of Member (Hydro), CEA.
- Prepared long term trajectory for Hydro Purchase obligations.
- A perspective plan has been prepared in which 79 no. of hydro schemes with an aggregate capacity of 32012 MW (i.e. including 11 Pumped Storage Schemes of 8225 MW) and which include 12973.5 MW of HE projects under construction for providing benefits during the period 2019-20 to 2029-30.

- Associated in the committee for preparation of Bidding Document for procurement of power from hydro projects in medium and the long-term.
- Committee constituted to investigate into the issue of Penstock rupture of Kopili HE Station of NEEPCO.
- Electricity Act with amendments proposed by MoP was examined and commented upon.
- Examined matter relating to advance excavation in Pinnapuram before grant of TEC.
- Scope of Work (SOW), Qualifying requirement (QR) for DPR of Lugu Pahar Pump Storage (LPPS) Project of DVC in Jharkhand was examined and commented upon.
- Associated with organization of International Symposium on 'River Basin Development and Management including Optimization of Reservoir Operation' and 'Impact of Climate Change – Sustainable Dams and Hydropower Development including Pumped Storage', 4-10 April 2020 at New Delhi under the aegis of ICOLD.
- Draft Guidelines of CWC relating to Permissible Velocity in Concrete Lined Water Conductor System (Head Race Tunnel) conveying Water for Power Generation were examined and commented.
- Examined Studies for Optimal Generation mix and provided requisite inputs.
- Matter relating to implementation of minimum environmental flows in River Ganga (up to Unnao) was examined.
- Provisional expenditure for upcoming Hydro-Electric Projects have been worked out in connection with Task Force for consolidating the National Infrastructure Pipeline of Rs. 100 lakh crore FY 2019-20 to FY 2024-25.
- Draft Country Programme Document for engagement with the Green Climate Fund (GCF) was examined and commented upon.
- A Draft agreement of SASEC Regional Power Trade Framework was examined and commented upon.
- Report on "Study on Developing Roadmap for improving Electric Power Supply Reliability in India" under Japan-India Energy Dialogue was examined and commented upon.
- 12th meeting of India-China Expert Level Mechanism (ELM) on Trans-Border Rivers at Ahmedabad on 12th – 13th June, 2019 was attended.
- Project Preliminary report (PPR) of Indrapuri Reservoir Scheme, Bihar was examined and commented upon.
- Papers on "Hydro Power Development: Changing Scenario" & "Bilateral Co-operation for mutual benefits in Hydro Power Sector" were presented in India Water Week organized by NWDA, MoWR held from 24th – 28th September 2019.
- Draft CEA Guidelines for Renovation & Modernization (R&M) of Hydro Power Stations was examined.
- Issue related to storage of water in upstream of Kol dam HEP was examined.
- Committee constituted under chairmanship of Member (hydro) to suggest measures for "Revision of Norms for requirement of manpower in HEPs".
- Report of the Committee constituted by MoWR for uprating of Installed Capacity of Karcham Wangto HEP finalized.
- Inputs were furnished for review of National Electricity Plan (Vol-II Transmission) for the period 2017-22 & for preparation of Transmission Plan for the year 2024-30.
- Inputs were furnished regarding 7th Trade Policy Review (TPR) of India.
- Draft reports of Basin wise reassessment of Hydro Electric Potential in Country is being examined.

Indus Water Treaty (IWT) Matters

- Visit to Kishenganga HEP in J&K was conducted to assess the release of minimum flows in the river in line with the Court of Arbitration judgment.

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, Myanmar, China and Bangladesh for mutual benefits:

- Rendering Consultancy Services for Preparation of Detailed Project Report of Kuri Gongri HEP (2640 MW) in Bhutan.
- Preliminary assessment study report on Thaukyegat (1) H.E. Project, Myanmar was examined.
- Extending assistance in finalization of DPR for Pancheshwar and Saptakoshi HEPs and matters relating to Tanakpur barrage, Garba Tawaghat HEP were dealt with.

5.9 Hydro Power Plants Performance & Operation Monitoring

- The report "Review of Performance of Hydro Power Stations" for the year 2018-19 has been published. Performance of 710 units in 204 Hydro Stations with aggregate Installed Capacity of 45399.2 MW (above 25 MW) was analyzed in respect of their outages & generation in this report.
- Midterm review of generation performance of hydroelectric stations of the country for the year 2019-20 was carried out in November and December 2019 after withdrawal of South-West monsoon by interaction with Power Utilities and the generation targets were reviewed for the remaining part of -the year 2019-20 as 148.05 BU.
- Month-wise/station-wise hydro generation targets in respect of HE Stations (above 25 MW) for year 2020-21 were finalised in consultation with various utilities as 140.36 BU which include 57.84 BU, 68.77 BU & 13.75 BU from Central, State & Private Sector Stations respectively.
- Visit to Karcham Wangtoo Hydro Electric Project in Himachal Pradesh was conducted as part of Expert Committee constituted to look into the issues of uprating of the project.

5.10 Hydel Generation Performance during year 2019-20

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

Region	Generation (BU)		Deviation (+/ -)
	Target	Actual	(%)
Northern	71.51	80.55	12.64
Western	12.20	17.81	45.98
Southern	27.12	31.75	17.07
Eastern	19.24	20.82	8.21
N-Eastern	6.85	4.82	-29.63
All India	**136.93**	**155.76**	**13.75**

Against target of 136.93 BU, the actual energy generation during the year 2019-20 was 155.76 BU, which was 13.75% more than the target.

5.11 Renovation & Modernisation of Hydro Electric Projects

Renovation & Modernisation, Uprating and Life Extension (RMU&LE) 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 of VIII, IX, X XI and XII Plans:

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, total benefit of 3636 MW through Life Extension, Uprating and Restoration has been accrued. The state-wise list of Hydro RM&U Schemes completed during VIII, IX, X, XI and XII Plans are given at **Annex-5 E, F, G, H & I** respectively.

5.11.2 Present Status (2017-22 and 2022-27)

During 2017-22, an aggregate capacity of 9197.45 MW at 46 Hydro Electric Power Station (8 in Central Sector and 38 in State Sector) is programmed for R&M which will accrue benefit of about 4527.35 MW through Life Extension, Uprating and Restoration.Out of the 46 schemes targeted for completion during 2017-22, three schemes (Ganguwal & Kotla and Dehar Power House (Unit-6) in 2017-18 and Salal HEP in 2019-20) in Central Sector and two schemes (Sholayar-I and Bhadra River Bed in 2019-20) in State Sector with an aggregate installed capacity of about 882.4 MW have been completed and have achieved a benefit of 132.4 MW through Life Extension and Uprating. Unit-3 of Idukki 1st Stage (130 MW) and Unit-3 of Sholayar (18 MW) of KSEB have also been commissioned in State Sector in 2018-19. The state - wise list of hydro R&M schemes expected for completion during 2017-22 is given at **Annex-5J.**

During 2022-27, an aggregate capacity of 4358.35 MW at 33 Hydro Electric Power Station (4 in Central Sector and 29 in State Sector) is programmed for R&M, which will accrue benefit of 3428 MW through Life Extension and Uprating. The state-wise list of hydro R&M schemes expected for completion during 2022-27 is given at **Annex-5K.**

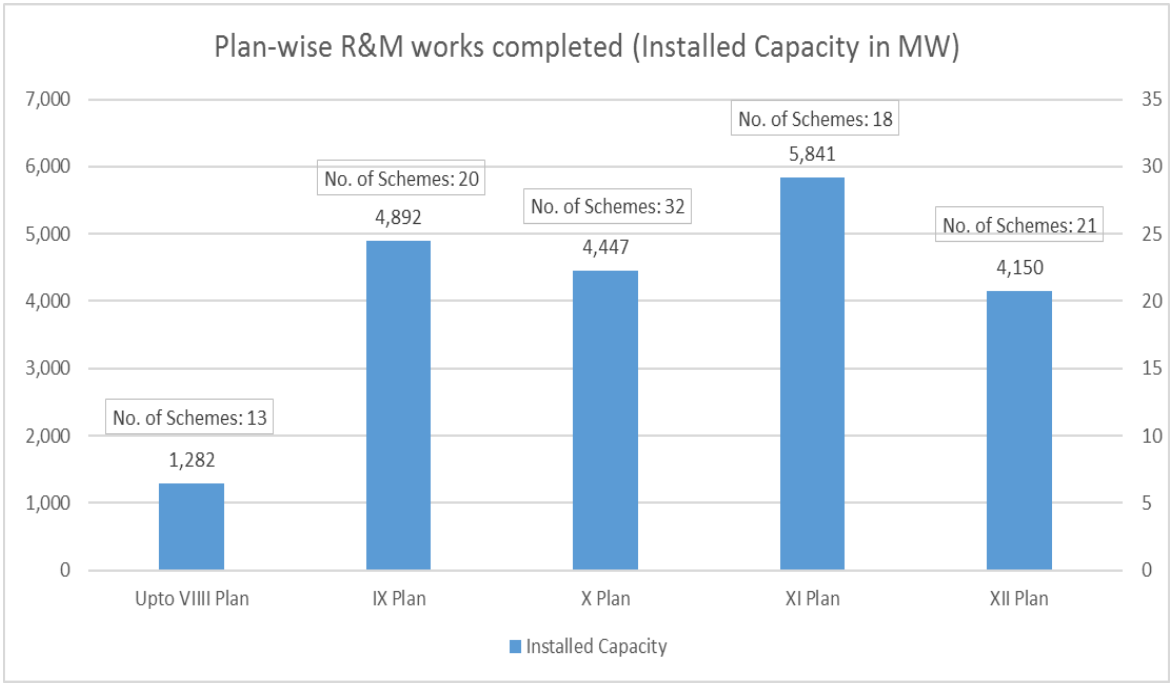
Plan-wise summary of R&M of H.E. Projects starting from VIII Plan is given below:

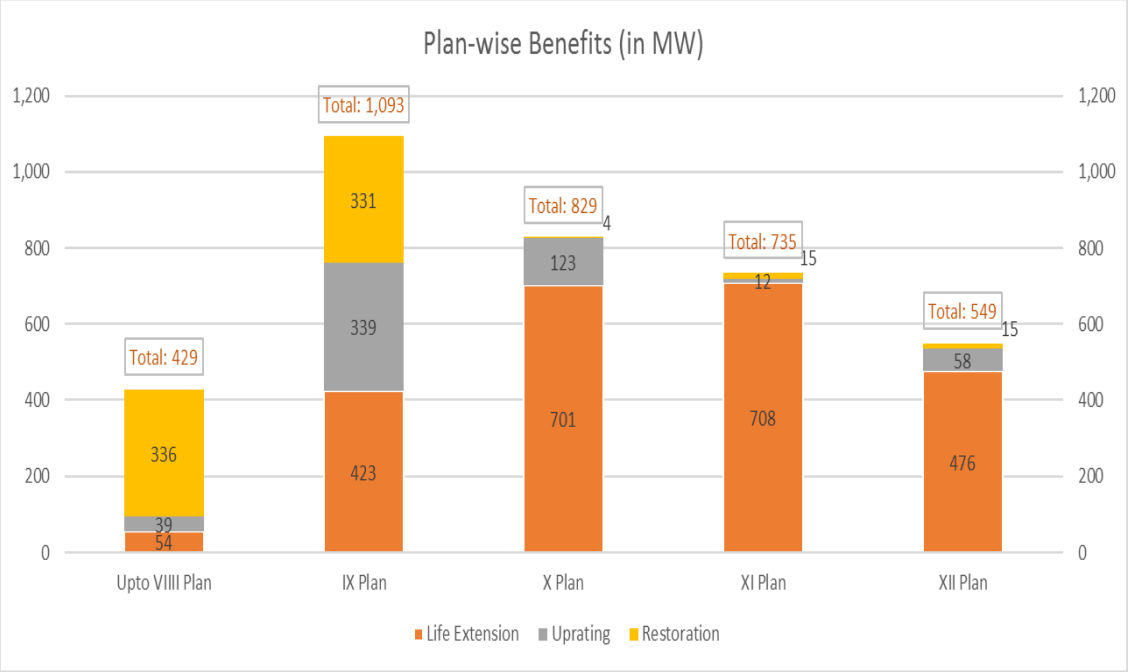
Summary of R&M of Hydro Electric Projects

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

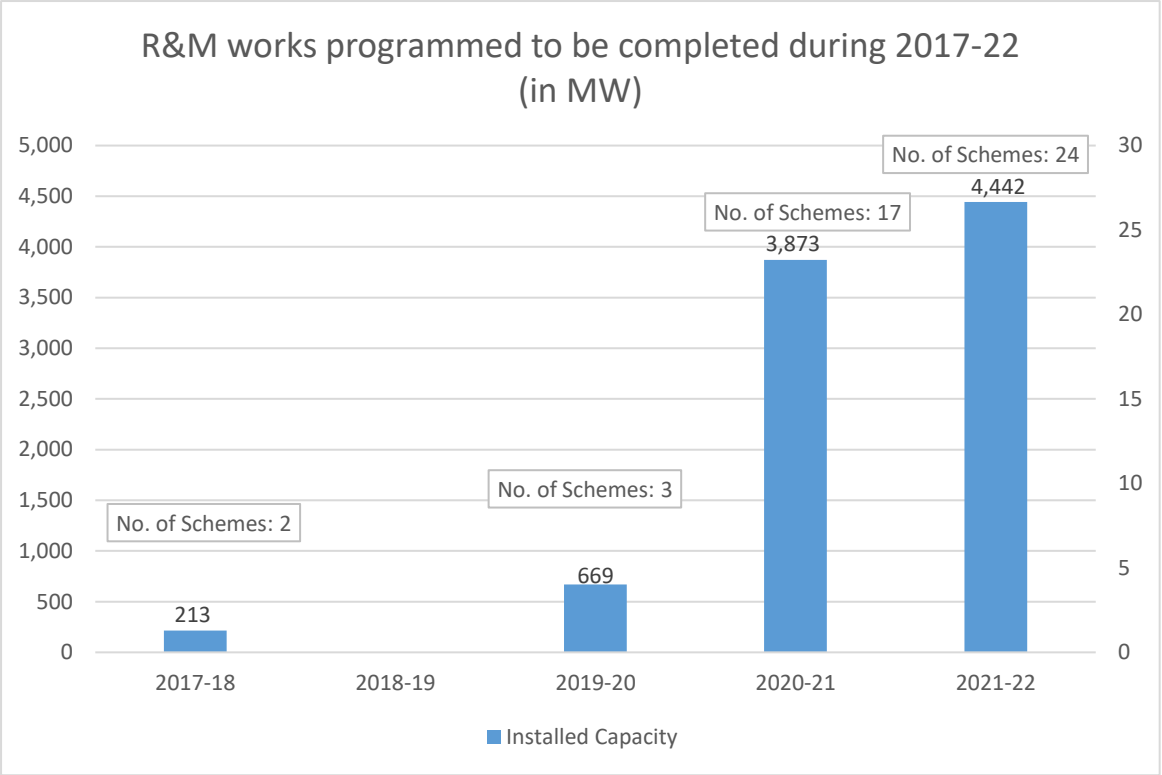
LE - Life Extension, Res. – Restoration, U – Uprating





II Programme of R&M works during 2017-22

S.No	Category	No. of Projects			Capacity (MW) covered under R&M&LE	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	8	38	46	9197.45	5822.36	4527.35 [4391.65(LE) +135.7(U)]
2.	Completed	3	1	4	858.40	143.60 (Actual Cost)	132.40 [118.4 (LE)+14 (U)]
3.	Under Implemen-tation	4	24	28	5791.10	3724.34	2152.52 [2042.30(LE) +109.70 (U)]
4.	Under Tendering	1	10	11	1273.75	1574.04	968.75 [956.75(LE) +12 (U)]
5.	Under DPR Preparation/ Finalisation/ Approval	0	3	3	1274.20	341.47	1274.20 (LE)



III Programmed R&M works during 2022-27

S. No.	Category	No. of Projects			Capacity (MW) covered under R&M&LE	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	4	29	33	4358.35	3428 [3358 (LE)+ 70 (U)]
2.	Under Implementation	1	1	2	511.00	396(LE)
3.	Under Tendering	0	6	6	1065.35	268 [240 (LE)+ 28 (U)]
4.	Under DPR Preparation/Finalisation/Approval	2	7	9	905	947[905 (LE) +42 (U)]
5.	Under RLA Studies	1	15	16	1877	1817 (LE)

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

5.11.2.1 Achievements under R&M in Hydro during the year 2019-20

R&M works of one schemeSalal HEP in Central Sector and two schemes Sholayar-I and Bhadra River Bed in State Sector with an aggregate installed capacity of 669 MW have been completed and have achieved benefit of 84 MW through Life Extension and Uprating.

5.1.1.1 Programme for the year 2020-21

For the year 2020-21, it is programmed to complete following 17 schemes having capacity under

R&M of 3873.1 MW. On completion of these schemes, there will be a benefit of 1433.5 MW through Uprating and Life Extension.

S. No.	Name of Scheme	Capacity under R&M (No. x MW)	Agency
1	Bhakra LB	5x108	BBMB
2	Bhakra RB	5x157	BBMB
3	Baira Siul	3x60	NHPC
4	Rihand	6x50	UPJVNL
5	Munirabad Dam Power House	2x9 + 1x10	KPCL
6	Bargi	2x45	MPPGCL
7	Dehar	1x165	HPSEB
8	Giri	2x30	HPSEB
9	Bhaba Power House	3x40	HPSEB
10	Mukerin St. I,II,III & IV	3x15+3x15+3x19.5+3x19.5	PSPCL
11	Ganderbal	2x4.5	J&KSPDC
12	Chenani	5x4.66	J&KSPDC
13	Idukki 1st Stage	3x130	KSEB
14	Nagarjuna Sagar LCPH	2x30.6	TSGENCO
15	Nagarjuna Sagar Ph-II	1x110 + 7x100.8	TSGENCO
16	Hirakud-I	2x37.5	OHPC
17	Hirakud-II	1x24	OHPC
Total		**3873.1 MW**	

5.12 Concurrence/Appraisal of Hydro Schemes:

During the year 2019-20 (till 31.03.2020), DPR of one HE Schemewith an installed capacity of **930 MW**has beenappraised 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.	Kirthai- II HEP in Jammu & Kashmir by JKSPDC	6x140 +2x35 +2x10= 930	5989.75 (Price at August, 2015 level)	14.06.2019
	TOTAL	**930**		

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CHAPTER – 6

THERMAL POWER DEVELOPMENT

6.1 Setting up of Ultra Mega Power Projects (UMPPs)

Government of India has taken an initiative in November 2005 for the Development of Ultra Mega Power Projects (UMPPs) in India. It is a step taken for achieving capacity addition at an accelerated pace, catering to the need of power to number of States and to ensure cheaper tariffs utilizing economies of scale. The objective behind the initiative is also to mitigate the risk relating to tie up the essential inputs/clearances such as land, fuel, water and other statutory clearances etc. UMPPs are very large sized projects about 4000MW capacity with super critical technology. The Ministry of Power has identified Central Electricity Authority (CEA) as the Technical Partner and Power Finance Corporation (PFC) as the Nodal Agency for development of the UMPPs in the country.

The projects are awarded to the successful developers based on tariff based International Competitive Bidding (ICB) route. To tie-up the necessary inputs/ clearances, project-specific shell companies i.e. Special Purpose Vehicles (SPVs) are set up as a wholly owned subsidiaries of the Power Finance Corporation (PFC) Ltd. These SPVs, along-with the various clearances etc. are subsequently transferred to the successful developer.

Four UMPPs namely Mundra in Gujarat, Sasan in Madhya Pradesh, Krishnapatnam in Andhra Pradesh and Tilaiya in Jharkhand had been awarded to the successful bidders. The detail of these projects are as given 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.

STATUS OF AWARDED UMPPS:

1. Mundra UMPP (5X800 MW) in Gujarat:

The project was awarded to M/s. Tata Power Ltd. at a Levellized Tariff of Rs. 2.264/kWh.

Gujarat, Maharashtra, Punjab, Haryana, and Rajasthan are the beneficiary states. All five units of this UMPP were fully commissioned since 2013 and are in operation. The generation and PLF for last three years are as below:

Parameters	2017-18	2018-19	2019-20
Generation(MU)	26514.87	26839.30	26495.39
PLF (%)	75.67	76.60	74.74

2. Sasan UMPP (6X660 MW) in Madhya Pradesh:

The project was awarded to M/s. Reliance Power Ltd. at Levellized Tariff of Rs. 1.196/kWh. The beneficiary states are Madhya Pradesh, Punjab, Uttar Pradesh, Delhi, Haryana, Rajasthan and Uttrakhand. All six units of this UMPP were fully commissioned since 2015 and are in operation. The generation and PLF for last three years are as below:

Parameters	2017-18	2018-19	2019-20
Generation(MU)	31792.52	32877.27	33340.92
PLF(%)	91.65	94.78	95.85

3. Krishnapatnam UMPP in Andhra Pradesh:

This UMPP was awarded M/s. Reliance Power Ltd (RPL) at Levellized Tariff of Rs. 2.333/kWh. The developer has stopped the work at site citing the new regulation of coal pricing in Indonesia. The procurers had issued Termination Notice to developer. Delhi High court has issued judgement in the case on 15.01.2019 and has dismissed the appeal by Coastal Andhra Power Limited (CAPL) finding no merit in the appeal. BG has been encashed by Procurers.

4. Tilaiya UMPP in Jharkhand:

This UMPP was awarded to M/s. Reliance Power Ltd. at Levellized Tariff of Rs. 1.77/kWh. The developer has issued Termination Notice citing non-transfer of land by lead procurer. The procurers had decided to accept the Termination Notice. SPV has been transferred to the lead procurer i.e. Govt. of Jharkhand on 16.05.2018. The coal blocks of Kerandari B &C for this project has been de-allocated by MoC on 27.12.2019. Procurers have decided for re-bidding of the project.

Status of UMPPs under Pipeline:

The following UMPPs are under different stages of development and bidding process would be initiated after finalization of Revised Standard Bidding Documents (SBDs). Status of these UMPPs is given below:

- **Bedabahal UMPP in Odisha:** The site has been identified at Bedabahal village in Sundergarh district, Odisha. Power Allocation from this UMPP has been made to Odisha, Punjab, Haryana, Madhya Pradesh, Rajasthan, Uttar Pradesh, Tamil Nadu, Uttarakhand and Chhattisgarh. All clearances and inputs were tied up. Allocation of coal blocks in the name of Infra SPV for Odisha UMPP is under progress.

- **Cheyyur UMPP in Tamil Nadu:** The site has been identified at Cheyyur village in Kanchipuram district, Tamil Nadu. Initially, it was proposed on imported coal due to coastal location. Power Allocation

from this UMPP has been made to Tamil Nadu, Karnataka, Maharashtra, Telangana, Andhra Pradesh, Uttar Pradesh, Kerala and Punjab. Later, this UMPP has been shifted from imported coal to domestic coal due to cheaper tariff. Accordingly, development of this UMPP on domestic coal at existing location is under process. Ministry of Coal has been requested to allocate the suitable coal block for this UMPP.

- **Banka UMPP in Bihar:** A site at Kakwara in Banka district has been identified for setting up of UMPP in Bihar. Infra SPV and Operating SPV has been incorporated. Power Allocation from this UMPP has been made to Bihar, Jharkhand, Uttar Pradesh and Karnataka. ToR for EIA study has been issued by MoEF&CC. The site specific studies and land acquisition are under process.

- **Deoghar UMPP in Jharkhand:** Initially, a site at Husainabad in Deoghar district has been identified for setting up of 2nd UMPP in Jharkhand**.** Power allocation from this UMPP has been made to Jharkhand, Gujarat, Tamil Nadu, Haryana, Kerala, Goa and Karnataka. However, due to resistance from the local public, Government of Jharkhand has proposed an alternate site at MohanpurAnchal in Deoghar district. The suitability of site is under investigation.

Status of other Proposed UMPPs:

The following identified UMPPs has been considered for closure due to insignificant progress over the period. In this regard, MoP on 26.07.2019 has requested to the concerned state governments to convey their confirmation for closure of the UMPPs and the same is awaited.

- **2nd UMPP in Odisha:** Site at Bijoypatna in Chandbali Tehsil of Bhadrak district has been identified and consent of Govt. of Odisha has not been received till date. The Bankhui Coal block for this project has been de-allocated from Sakhigopal Integrated Power Company Ltd by MoC on 27.12.2019.

- **3rd UMPP in Odisha:** Site at Narla&Kasinga sub division of Kalahandi district has been identified and consent of Govt. of Odisha has not been received till date.

- **2nd UMPP in Tamil Nadu:** The proposed site near Nagapatttinam in Tamil Nadu was not environmentally suitable and alternate site has not been proposed by state government.

- **2nd UMPP in Gujarat:** The land at identified site in Chikhli-Kob at Gir-Somnath District was not sufficient.

- **UMPP in UP:** The proposed site at Etah has major portion as agricultural land and is far away from coalfields.

The following identified UMPPs are under process of closure of SPV due to various reasons:

i) UMPP in Karnataka.
ii) UMPP in Maharashtra.
iii)2nd UMPP in Andhra Pradesh.

6.2 CONSTRUCTION MONITORING OF THERMAL POWER PROJECTS

As on 31.03.2020, Thermal capacity of 60916.15 MW is at various stages of under construction in the country.

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.

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 equipment supplies and project milestones commitments from project authorities and equipment suppliers/executing agencies 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 NitiAayog etc.
- Thermal projects visit to assess the progress of various activities at site including Gas based projects.
- 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.

6.3 New Thermal Power Projects accorded Environment Clearance

6.3.1 Power Projects accorded Environment Clearance

During the year 2019-20 , Environment clearance has been granted to 03 nos. of thermal power project totalling to a capacity of 3860 MW. The list of such plants is as below:

Sl. No.	Name of the project	Date of Clearance	Environment Clearance Capacity (MW)
01	3x600 MW Coal Based Singareni Thermal Power Plant– Expansion from 2x600 MW to 2000 MW by SCCL	18.12.2019	800
02	Proposed 3x800 MW Supercritical thermal Power Project by ODISHA THERMAL POWER CORPORATION LIMITED	10.12.2019	2400
03	Proposed 1x660 MW Coal based Supercritical Sagardighi Thermal Power Phase-III Expansion Unit–5,at Murshidabad, West Bengal by WBPDCL	24.03.2020	660
		Total	**3860 MW**

6.3.2Power Projects for which order placed

During the year 2017-18, Orders for 9,040 MW thermal capacity were placed by various utilities. During the year 2018-19, orders for 660 MW thermal capacity have been placed. During the year 2019-20 , orders for 2640 MW thermal capacity was placed as listed below:

	Project	Implementing Agency	Plant Configuration	Capacity (MW)	Main Plant (BTG)
01	Khurja Super Thermal Power Station Unit#1&2	THDCIL	2x660	1320	1. Steam Generator Package - M/s L&T MHPS Boilers Pvt. Ltd. on 29.08.2019. 2. Turbine Generator package awarded (on 03.10.2019) to M/s BHEL.
02	Buxar Super Thermal Power Plant	SJVNL	2x660	1320	M/S Larsen & Toubro on 22.06.2019

6.4 Coal Block Allocation

Since the cancellation of 204 nos. of coal blocks by the Hon'ble Supreme Court in 2014, total of 50 nos. (catering to 63,915 MW)have been e-allocated / e-auctioned to power sector as per Coal Mines (Special Provisions) (CMSP) Act 2015 out of which 22 nos. of coal blocks (catering to 17,355 MW capacity) are Schedule–II and balance 28 nos. of coal blocks (catering to 46,580 MW capacity) are Schedule-III. Two nos. Schedule-III coal blocks namely Mandakini and Utkal-C have been surrendered.

Another 14 nos. have been allocated to power sector (Central sector – 4 nos and State sector- 10 nos) under Rule-4 of Auction by Competitive bidding of Coal Mines Rules 2012 under MMDR Act out of which 01 no. coal block namely Kudanali-Lubri (which was jointly allocated to NTPC & Jammu & Kashmir State Power Development Corporation Ltd) has been surrendered and subsequently cancelled.

And only 01 no. block namely PakriBarwadih allotted to NTPC was allocated by the Screening committee.

Out of the 50 nos. coal blocks allocated so far under CMSP Act 2015, 09 nos. coal blocks (05 nos. Schedule-II and 04 nos. Schedule-III) have been allocated through e-Auction process whereas 41 nos. (17 nos. Schedule-II and 24 nos. Schedule-III) have been allocated to government sector as per Coal Mines (Special Provisions) Act, 2015.

Among e-auctioned coal blocks, 02 nos. namely Sarisatoli& Amelia North are producing coal while 01 no. coal block, namely, Talabira-I has been exhausted as per approved mine plan.

Among e-allocated coal blocks, 05 nos. of Schedule-II coal blocks namely Parsa East, Kanta Basan, Barjora, Barjore North & Pachwara North and 06 nos. of Schedule-III coal blocks namely Dulanga, Talaipalli, Tadicherla, Manoharpur & Dipside Manoharpur and Gare Palma

Sector-III have started producing coal.

Further, 01 no. coal block allotted through Screening Committee to NTPC namely PakriBarwadih has already come under production.

Thus at present; there are total of 62 nos. coal blocks allotted to the Power Sector. (Central Sector - 16 nos., State Sector - 40 nos. and Private sector - 6 nos.)

The total nos. of coal blocks under production are 14 nos. The quantity of coal produced in the FY 2019-20 is 34.24 MT. The expected coal production in the year 2020-21 is around 65 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 2020 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 23 nos. Thermal Power Projects totaling 25,340 MW under Central /State Sector category under SHAKTI policy, out of which 3,180 MW capacity has been accorded linkage during year 2019-20.

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:-Two rounds of bidding for coal linkage under Shakti B(ii) have been held so far, in first round of bidding, coal linkages were awarded by CIL 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 totalling 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).

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 drawal 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:- Coal linkages 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 totalling to 7.15 MTPA (G-13 grade equivalent).

6.5.4 Shakti Policy Para B(iv):-

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

Achievement:- Under this clause, coal linkages have been allotted by CIL to Gujarat state for 4000 MW, to UP state for 1600 MW and to MP state for 2640 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:- Under this clause, covering para B(iii), coal linkages for the quarter April-June' 2020 were awarded to 9 nos. of Thermal Power Plants with installed capacity of 7320 MW and untied capacity of 5961.9 MW. CIL has allotted coal to various developers totalling to 1.57 MTPA (G-13 grade equivalent).

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, 31 nos. Thermal Projects totalling 36,930 MW were granted Bridge Linkage so far out of which a capacity of 2,310 MW has been accorded Bridge linkage in the year 2019-20 .

6.7 Power Development Activities in North Eastern Region

The following thermal project(s) is proposed for development in North Eastern region:

(i) Margherita TPP - 2x800 MW by APGCL in Assam - M/s Assam Power Generation Corporation (APGCL) had a proposal to set up a 2x800 MW Thermal Power Project at Margherita in Assam. Draft DPR for the project has been submitted by consultant M/s NTPC and coal linkage is yet to be tied-up.

6.8 Private Sector participation in Power Sector

For the purpose of facilitating procurement of power through competitive bidding, the Government has issued guidelines for tariff based competitive bidding. The Standard Bid Documents for procurement of power under long term and medium

term Power Purchase Agreements were issued for Case-I and Case-II bidding in 2005. Since 2005, a capacity of 7,800 MW was commissioned under case-II category. The list of projects under case-II is given under:

Projects Commissioned based on Case-II bids

Name of Project	Developer	District	Capacity (MW)
Haryana			
Mahatma Gandhi Super Thermal Power Project, Jhajjar Power Limited.	M/s CLP India Pvt. Ltd.	Jhajjar	2x660
Punjab			
Talwandi Sabo Power Limited	M/s Vedanta	Mansa	3x660
Nabha Power Limited	M/s L&T	Patiala	2x660
Uttar Pradesh			
Anpara 'C' TPS	M/s LANCO	Sonebhadra	2x600
Bara Thermal Power Plant	M/s PPGCL	Allahabad	3x660
		Total	**7800MW**

Further, substantial amount of power is contracted from IPPs through Case-I bids by many State Utilities and Discoms. The Government has also set up Special Purpose Vehicles under Power Finance Corporation for collective procurement of power on behalf of the distribution utilities by inviting tariff based bids for supplying power from Ultra Mega Power Projects.

The Private Sector contribution towards generation capacity during 10th Plan (2002-07) is 2,670 MW comprising 1,970 MW of Thermal and 700 MW of Hydro. During the 11th Plan (2007-12) and 12th Plan (2012-17), the private sector contributed 23,012 MW and 54,279 MW towards the generation capacity. The Thermal and Hydro capacity added during the 11th and was 21,720 MW and 1,292 MW, while that added during 12th Plan was 53,660 MW and 619 MW, respectively.
During the year 2018-19, Private Sector has contributed 972 MW to Thermal generation capacity, while the same during the year 2019-20 (up to 31.12.2019) was 45 MW in Thermal sector.

6.9 Retirement of Old & Inefficient Thermal Power Units

A total of 10305.38 MW capacity of old & inefficient coal and lignite based thermal power units have been retired in Govt. Sector by various power utilities since Mar' 2016 to Mar' 2020. Out of this capacity, units totalling 1835 MW have been retired during the year 2019-20 and deleted from the National Installed Capacity by CEA.

6.10 Use of Treated Sewage Water by TPS under NMCG (National Mission for Clean Ganga)

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, 04 nos. of Thermal Power Station (4598 MW) i.e. Koradi TPS (2,418 MW), Nasik TPP Phase-I (1,350 MW) in Maharashtra, IPGCL(330 MW) in Delhi and Bhavnagar Lignite TPS (500 MW) in Gujrat are utilizing STP water, totalling to 285 MLD. While 03 nos. of Thermal Plants (3030 MW) have successfully commissioned / constructed the project of utilization of Tertiary Treated STP water from respective STPs to Thermal Plants, amounts to 205 MLD treated water. Commercial operation of these projects is yet to start. further, 02 nos. of Thermal Plants (1650 MW) have successfully placed the order of construction of the project (Tertiary Treatment Plant and Pipeline), STP water associated with these projects amounts to 43 MLD.

6.11 Clean Development Mechanism:

Central Electricity Authority (CEA), brings out a CO2 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 CO2 emissions baseline to be used by CDM project developers in country. Version 14.0 &15.0 of Database for the years 2017-18 and 2018-19 respectively is available on CEA's website www.cea.nic.in.

6.11.1 Environment aspects of electricity generation:

CEA collecting and compiling the monthly environmental data viz. stack emission, Ambient Air Quality and Effluent Discharge for the year 2018-19 for thermal power stations. This database has been compiled and being reviewed on Quarterly basis. Data base for the year 2019-20 is also being compiled.

6.11.2 Performance Award Scheme for Thermal Power Stations:

This scheme is a part of the "Comprehensive Award Scheme for Meritorious Performance in Power Sector". Performance Award Scheme for thermal power stations has been developed with a view to accord recognition to power stations based on their all-round performance by integrating the four operational parameters viz. Station Heat Rate, Auxiliary Power Consumption, Specific Secondary Fuel Oil Consumption and Peaking PLF. The scheme in its present form is intended to foster the competitive spirit amongst various power stations so as to encourage them to improve performance in all spheres of their working. The scheme would also help in evolving bench mark for various performance indices. The scheme covers all coal/lignite based and Combined Cycle Gas Turbine (CCGT) thermal power stations of Central, State and Private Sector (excluding captive power plants) having units of size 100 MW or above for coal based power stations whereas CCGT based power stations should have at least one GT of size 30 MW or above. The award scheme envisaged eight number awards for meritorious performance of thermal power stations.

Applications for Performance Awards Scheme for the year 2017-18 were invited from TPSs, requesting them to furnish their all-round performance data. Accordingly, one hundred sixty-

one applications from Thermal Power Stations were received for participation in Performance Awards Scheme 2017-18. The evaluation of Performance Awards Scheme for the year 2017-18 is under evaluation. Keeping in view the present scenario of power sector, the performance award scheme for thermal power plants for the year 2018-19 & onwards has been revised (as per MoP instructions) and is under finalization.

6.11.2 Environment Management Award Scheme for Coal/Lignite based Thermal Power Stations:

One Environment Management Award Scheme for coal/lignite based thermal power stations was introduced to promote best strategy and management of environmental issues by coal/lignite based thermal power stations. Applications for Environment Management Award 2017-18 were invited from TPSs requesting them to furnish information on various environmental parameters such as CO2 emission, SPM emissions at stack, Fly Ash Utilization and Effluent Discharge etc. Accordingly, sixty-one applications from Thermal Power Stations were received for participation in Environment Management Award Scheme 2017-18 and is under evaluation.The performance award scheme for thermal power plants for the year 2018-19 & onwards has been revised (as per MoP instructions) and is under finalization.

6.11.3 National Energy Conservation Awards 2019:

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 2018-19 proposals received from three industrial sectors viz. Textile, Integrated Steel and Sponge Iron were evaluated by CEA. The awards to the best performing firms in three sectors were given during National Energy Conservation Day function held in New Delhi on 14th December, 2019.

6.11.4 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 for Thermal Power Stations making norms for Particulate Matter (PM), SO2, NOx, Mercury and water consumption.

CEA/MoP has prepared a phasing plan for upgradation/ installation of ESP/FGD in a phased manner starting from 2018 and extending up to 2022. Central Pollution Control Board (CPCB) has issued notices to the Thermal Power Plants identified in the above phasing plan to comply with new environmental norms by the stipulated date.

6.12 THERMAL CAPACITY ADDITION PROGREAMME

6.12.1 Thermal capacity addition target during 2018-19

The thermal capacity addition target for the year 2018-19 was 7266.15 MW against which a capacity of 5781.755 MW was achieved. This includes 4080 MW Capacity which was achieved from the target 2018-19 and 1701.755 MW additional capacity achieved. Sector-wise details of target and achievement during the year 2018-19 are as follows:

SECTOR	THERMAL (MW)	
	Target	Achieved
CENTRAL	2760	1960
STATE	4506.15	2849.755
PRIVATE	0	972
TOTAL	**7266.15**	**5781.755**

The details of target/ achievements for the year 2018-19 is enclosed at Annexure 6A.

6.12.2 Thermal Capacity Addition Programme for the year 2019-20

The thermal capacity addition target for the year 2019-20 is 10296.15 MW against which a capacity of 6765 MW has been achieved up to 31.03.2020. This includes 6720 MW Capacity which has achieved from the target 2019-20 and 45 MW additional capacity achieved. Sector-wise details of target and achievement during the year 2019-20 are as follows:

SECTOR	THERMAL (MW)	
	Target	Achieved
CENTRAL	6040	3940
STATE	4256.15	2780
PRIVATE	0	45
TOTAL	**10296.15**	**6765**

The details of target/achievements for the year 2019-20 is enclosed at Annexure-6B.

Note: Definition of Capacity addition has been changed as per CEA's Office Memorandum dated 29.03.2019.

6.13 Thermal Technology Development and Design & Engineering

6.13.1 Supercritical Technology

CEA has been actively associated in developing road map for introduction of new technologies for thermal power generation. Govt. of India had approved two bulk orders for Supercritical units in September-2009 (Bulk order I) for 11 number of 660 MW supercritical units and in January-2011 (Bulk order II) for 9 number of 800 MW supercritical units for various NTPC & DVC power projects. The GoI approval stipulated setting up of a subsidiary or Joint Venture (JV) Company for manufacturing of supercritical boiler (or turbine) in India with firm commitment to indigenize manufacturing in India in a phased manner as per Phased Manufacturing Programme (PMP) laid down in the GoI order and levying of liquidated damages for non-adherence to the pre-agreed schedule (milestones) of PMP. A Committee under Member (Thermal), CEA is monitoring the progress of phased manufacturing program. Three manufacturers of boilers (SG) and four manufacturers of Steam turbine generator (STG) have completed the setting up of manufacturing facilities as per PMP milestones.

A number of 660/ 800MW Units are operational in the country and many more number of supercritical units of 660/800 MW are under construction. Initially supercritical units were designed with steam parameters of

247 kg/cm2, 537/565 deg C. Subsequently, the parameters of 247 kg/cm2, 565/593 deg C and higher are being adopted for supercritical units.

Ultra Supercritical Thermal Power Plants with steam pressure of around 270 kg/cm^2 and temperatures of around 600/ 600 deg C are also in the process of being adopted in the country. The improvement in design efficiency of Ultra supercritical plants is around 1.5% point over that of supercritical plants. Some of the new upcoming power plants viz. Khargone TPP, North Karanpura TPP, Telangana TPP &Patratu TPP of NTPC and Jawaharpur STPP &Obra-C STPP of UPRVUNL &Khurja TPP of THDC are already with steam parameters of Ultra- supercritical class.

6.14 Important Activities

Following activities were also undertaken:

(a) Standard technical specification for retrofit of sea water based Flue Gas Desulpherization(FGD) system in thermal Power Plant was finalized and uploaded on CEA website.

(b) Various issues arising due to MoEF&CC Notifications related to new emissions norms, specific water consumption, Open/ Closed cooling water system and augmentation of ESP by various utilities were dealt with.

(c) Comprehensive Review of Regulations entitled "Central Electricity Authority (Technical Standard for construction of Electrical plants and Electrical lines) Regulations, 2010 for issue of the amendment was done and discussed in Authority Meeting in December 2019. It was proposed by the Authority to prepare a comprehensive fresh Regulations instead of issuing amendments. The work of preparation of fresh Regulations was in progress.

(d) Comprehensive review of CEA Regulations entitled "Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations, 2011" was taken up.

(e) CE (TETD) was deputed by Ministry of Power to attend the meetings of Over Arching Committee (OAC), monitoring the progress of R&D activities (Phase-I) of development of Advanced Ultra Supercritical technology (A-USC).

(f) The issue of upward revision of the Technical Minimum load of 55% in respect of gas based generating units of RGPPL, as referred by CERC to CEA, was examined and replied.

(g) The Grievances of M/s Paharpur Cooling Towers (PCTL) against restrictive and discriminatory practice being followed by China for supply of air cooled condensers (ACC) and for intervention to invoke the clause 10(d) of the Public Procurement Order (Preference to Make in India) Order 2017 was taken up by constituting a committee and report was prepared & submitted to MoP.

(h) Based on the approval of MoP, CEA Advisory, 2020on Sourcing of Supercritical units from indigenous manufacturers was issued to Central/ State power utilities.

(i) The advisory to be issued on the basis of recommendations of committee for fire incident at Unit # 7, 500MW of Anpara D TPS, Anpara UP of UPRVUNL was taken up.

(j) The issues related to the availability of the O&M and spares support to the power plants sourced from Chinese OEMs and also the generation demand to assess the sale of power from the project on

Acquisition of environmentally compliant IL&FS Thermal Power Plant by NTPC was taken up and report was sent to MoP.

(k) A draft of Notification for making co-firing of biomass pellets mandatory as minimum 5% (on monthly average basis) in coal based thermal power plants was prepared and sent to MoP.

(l) A Note on impact of co- firing of agro residue based biomass pellets (non- torrefied&torrefied) on unit heat rateand auxiliary power consumption in coal fired thermal unit/ plant was prepared and sent to MoP.

(m) A Note on 'Must Run Status' and 'Priority in Merit Order Dispatch' in respect of coal fired thermal power plants having co-firing of biomass pellets with coal was prepared and sent to MoP.

(n) A Committee was constituted by MoP under chairmanship of Member (Thermal), CEA for 'Standardization of rates for biomass pellets & raw agro residue in bale form'. Two meetings of the Committee were held& work was in progress.

(o) A Committee was constituted by UPRVUNL under chairmanship of Director (TE&TD), CEA to certify essentiality of purchase of 500 MW Toshiba make Generator stator & Rotor from its OEM M/s Toshiba JSW Power System Pvt Ltd. for 2x 500 MW Anpara B TPS. Report was prepared and sent to UPRVUNL.

a. Renovation and Moder-nisation and Life Extension Programme of Thermal Power Plants.

The main objective of Renovation & Modernisation (R&M) of thermal generating units is to make the operating units well equipped with modified/augmented with latest technology with a view to improve their performance in terms of output, reliability, availability, reduction of outage time, ease of maintenance and minimizing inefficiencies. The R&M programme is primarily aimed at generation sustenance and overcoming problems. The life extension (LE) programme on the other hand focuses on plant operation beyond their original design life after carrying out specific life assessment studies of critical components.

6.15.1 Renovation and Modernisation (R&M) and Life Extension Programme (LEP) from 7th Plan onwards till 12th Plan.

R&M Programme in a structured manner was initiated in 1984 as a centrally sponsored programme during 7th Plan and the programme continued during the two Annual Plans 1990-91 & 1991-92. The Plan wise details are given below:-

S. No.	Five Year Plan	Year	No. of TPS / No. of Units	Capacity (MW)	Additional Generation Achieved MU/ Annum*	Equivalent MW**
1	7th Plan & 2 Annual Plans	85-86 to 89-90 & 90-91, 91-92	**34 / 163**	**13570**	10000	2000
2	8th Plan (R&M) (LEP)	1992 to 1997	**44 / 198** 43/(194) 1 /(4)	**20869** (20569) (300)	5085	763
3	9th Plan (R&M)	1997 to 2002	**37 / 152** 29/ (127)	**18991** (17306)	14500	2200

	(LEP)		8/ (25)	(1685)		
4	10th Plan (R&M) (LEP)	2002 to 2007	**9/25** 5/(14) 4/(11)	**3445** (2460) (985)	2000	300
5	11th Plan (R&M) (LEP)	2007 to 2012	**21/72** 15/(59) 6/(13)	**16146** (14855) (1291)	5400	820
6	12th Plan (R&M) (LEP)	2012 to 2017	**18/37** 8/16 10/21	**7202.5** 4560.50 2641.76	-----	-----

*Tentative figure.
** Equivalent MW has been worked out assuming PLF prevailing during that period.

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

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

6.15.3 Achievements of R&M & LE Projects during 2017-22 upto 31-03-2020:

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 31-03-2020. 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	25-07-2017	210	GSECL	State	27-11-2017
R&M	Kathalguri CCGT	3	19-06-2017	33.5	NEEPCO	Central	20-07-2017

	Kathalguri CCGT	6	19-03-2018	33.5	NEEPCO	Central	31-03-2018
Sub Total		**3 4 (Units)**		**477.00**			
2. 2018-19							
LE	Koradi TPS	6	25-08-2015	210	MAHAGENCO	State	16-07-2018(oil firing) 20-08-2018(coal firing)
	Obra TPS	12	01-10-2016	200	UPRVUNL	State	24-09-2018
R&M	--	--		--	---	--	--
Sub Total		**02(unit)**		**410**			

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**	

a. 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 data. Information compiled on monthly/quarterly basis. Based on data / information collected & compiled, Quarterly Review Report on status of R&M projects were prepared.

b. Thermal units under shutdown for R&M/ LE Works

The following 3 units are under shut down for R&M and Life Extension works.

Sl. No.	Name of Project	Utility	State	Unit No.	Capacity (MW)	Shutdown Date
1.	Obra TPS	UPRVUNL	U.P.	7	100	01-07-2010
2.	Barauni TPS	BSPGCL	Bihar	6	110	15-11-2009
3.	Obra TPS	UPRVUNL	U.P.	13	200	16-05-2018
Total					**410**	

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

The year-wise FGD Phasing Plan and ESP Upgradation Plan are given below:

i) Year wise FGD Phasing Plan

Year	No. of Units	Capacity (MW)
2019	39	16410
2020	47	22310
2021	170	62297.5
2022	184	65454.5
Grand Total	**437**	***165942**

*Now the total capacity for monitoring the implementation of FGD as on 31-03-2020 is 165942 MW& no. of units are 437 after including the units commissioned after 31-08-2017.

ii) Year wise ESP Upgradation Plan

Year	No. of Units	Capacity (MW)
2018	1	500
2019	2	1300
2020	27	10405
2021	97	23495
2022	93	27725
Total	220	63425

To ensure compliance of the new Environmental Norms letters have been issued to concerned utilities for furnishing the details of action taken till date and further plan for FGD installation/ ESP –upgradation.
In view of the above CEA has started the monitoring of the implementation of the revised implementation plan.

6.16.1 Summary of Current Status of Implementation of phasing plan for FGD Installation:

General Summary (MW)

S. No	Sector (Capa-city in MW)	FGD planned	Feasibili ty Study Started	Feasibility Study Completed	Tender Specifi-cations Made	NIT Issued	Bids Award -ed	FGD Commi-ssioned
1	Central	53850	53850	53850	51960	51960	32840	420
2	State	50855	49205	43545	28295	23675	1000	0
3	Private	61237	59327	49122	40400	38000	6000	1320
	Total	165942	162382	146517	120655	113635	39840	1740

S. No	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specifica tions Made	NIT Issued	Bids Award -ed	FGD Commi-ssioned
1	Central	145	145	145	136	136	73	2
2	State	159	153	142	88	69	2	0
3	Private	133	129	100	75	70	10	2
	Total	437	427	387	299	275	85	4

500 MW Critical units

Units > 500 MW & located in areas either criticaly polluted or having population density > 400/km2

S. No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specifications Made	NIT Issued	Bids Awarded	FGD Commi-ssioned
1	Central	29320	29320	29320	29320	29320	19820	0
2	State	13980	13980	12280	8780	8780	1000	0
3	Private	13510	13510	12910	10670	9470	3770	1320
	Total	56810	56810	54510	48770	47570	24590	1320

S. No	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specifications Made	NIT Issued	Bids Awarded	FGD Commi-ssioned
1	Central	57	57	57	57	57	38	0
2	State	25	25	22	15	15	2	0
3	Private	22	22	21	17	15	6	2
	Total	104	104	100	89	87	46	2

NCR Summary

S. No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specifications Made	NIT Issued	Bids Awarded	FGD Comm-issioned
1	Central	3320	3320	3320	3320	3320	3320	420
2	State	4770	4770	4770	4770	4770	0	0
3	Private	4700	4700	4700	4700	4700	4700	1320
	Total	12790	12790	12790	12790	12790	8020	1740

S. No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specifications Made	NIT Issued	Bids Awarded	FGD Commissioned
1	Central	9	9	9	9	9	9	2
2	State	17	17	17	17	17	0	0
3	Private	7	7	7	7	7	7	2
	Total	33	33	33	33	33	16	4

6.16.2 FGD- ESP Phasing Plan of Thermal Power Plants located in Delhi NCR

Sl. No.	Name of Thermal Power Station	Timeline for FGD	Current Status
1	**Dadri (NCTPP), U.P Unit 1-4 (210X4 MW) NTPC**	**31.12.2019**	**FGD:** Awarded on 26 Oct 18. Work in progress **ESP:** Statutory limits being complied. **DE-Nox:** Statutory limits being complied.
	Dadri (NCTPP), U.P	**31.12.2019**	**FGD:** Awarded on 01 Feb 18. Work in

	Unit 5-6 (490X2 MW) NTPC		progress **ESP:** Statutory limits being complied. **DE-Nox:** combustion modification implemented.
2	**GHTP (LehraMohabbat), PunjabUnit 1-4(210X2 &250X2 MW) PSPCL**	**31.12.2019**	**FGD:** NIT issued. **ESP:** Matter being taken up with BHEL **De-NOx:** Matter being taken up with BHEL
3	**Harduaganj, U.P Unit-8&9 (250X2 MW) UPRVNL**	**31.12.2019**	**FGD:** Bid opened. **ESP:** Statutory limits being complied. **De-NOx:**Tender Part II to be invited.
4	**Indira Gandhi STPP, Haryana Unit 1-3 (500X3 MW)NTPC**	**31.12.2019**	**FGD:**Bid awarded. **ESP:** Statutory limits being complied. **DE-NOx:** Awarded on 29 Oct 2018.
5	**Mahatma Gandhi TPP, Haryana Unit-1-2(660x2 MW)CLP**	**31.12.2019**	**FGD:** FGD Installed and Under operation. **ESP:** Statutory limits being complied. **DE-Nox:** combustion modification implemented.
6	**Panipat TPS, Haryana Unit-6 (1X210 MW) HPGCL**	**31.12.2019**	**FGD:**Retendering to be done. **ESP:** SPM values are within limits. **De-NOx:** combustion modification planned.
	Panipat TPS, Haryana Unit-7-8 (2X250 MW) HPGCL	**31.12.2019**	**FGD:**Retendering to be done. **ESP:** SPM values are within limits. **De-NOx:** combustion modification planned.
7	**Rajiv Gandhi TPS, Hisar, Haryana Unit-1(2X600 MW) HPGCL**	**31.12.2019**	**FGD:**Bid opened. **ESP:**Repair for ESP fields during overhauling in Oct- Nov., 2019. **De-NOx:** combustion modification planned.
8	**Yamunanagar (DCTPS), Haryana Unit-1(2X300 MW) HPGCL**	**31.12.2019**	**FGD:**Bid opened. **ESP:**Repair for ESP fields during overhauling in Oct- Nov., 2019. **De-NOx:** combustion modification planned.
9	**Talwandi Sabo TPS, Mansa, Punjab Unit-1-3(660x3 MW)TSPL**	**31.12.2019**	**FGD:**Bid awarded. **ESP:** SPM are within the limits. **De-NOx:**complying with the norm of 450 mg/Nm^3.
10	**Nabha Power Ltd, Rajpura, Punjab Unit-1-2(700x2 MW)GMR**	**31.12.2019**	**FGD:**Bid awarded. **ESP:** Statutory limits being complied. **De-Nox:**complying with the norm of 450 mg/Nm^3.
11	**GGSSTP Ropar (4x210 MW) PSPCL**	**31/12/2019**	**FGD:** NIT issued. **ESP:** Statutory limits being complied. **De-NOx:** NOx values are below specified limits
	Total	**12790 MW**	

6.17 Flexible Operation of Thermal Power Stations

CEA organized flexible operation pilot tests at Mauda TPS of NTPC and Sagardighi TPS of WBPDCL with the help of O&M, BHEL team.The test was conducted successfully at 40% minimum load and 3% & 1% ramp rate. BHEL will submit the detailed report after analyzing the test result.

Flexibility Pilot test has been carried out at Ukai Thermal Power Station Unit 6 (1*500MW), GSECL on 04.03.2020 by BHEL/EDN Bangalore. Minimum load of 40% with ramp rate of 3% was successfully achieved.

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:

- *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.*
- *Identification of issues to be addressed regarding both existing and upcoming facilities, and also operation and maintenance.*
- *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*
- *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 meetingto discuss issues that have arisen or may arise in the course of implementation of the Cooperation*

Under CEA- JCOAL cooperation SCR Pilot test at NTPC's Sipat TPS was carried out to meet the new environmental norms and report has been submitted in 2019. Flexbilisation study has been carried out by JCOAL at Anpara-B TPS, UPRVUNL and Vindhyachal TPS, NTPC to enhance the flexibility of thermal units.

Preliminary survey is being conducted by Japanese for Biomass co-firing in NCR region in 2018. Further, JCOAL conducted viability study on agricultural biomass

utilization in Power Sector of India at GNDTPS Bathinda, PSPCL, Punjab on 11th& 12th December, 2019.

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 current year 2018-19 also, one group of 10 participants have undergone thee CCT Training Programme from 14th October 2019 to 22th October 2019.

A workshop on "Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" on 08.11.2019. Japanese companies like MHPS, Chugai, TEPCO and Toshiba have been participated in the workshop and explained their latest development towards efficiency and environmental implementation for coal fire power station.

Efficiency test at Mouda Thermal Power Station, NTPC has been conducted between 06.01.2020 to 10.01.2020 under Indo Japan Energy Dialogue by TEPCO Power Grid Inc. and JERA under the observation of CEA officers. Thermal Efficiency at different loading conditions was obtained for Units #3 and #4. Performance test results were submitted to CEA.

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, since 1996, fly ash generation and its utilization at coal/ lignite based thermal power stations in the country. 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.
This latest MoEF&CC's Notification of 25th January, 2016, emphasizing towards the efforts in the direction of enhancing gainful utilization of fly ash, stipulates

mandatory uploading on TPS's 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 Guaranteec At, 2005, Swachh Bharat Abhiyan, etc.

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 2018-19

The report for the Year **2018-19** 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 **2018-19**, the present status of fly ash generation & utilization is given in the table below:

Description	Year 2018-19
Nos. of Thermal Power Stations from which data was received	**195**
Installed capacity (MW)	**197966.50**
Coal consumed (Million tons)	**667.43**
Fly Ash Generation (Million tons)	**217.04**
Fly Ash Utilization (Million tons)	**168.40**
Percentage Utilization	**77.59**
Percentage Average Ash Content (%)	**32.52**

It may be seen from above that 77.59 % 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 2018-19. This is on higher side from the previous year i.e. 2017-18.

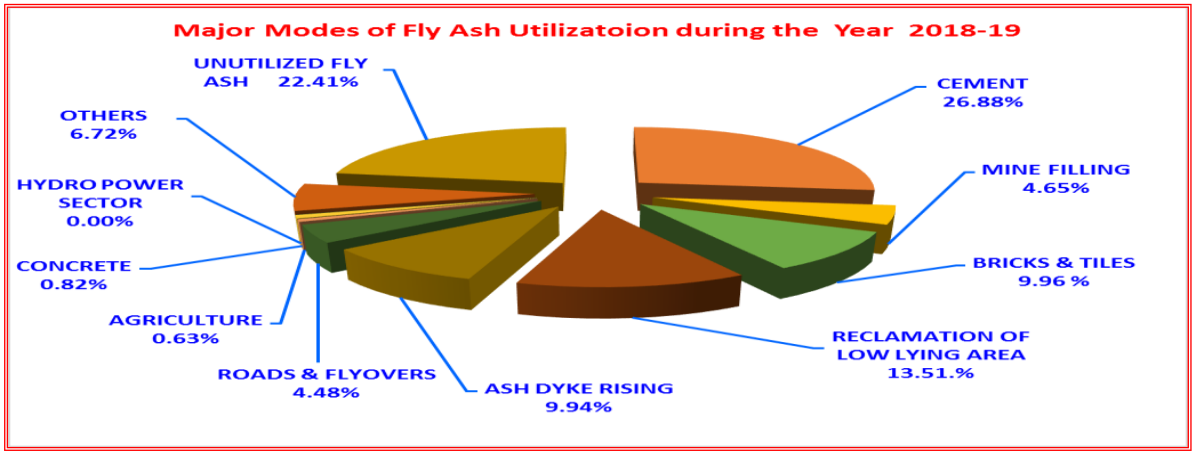
(B) Modes of Ash Utilization during year 2018-19

The major modes in which ash was utilized during the year 2018-19 is given in table below:

MAJOR MODES OF FLY ASH UTILIZATION DURING THE YEAR 2018-19

Sl. No.	Mode of utilization	Quantity and Percentage of Fly ash utilization in the Year 2018-19	
		Quantity (Million-ton)	Percentage (%)
(1)	(2)	(3)	(4)
1	Cement	58.3401	26.88
2	Mine filling	10.1002	4.65
3	Bricks & Tiles	21.6097	9.96
4	Reclamation of low lying area	29.3177	13.51
5	Ash Dyke Raising	21.5734	9.94
6	Roads & flyovers	9.7244	4.48
7	Agriculture	1.3769	0.63
8	Concrete	1.7742	0.82
9	Hydro Power Sector	0.0000	0.00
10	Others	14.5809	6.72
11	**Total Fly Ash utilization**	**168.3956**	**77.59**
12	Unutilized Fly Ash	48.6405	22.41
13	**Total Fly Ash Generation**	**217.0380**	**100.00**

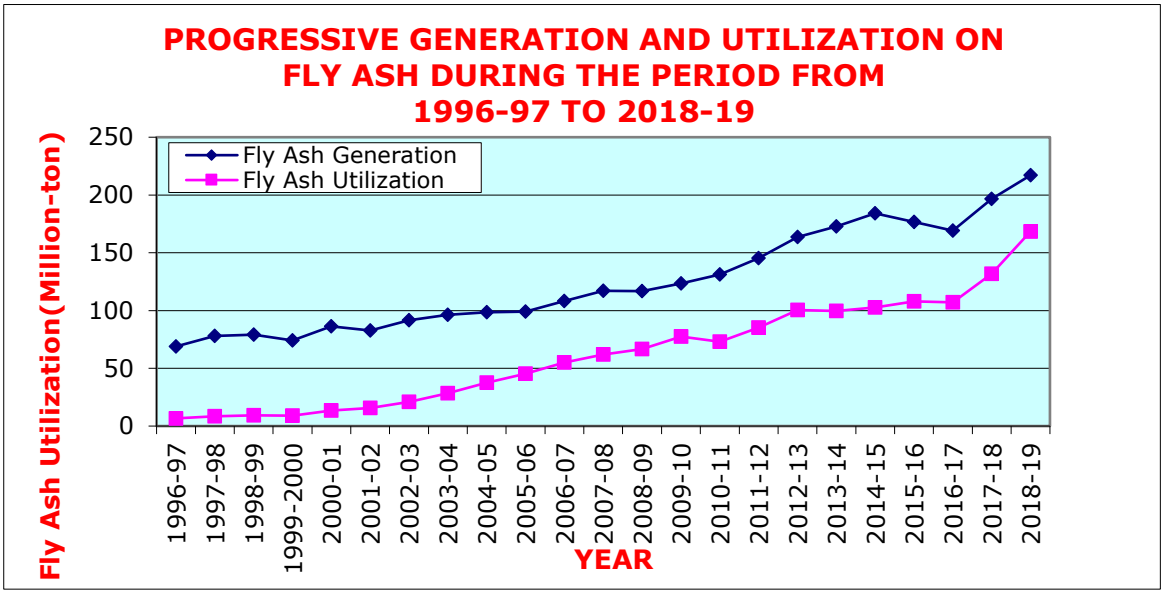
The utilization of fly ash in various modes in percentage during 2018-19 in the form of a pie-diagram is given below:



The maximum utilization of fly ash during 2018-19 to the extent of 26.88 % has been in Cement sector, followed by 13.51 % in reclamation of low-lying area, 9.96 % in making of bricks & tiles, 9.94 % in ash dyke raising, 4.65 % in mine filling, 4.48 % in roads & flyovers, etc.

6.19.6 Progressive Fly Ash Generation & Utilization during the Period from 1996-97 to 2018-19

The fly ash utilization has increased from 6.64 million tonnes in 1996-97 to a level of 168.40 million tonnes in 2018-19. A graph showing about progressive trend in fly ash generation and its utilization for the period from 1996-97 to 2018-19 is given below.



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 at a much better pace.

6.19.7 Conclusions on Fly Ash Utilization

i. Fly ash generation during 2018-19 is 217.04 million tonne due to combustion of 667.43 million tonne Coal/Lignite. During 2017-18, 196.44 million tonne of fly ash was generated due to combustion of 624.88 million tonne Coal/Lignite. However, fly ash utilizations during 2017-18 and 2018-19 are 131.87 million tonne and 168.40 million tonne 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 77.59% is achieved during the year 2018-19. It would require a lot of efforts to achieve the target of 100% utilization of fly ash. The stipulations of notification of 2009 and subsequent amendments should be effectively implemented. As per this report, about 22.41% un-utilized fly ash was dumped at various Thermal Power Stations in the country during 2018-19.

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

Annual Fly ash utilization has remained about 77.59% of the fly ash generated and therefore, it has become a matter of concern in view of its adverse environmental effect and its progressive accumulation may lead to a situation when ash pond may not be in a position to accommodate fly ash further. In view of seriousness and urgency of the issue, NITI AAYOG has convened several meetings on ''Policy Framework on Utilization of Fly Ash and Slag''. During one of its meetings on 17.03.2017, NITI AAYOG desired an online repository of the fly ash generated by thermal power plants indicating the following parameters:

- 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, 101-500 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.

A web based monitoring system and a mobile application have been developed. Login ID and Password have been issued to Power Utilities/ Thermal Power Stations for uploading the monthly data of fly ash generation and utilization. A workshop for facilitating the users had been organized on 28th August, 2017. Further, two video conferences were organized on the above issues on dated 12.09.2017 and 05.10.2017 with the help of M/s NTPC Limited. Feeding of data by the Thermal Power Stations on the web based monitoring system is under progress.

The mobile application "ASH TRACK" is a GIS-based interface between fly ash generators and potential fly ash users. It contains useful information regarding quantum of fly ash available at nearby TPS and contact details of nodal officer of concerned TPS, etc.

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-ministerial 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 implementation status on above recommendation of the Expert Committee for effective utilization of fly ash by TCD Division, CEA. In response 64 thermal power plants provided the action taken report on recommendation of the Expert Committee and same has communicated to Ministry of Power.

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.

6.20 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 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.

For the FY 2018-19, Thirty Eight (38) Meritorious Performance Awards along with one (1) consolation award in 11 categories will be envisaged to the power sector.

Scheme Code	Name of the Award Scheme	No. of Awards
Th-1	Award Scheme for Performance of Thermal Power Stations	8
Th-2	Award Scheme for Early Completion of Thermal Power Projects	3
Hy-1	Awards Scheme for Performance of Hydro Power Stations	3
Hy-2	Awards Scheme for Expeditious Completion of Hydro Power Projects	2
Tr-1	Award Scheme for Transmission system Availability.	3
Tr-2	Award Scheme for Early Completion of Transmission Projects	6
Nu-1	Award Scheme for Performance of Nuclear Power Stations	1+1*
Rf-1	Award Scheme for Performance of Govt. Owned Distribution Companies	3
Rf-2	Award Scheme for Performance of Private Distribution Companies	3
Rf-2	Award Scheme for Performance of Rural Distribution Franchises	3
En-1	Award Scheme for Environment Management for Coal based Thermal Power Stations	3
	Total Awards	**38+1***

*One (1) Consolation Award

6.20.2 Awards for the year 2014-15 and beyond

Award Scheme 2014-15, 2015-16 and 2016-17 has been sent to Ministry of Power for further action. The evaluation process of award schemes for the year 2017-18 & 2018-19 is in progress.

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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 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 except in Bihar and Assam, in which access to unconnected households have been proposed beyond Financial Year 2019. The identified action plans are under implementation by the respective states and UTs.

For monitoring of implementation of Roll out plans/action plans as envisaged in 24x7 PFA documents and to facilitate the States/UTs in reporting the same, MOP has on 8th December 2016, set up a Central Program Monitoring Unit for Power For All (CPMU-PFA), which comprises of the members from REC, NHPC and PFC (with REC Ltd as Nodal officer).

Further, in order to address the implementation issues of Rollout Plan, MoP has also set up an **Inter-Ministerial group** comprising of Members from Ministry of Power (MoP), Ministry of Coal (MoC), Ministry of Environment & Forest (MoEF), Ministry of New and Renewable Energy (MNRE), Ministry of Railways (MoR), Ministry of Petroleum & Natural Gas (MoP&NG), Ministry of Agriculture (MoA), Bureau of Energy Efficiency (BEE), Department of Expenditure DoE), Central Electricity Authority (CEA), Rural Electrification Corporation (REC) and Power Finance Corporation (PFC). As a member of Monitoring committee of this initiative, CEA has been attending the meeting of MOP regular basis and contributing in sorting out the issues for achieving the goal of 24x7 power for all.

1) **Village Electrification:** As per the present status of all the states, all the inhabited un-electrified villages including villages in hamlet areas/interior villages stood electrified as on 28th April, 2019 under DDUGJY.
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. REC ltd is the Nodal agency for implementation of this scheme. A total of 2.38 crore willing un-electrified households were electrified under Saubhagya scheme up to 31.03.2019, thereby achieving 100% target in all participating states, except for 18,734 households in Left Wing Extremist (LWE) affected Bastar region of Chhattisgarh. Subsequently, some states have submitted requests for electrification of additional households under this scheme, which is given at Clause No 7.29 below.
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 under PFA for

distribution network includes formulation and implementation of perspective distribution plan envisaging substantial distribution capacity as well as expansion and provision of last-mile connectivity. This would include augmentation of the existing network to cater to un-electrified areas. To address some of the challenges faced in distribution such as last-mile connectivity, illegal connections, high losses and quality of supply, an effort has been made by the utilities in various areas of distribution system such as 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 etc. under the sanctioned components of DDUGJY scheme, IPDS scheme, and Saubhagya scheme which are given in details in the paragraphs below.

Status of Power Supply in rural Areas: As per the status available in MIS of DDUGJY for March, 2020, the achievement of 24x7 Power for all in Rural Areas is as below:

Duration of supply	Name of State*
24 Hrs of Supply -in 8 States	Gujarat, Himachal Pradesh, Kerala, Maharashtra, Punjab, Tamil Nadu, Telangana, West Bengal
<24 to 23 Hrs of Supply in 5 States	Andhra Pradesh,Uttarakhand, Madhya Pradesh, Manipur, Tripura
<23 to 20 Hrs of Supply in 6 States	Chhattisgarh, Rajasthan, Odisha, Bihar, Meghalaya, Nagaland
< 20 Hrs of Supply in 10 States	Karnataka, Assam, Uttar Pradesh, Sikkim, Haryana, Jammu & Kashmir,Jharkhand, Mizoram, Arunachal Pradesh

* Excluding Goa & UTs

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.

CEA has requested all eligible Discoms and RDFs in the country to send their proposal for participation along with the required data for evaluation under Award Scheme for

the consideration years2017-18 and 2018-19. The information/data till date from 11 Public Discoms and 6 Private Discoms have been received for the year 2017-18, which are being analyzed for evaluation under the criteria of the scheme. The participation for Award Scheme 2018-19 is very low (08 nos) due to abovementioned reasons of not instituting the award for last two years.

7.3 Development of Smart Grid in the Country

- Govt. of India launched 'National Smart Grid Mission (NSGM)' in March, 2015for planning and monitoring the implementation of policies & programmes related to smart grid activities in India. In May, 2018, MoP sanctioned continuation of NSGM upto March 2020 with a total outlay of Rs 990 Cr including budgetary support of Rs 312 Cr from Govt. of India. Under NSGM, 30% funding is being provided by Govt of India for Smart Grid projects in the country.

- NSGM has a three-tier structure i.e Governing Council headed by the Hon'ble Minister of Power, Empowered Committee headed by the Secretary (Power) and Technical Committee headed by the Chairperson, CEA.
- Smart Grid being a new technology, NSGM is assisting in capacity building of States/DISCOMs in smart grid by conducting study courses and seminars etc. NSGM Project Monitoring Unit (NPMU), the nodal agency of NSGM, is also handholding the States for speeding up the development of Smart Grid projects in the country.
- 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. DP&T Division has also assisted NSGM for development of model DPR and RfP for smart grid projects along with all the technical matters related to Smart Grid.

7.3.1 Smart Grid Pilot Projects

To test the various smart grid technologies available, eleven (11) Smart Grid Pilots including a smart City pilot at IIT Kanpur and Smart Grid knowledge Centre at Manesar, were sanction by MoP at different geographical location in the country with functionalities like Advanced Metering Infrastructure (AMI), Power Quality Management (PQM), Peak Load Management (PLM), Distributed Generation (DG), Micro Grids and Outage Management System etc. These pilot projects cover about 1.67 lakh consumers for a total sanctioned cost of Rs.254.29 Cr. With GoI funding of Rs. 130.06 Crores. All the pilot projects have been completed during 2019-20.

7.3.2 Status of Smart Grid Projects under NSGM

Under NSGM, 5 Smart Grid Projects worth Rs.683.16 Crores have been sanctioned with funding commitment of Rs 204.95 Crores. The status of these Smart Grid Projects is as below:

Sl. No.	Project Area/State/UT	Sanction Date	No. of consumer (in Lakhs)	Approved project cost	NSGM Support @30% of Approved Cost	Status
1	Chandigarh (Sub Div-5)	Apr'16	0.295	28.58	8.57	Project under implementation
2	Chandigarh (Complete City Excl. Sub Div-5)	Sep'18	1.84	241.49	72.45	Sanction letter issued. Bids for PMA in progress
3	Ranchi, Jharkhand	Sep'18	3.6	228.69	68.61	Bid Evaluation in progress
4	Rourkela, Odisha	Sep'18	0.87	96.97	29.09	Under Re-tendering
5	6 urban towns of JVVNL (Baran, Bharatpur, Bundi, Dholpur, Jhalawar & Karauli) , Rajasthan	Dec 2019	1.5	87.43	26.23	Sanctioned in 4th Empowered Committee held on 23-12-2019
	Total		8.10	683.16	204.95	

7.4 Committee constituted by MoP to prepare a Report on development of Smart Grid in the Country

In the Governing Council Meeting of NSGM held under the Chairmanship of Hon'ble Minister of State for Power and New & Renewable Energy on 16th January, 2019, it was directed that a Committee may be constituted in CEA to study and prepare a report on "Development and Implementation of Smart Grid" in the country. Accordingly, a Committee under Member (GO&D), CEA with Members from PGCIL, NPMU, POSOCO, CESC Kolkata, CESC Mysuru & UGVCL Gujarat was constituted in CEA. After various deliberations, the report of the Committee was submitted to MoP in September, 2019.

7.5 Committee Constituted by MoP for Smart Meter Rollout Plan in the Country

- Ministry of Power vide letter Dt 14th Aug 2019 constituted a Committee under chairmanship of Chairperson, CEA with CMD- PFC, CMD- REC & MD-EESL as members of the committee and CE(DP&T) as Member & Convener of the Committee to deliberate on various models for rolling out smart meters in the country in three years in prepaid mode.
- The committee deliberated various funding models including Opex models and submitted the report of the Committee with its recommendations to MOP in September 2019.

7.6 Committee related to use of Cloud Services in Smart Metering Projects under Govt funded Schemes: -

MOP constituted a Committee under the Chairmanship of Chief Engineer (DP&T), CEA with members from PFC, REC and NSGM to compile a report on issue of cloud based services, rules applicable for hiring of services, finalizing RFP, calling for bids, examining tenders etc to be followed in Smart Metering projects with Govt Funding. The committee deliberated on the issues and submitted the report to MOP in Dec 2019.

7.7 Group of Officers (GoO) to Review of Performance of NSGM and to examine the performance and feasibility of continuation of NSGM beyond March 2020

To review the progress of National Smart Grid Mission (NSGM) and to examine the performance and feasibility of continuation of NSGM beyond March 2020, Ministry of Power constituted a Group of Officers (GoO) in Dec 2019 under chairmanship of Member (GO&D), CEA with members from NSGM, PFC, REC, PGCIL & CEA. The GoO deliberated upon the performance of NSGM and feasibility of continuation of NSGM beyond March 2020 and submitted the Report to MOP in Feb 2020.

7.8 Material to MOP on Smart Metering for New Comprehensive Scheme

- Furnished the material to MOP on Smart Metering for New Comprehensive Distribution Scheme
- Furnished a note to MOP on International Best Practices on implementation of Smart Metering.

7.9 Research & Development Projects in the Distribution Sector

Officers from DP&R Division participated in various meetings of the Technical Committee on Grid, Distribution and Energy Conservation Research held at CPRI, Bengaluru for review and approval of various R&D projects under NPP, RSoP and IHRD Schemes.

7.10 Integrated Power Development Scheme (IPDS):

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 will be 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%. The programme has two major components under which the investments through this scheme will lead to reduction in loss level. **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, 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 achievement/ Progress of the schemes is 80%.

7.11 Association with 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 various states

As a nodal division for matters related to disaster management, DP&R division nominated officers from this divisions 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 Odisha, Karnataka, Punjab, Maharashtra, Uttar Pradesh, Bihar, Kerala, Assam, Himachal. Rajasthan, Madhya Pradesh, Meghalaya and Tripura. 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.

7.12 Amendment in CEA Regulations

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

❖ 3rd Amendment of Central Electricity Authority (Installation & Operation of Meters) Regulations, 2006

Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 weretaken up for review and based on the comments received from various stakeholders and after approval of the Authority the amendment Regulations were notified in the official Gazette on 23rd December, 2019. In the Amendment Regulations, major modifications include:

i. all new Consumer Meters shall be Smart Meters with prepayment feature
ii. all new Interface Meters and Energy Accounting and Audit Meters shall be of static type and shall have automatic remote meter reading facility.
iii. time block for recording of meter data by the meter shall be 15 minutes or as specified by the Central Commission

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

The 2nd draft Amendment of Central Electricity Authority (Technical Standards for construction of Electrical plants and Electric lines) Regulations, 2010 pertaining to distribution sector has been sent to TE&TD Division after approval from Member(GO&D).

7.13 Ease of Doing Business

Ministry of Power constituted a Committee under Member (Grid Operations & Distribution), CEA with Chief Engineer (DP&R Division) as its convener, for comprehensive review/ validation of the reforms undertaken by Discoms of Delhi and Mumbai for "Getting Electricity" indicator under Ease of Doing Business, for further improvement of ranking of India on this particular indicator. Other members of the Committee include representatives of Distribution Utilities of Delhi and Mumbai. Report of the Committee was finalized and submitted to MoP in May, 2019.

7.14 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'. The Panel has held three meetings in this regard and the Draft Standards after finalization would be sent to ETD 01 for discussion in the Committee meeting.

7.15 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 on 'DC Grid for medium power applications' inline with 48V ELVDC standard and IEC TS 61200-102 draft standard. The Panel has held two meetings in this regard and the draft is under discussion.

7.16 Formulation of Electricity (Rights of Consumers) Rules, 2020

Hon'ble Minister in a meeting held in July, 2019 indicated that CEA shall formulate norms/standards/rules for prescribing Quality of Service by the Distribution Utilities. For the said purpose, a Committee was constituted under Member(GO&D), CEA with Chief Engineer (DP&R Division), CEA as its convener. Other members of the Committee were representatives from Regulatory Commission, Distribution Utilities, PRDC etc. The committee formulated the draft Electricity (Rights of Consumers) Rules, 2020. These Draft Rules details the obligations of the licensee and specifies the set of practices that shall be adopted by the licensee to provide efficient, cost-effective, reliable and consumer friendly services so as to facilitate ease of use as well as ease of doing business by the consumers.

7.17 Uniformity in Supply Voltage

It was observed in the Committee meetings of ETD 01 of BIS that the ambiguity regarding the standard voltages (230 V or 240 V) is profound and decided that these shall be discussed with CEA so as to revise the standard voltages as needed in IS 12360.

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. It was also decided to request CEA to organize the Working Group meetings with the following composition:

1. CEA
2. Secure Meters
3. Lab
4. Utilities- DMRC/TATA Power

The first meeting of the Working Group was held on 24.07.2019 and the matter is under discussion.

7.18 WORKS RELATED TO UNION TERRITORIES (UTs)

7.18.1 UT of Daman & Diu

Technical approval was accorded to the following Schemes for UT of Daman & Diu:

- Scheme for replacement and enhancement of capacity of 4 nos. of 10 MVA old Power transformers to 15 MVA Power transformers at 66/11 kV Dabhel, Ringanwada and Varkund Sub- stations in Daman.
- Scheme for providing Underground Power Distribution System for the FY 2019-20, FY 2020-21 and FY 2021-22 in UT of Daman & Diu.
- Scheme for Normal Development and Release of Service connections for the FY 2019-20, FY 2020-21 and FY 2021-22 in UT of Daman & Diu.

7.18.2 UT of A&N Island

- SFC Memo for establishment of Renewable Energy Management Centre (REMC) and Energy Management Centre (EMC) at Port Blair, A&N Island was examined and comments furnished.
- The matter regarding revival of 20 MW diesel based Suryachakra Power Plant at Bambooflat- Ref from M/s Vamana Bhagya Pvt.Ltd. was examined and comments fursnihed.

7.18.3 UT of Puducherry

The proposal regarding re-structuring/ upgradation of various posts as a result of study on the restructuring of Electricity Department was examined and comments furnished.

7.18.4 UT of Chandigarh

The SFC memo for Smart Grid Project for Chandigarh was examined and comments furnished.

7.18.5 Delhi

- The reference received from Delhi Govt regarding shifting of distribution transformers in stretch from Lal Quila to Fatehpuri chowk under Chandni Chowk beautification project was examined and comments furnished to Delhi Govt.
- Accorded approval for the pilot project regarding installation of special type compact submersible underground transformer & 11kV submersible underground switchgear by TPDDL, Delhi.

7.18.5 UT of J&K and UT of Ladakh

Ministry of Power vide OM Dt 17th Dec 2019 constituted two committees for development of Road Map for Power sector for UTs of J&K and Ladakh. The preparation of road map for Distribution sector for these UTs was in progress.

7.19 Technical Clearance/examination of distribution schemes received from Ministry DONER and NEC for North Eastern States: -

The following works were completed during 2019-20 for North Eastern States: -

Arunachal Pradesh

- Technical clearance of the scheme for construction of 33 KV line from Dirang to Jang in West Kameng and Twang district in Arunachal Pradesh was accorded.

Sikkim

- Technical clearance of the DPR of strengthening, modernization and improvement of Sub-Transmission &Distribution system of Raj Bhawan, Mintogang, High Court, VIP area and surrounding areas in Gangtok, East Sikkim was accorded.
- Technical clearance of the Scheme for providing 11 KV Downstream Last Mile Connectivity for strengthening of T & D System in Sikkim under NESIDS was accorded.
- Technical clearance of the DPR for remodelling of Power Transmission & Distribution System under Sang, Khameong, Singtam, Makha ane Samdong Bazar under Tumin Lingee ane Khamdong Singtam Constituencies, East Sikkim under NESIDS was accorded.

Nagaland

- Technical clearance of the Scheme for construction of 33/11 KV, 1x1.6 MVA S/S st Longmatra under Kiphire Division, Nagaland was accorded.
- Proposal of Govt of Nagaland for construction of 66/11 KV, 20 MVA S/S at Mon District along with associated works under NESIDS and HADP Special Packages was examined and comments furnished.
- The proposal received under Multi-Disciplinary Committee to look into development issues and special needs of the Eastern Nagaland was examined and comments furnished to MoP.

Mizoram

- Technical clearance of the Detailed Project report (DPR) for strengthening 33 kV Sub-station at Zaizawhtlang and Thenhlum with associated lines in Mizoram was accorded.

Manipur

- Proposal of Govt of Manipur for funding for system strengthening of existing infrastructure and LT smart pre - paid metering was examined & comments furnished.

Tripura

- Proposal received from Govt. of Tripura regarding fund support of Rs. 55.08 Cr for implementation of 11 kV downstream connectivity matching with time frame in developing S/Ss under NERSIP was examined and comments furnished.

7.20 Concurrence/ Examination of Preliminary Project Report (PPRs) of various States under External Assistance from ADB/World Bank/ MDB etc.: -

- Preliminary Project Report (PPRID-10644) for Distribution System Strengthening, SCADA enablement of 33/11 kV Sub stations and AMI based Smart metering in 3 discosm of Madhya Pradesh with funding from KfW was examined and concurrence accorded.
- Preliminary Project Report (PPRID-10554) reg. implementation TA support for Maharashtra Rural High Voltage Distribution System (HVDS) expansion Programme funded by ADB was examined and concurrence accorded.
- Distribution Portion of PPR (PPR ID: 10738) from Government of Himachal Pradesh for “Himachal

Hydropower and Renewable Power Sector Development Program" by HPSEBL with external assistance from World Bank/IBRD was examined and concurrence accorded.

- Project Proposal from BEE regarding SBI Loan from KfW for providing funding for Energy Efficient Housing Programme was examined and comments accorded.
- Preliminary Project Proposal 'PFC Discom Investment Facility" by Power Finance Corporation Limited with external assistance from KfW was examined and comments accorded.
- PPR of EESL for 3rd line of credit for US $ 500 million from Asian Development Bank Project was examined and comments accorded
- PPR of EESL for Technical Assistance for World Bank under 2nd Line of Credit from ADB was examined and comments accorded.
- Preliminary Project Proposal of EESL (PPRID: 10804) on Energy Efficiency Scale-up Program (Additional Financing) with external funding of USD 300 Million from World Bank – IBRD was examined and comments accorded.

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

- The proposal from the Govt. of Bangladesh for "Modernization of City street light system at different area under Chattogram City Corporation" under the GoI line of Credit of US $ 4.5 Billion extended to Bangladesh was examined and comments furnished.
- Detailed Project Report (DPR) for Electrification of Enugu in Nigeria was examined and comments furnished.
- Sub-transmission portion of DPR for construction of 225 kV Double circuit and 132 kV Single Circuit Transmission Lines and associated substations in Sierra Leone was examined and comments furnished to SETD Division.

7.22 Conduction of Mock Test Exercise at Parliament House S/S: -

To ensure reliability of power supply to Parliament house before onset of each Parliament session a Mock test exercises at CPWD 11 KV Parliament House S/S were organized by CPWD in presence of officers of CEA, CPWD & NDMC before the Monsoon, Winter and Budget Sessions of Parliament and the reports of the Mock Test Exercise were sent to MOP, CPWD & NDMC.

7.23 Distribution Perspective Plan 2022: -

In order to provide a uniform framework and guidelines to utilities/DISCOMs and to evolve integrated approach for strengthening of Distribution sector in the country, the Distribution Perspective Plan for distribution sector upto 2021-22 was taken up by DP&T Division of Central Electricity Authority under guidance of Ministry of Power. This Plan was prepared with the detailed consultation with DISCOMs and was based on the data/ inputs provided by the Distribution Companies and State Power Departments considering the projected electricity requirement in 19th EPS and other related factors.Hon'ble Minister of State for Power reviewed the DPP in a meeting in MoP in June 2019 and as directed in the meeting, the revised DPP was submitted to MoP in July 2019.

7.24 Manual on Distribution Planning Criterion:

In the meeting chaired by Hon'ble MOS for Power to discuss the draft Distribution Perspective Plan 2022, it was directed that CEA should bring out a Manual on Distribution Planning Criteria for guidance of Distribution Utilities for planning their Distribution System. According, a Committee was constituted under the Chairmanship of Member (GO&D), CEA to prepare and finalize a manual on Distribution Planning Criteria for distribution utilities. The draft manual has been prepared and circulated to all DISCOMs for their comments.

7.25 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, CERT-MoP and CERT-In for disseminating information and advisory to DISCOMs on cyber security issues received from NCIIPC, CERT-In & CERT-MoP. The following actions were taken by CERT-D during 2019-20 –

- The Cyber Crisis Management Plan (CCMP) for Distribution Sector was circulated to all Distribution Utilities (DISCOMs) for adoption and preparing their own CCMP for implementation in their utilities.
- At present, 62 major DISCOMs have nominated their Chief Information Security Officer (CISOs). CERT-D is pursuing with remaining DISCOMs for nominating their CISOs.
- 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 empanelled agencies etc, 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 and Guidelines issued by NCIIPC for Mitigation of Cyber Security Threats in Power Sector were issued to all DISCOMs for their compliance.
- CERT-D has circulated the MeitY guidelines for setting up of CSIRT's as received from MoP to all DISCOMs for necessary action.
- Attended various meetings conducted by CERT-In/NCIIPC/CISO-MoP.
- Letter to DISCOMs for identifying the Critical Information Infrastructure (CII) for their organization as per guidelines given by NCIIPC.
- Furnished Critical Information Infrastructure (CII) details of 22 DISCOMs to CISO-MoP & NCIIPC.
- Furnished status of cyber security measures taken by DISCOMs to MoP/CISO-MoP.

7.26 Report of the Status of Feeder, Distribution Transformer and consumer metering

In July 2019, Ministry of Power directed CEA to prepare a report on the status of Feeders, DTs and Consumers metering in the country and also to submit the monthly status of the metering. Based on the data

received from Discoms and that available at various portals like NPP, Uday, Urja Mitr, Discoms' websites, etc., a Discom wise preliminary report on Feeder, DT and Consumer metering was submitted to MOP in Dec 2019. The report was also discussed in the RPM meeting chaired by Hon'ble Power Minister on 9-10 January 2020.

7.27 Rural Electrification

7.27.1 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.

As per the data furnished by State Govts, 282913 number of pumpsets/tubewells energized during 2019-20 and cumulatively, 21354379 pump sets/tube wells have been energized at the end of March 2020 in the Country. Overall status of Rural Electrification in the Country is shown under DDUGJY at Para 7.7.2.

7.27.2 Deendayal Upadhyaya Gram Jyoti Yojna (DDUGJY):

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; and
(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 will be carried forward to the new scheme of DDUGJY in addition to the outlay indicated as above.

Under the new scheme, 60% of the Project cost will be extended by Govt. of India as Grant in respect of States other than special category (85% for the Special Category States i.e. all North Eastern States including Sikkim, J&K, Himachal Pradesh, Uttarakhand). Minimum 10% (5% for Special Category States) shall be contributed through own sources by the State Govt./ State Power Utility and the balance 30% (10% for Special Category States) may be arranged through Loan or own sources by the Sate Govt./ State Power Utility. Additional grant upto 15% (5% in case of Special Category States) by conversion of 50% of loan component will be provided by Govt. of India on achievement of prescribed milestones such as timely completion, reduction in AT&C losses & upfront release of revenue subsidy by State Govt.

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. Financial progress of the scheme (based on MIS of DDUGJY as on March20) is 59%.

7.27.3 Decentralized Distributed Generation (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.

Status of DDG projects sanctioned under RGGVY/DDUGJY as on 31.03.2020:

Under DDG, 4,151 projects covering 2,29,611 Nos. of Households (including BPL Household of 2,24,043) in 3402un electrified villages/hamlets in 16 States (Andhra Pradesh, Assam, Arunachal Pradesh, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Odisha, Rajasthan, Telangana, Uttar Pradesh,Uttarakhand, Manipur& J&K) at an estimated cost of Rs.1,490.80 crores have been sanctioned by the Monitoring Committee, and out of which Rs.771.36 crores have been released and 3,363 (98.85%) un electrified villages/hamletshave been commissioned.

7.28 Publication of Distribution Data regarding Reliability Index:

As per the mandates available in clause 5.13.1 of National Electricity Policy (NEP), the Appropriate Commission to regulate the utilities based on pre-determined indices on quality of power supply w.r.t. many parameters including frequency and duration of interruption of feeders. The clause 5.13.2 of NEP stipulates that Reliability Index (RI) of supply of power to consumers should be indicated by the distribution licensee. A road map for declaration of RI for all cities and towns upto the District Headquarter towns as also for rural areas, is required to be drawn by up SERCs. The data of RI should be compiled and published by CEA". Accordingly, based on the data furnished by Discoms/Licensees, the data of RI in the proforma prescribed by CEA covering all cities and towns and also for rural areas has been compiled for 2017-18 and published on website of CEA.

Further, to align with the Standards of Performance (SOPs) of SERCs, the formats for collection of RI data has been modified to accommodate the parameters, methods of calculations etc of SOPs and circulated to all Discoms/Power departments to be effective from 2018-19 and onwards. Accordingly, based on the data furnished by Discoms/SERCs, the data of RIs, viz System Average Interruption Frequency Index (SAIFI),System Average Interruption Duration Index (SAIDI) etc covering all cities and towns and also for rural

areas has been compiled for 2018-19and the data collection for 2019-20is under progress.

7.29 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. The achievement/ Progress of the schemes (based on progress of electrification in MIS of DDUGJY as on 31.03.2020) is given as below:

A total of 2.38 crore (reconciled as per MIS for March20) un-electrified willing households have been electrified in 29 states and one UT since the launch of the scheme on 11th October 2017.

Subsequently, around 18.85 lakh un-electrified households in seven States which were un-willing earlier (including 18,734 households balance for electrification as on 31 march2019) have opted for electricity connection, were identified before 31st March, 2019. Accordingly, States were advised by MOP to electrify these additional household under Saubhagya, out of these13,92,281 households were electrified by 31st March, 2020.

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

Hon'ble Prime Minister on 07.11.2015 announced a Rs 80,000 crore development package for Jammu and Kashmir, which includes 11708 Crore package for augmentation of power infrastructure and distribution systems; solar power; small hydro projects. Out of this package, the amount sanctioned for Strengthening of Distribution system and new technologies in the state of J&K is Rs 2570.14 Crores. The details of the distribution projects sanctioned on 9th Nov, 2016 by MOP, Government of India are 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 Physical progress as provided by respective PIAs under the PMDP-Rural is as below:-

Region	PIA	Progress
Kashmir	KPDCL	35%
	PGCIL	30%
	RECPDCL	0%
Jammu	JPDCL	52%
	PGCIL	52%
	RECPDCL	0%
Ladakh	LPDCL	100%
	PGCIL	30%

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 Physical progress as provided by respective PIAs under the PMDP-Rural is as below:-

Region	PIA	Progress
Kashmir	KPDCL	65%
	RECPDCL*	48%
Jammu	JPDCL	39%
	RECPDCL	60%
Ladakh	LPDCL	0%
	PGCIL	40%

*Consumer metering yet to be awarded

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 yet to be awarded.

Smart Grid projects: Projects worth Rs 141.26 Crores including PMA charges has been sanctioned and PGCIL is the PIA.The work is yet to be awarded

CEA is regularly monitoring the progress through PMA/PIAs and submitting the compiled report to Ministry of Power on monthly basis.

Additional fund for PMDP 2015:

i) JKPDD has submitted additional 18 DPRs for Rs. 562.22 cr. during January 2019 and a Committee headed by CE(DM); and having members from REC, PFC and PGCIL; has apprised these DPRs (subsequently revised to Rs. 819.11 crs.) for Rs. 711.89 crs., and recommended the same to MoP for funding to J&K on 29th Nov, 2019.

ii) JKPDD has also demanded additional fund to complete the full scope of work under the PMDP-2015. CEA apprised the additional fund requirements of Rs. 4076.00 crs. and submitted the report to MoP on 20th June, 2019 for consideration. Further, a committee comprising of members from CEA, REC and PFC is constituted by MoP to assess the possible justification of this additional demand for the projects sanctioned under PMDP-2015. This committee prepared report providing justification for Rs. 4738.88 crs, which has been submitted to MoP on 7th Oct, 2019 for its consideration and sanction to J&K.

7.31 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 forrural 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 playing following role for integration of Distribution sector data with NPP:

a) Updating/restructuring the formats for data capturing and its presentation in NPP, in consultation with NIC and IT Division of CEA.
b) Integration of all feeder data of all Discoms/Power departments in association with Discom/Power department and NIC, CEA held two meetings with Private Discoms to sensitise and facilitate integration of their feeder data with NPP in phased manner During the year the feeder master data of some Non IPDS towns under the private Discoms namely Tatapower Mumbai and Delhi, NDMC and BRPL Delhi has been mapped.

By end of March,2020 data of 39,449urban feeders in 53 Discoms and data of 1,07,209 rural feeders in 38 Discoms have already been integrated in NPP.

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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 / State Sectors and neighbouring under execution in the Country in Central 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 Design and Engineering Consultancy of electro- mechanical works carried out during the year

During the year, the design and engineering consultancy of electro-mechanical works of the following HEPs were carried out:

Sl. No.	Name of the H.E. Project	Executing Agency/ State	Capacity
1.	Punatsangchhu –I HEP	PHPA-I/ Bhutan	6x200 MW
2.	Punatsangchhu –IIHEP	PHPA-II/ Bhutan	6x170 MW
3.	Ganol HEP	MePGCL*/ Meghalaya	3x7.5 MW
4.	THDC Projects		
	(a) Under Construction:	i. Tehri PSP ii. Vishnugad Pipalkoti HEP iii. Dhukwan Small HEP	4x250 MW 4x111 MW 3x8 MW
	(b) Under Operation:	i) Tehri HEP ii) Koteshwar HEP	4x250 MW 4x100 MW
5.	Lakhwar MPP	Uttarakhand / UJVNL	3x100 MW

*Meghalaya Power Generation Corporation Ltd.

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 13 nos. (12 nos. in India+ 1 no. in Nepal) of DPR of HEPs aggregating to 8450 MW including clarifications/ drawings/ documents etc. as received from time to time were examined and commented upon.

b) General layout Plan/Salient features of 10 nos. of HEPs under Survey & Investigation (S&I) at pre-DPR stage aggregating to about 6270 MW were examined and commented upon.

c) Revised Cost Estimates received for 04 nos. of HEPs aggregating to 2144 MW were examined and commented upon.

A list of above projects has been indicated 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)
a)	***Hydro Projects in India***		
1	Thana Plaun HEP	Himachal Pradesh	191
2	Par-Tapi-Narmda Link Project	Gujrat & Maharashtra	21
3	Sunni Dam	Himachal Pradesh	382
4	Kirthai-I	Jammu and Kashmir	390
5	Mawphu (WahUmiam Stage-III)	Meghalaya	85
6	Singoli-Bhatwari HEP	Uttrakhand	99
7	Vyasi HEP	Uttrakhand	120
8	Luhri Stage.II HEP	Himachal Pradesh	172
9	Lower Kopili	Assam	120
10	Teesta HEP	Sikkim	500
11	Pinnapuram Pumped Storage HEP	Andhra Pradesh	1200
12	Dagmara HEP	Bihar	130
b)	***Hydro Projects in Abroad***		
13	Pancheshwar MPP	Nepal	5040

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	MyntduLeshka (Stage – II) HEP	Meghalaya	210
2	Saundatti Pumped Storage HEP	Karnataka	1260
3	Manalar Pumped Storage HEP	Tamil Nadu	500
4	Kodayar Pumped Storage HEP	Tamil Nadu	500
5	Mekedatu Balancing Reservoir cum Drinking Water Project	Karnataka	400
6	Pinnapuram Pumped Storage HEP	Andhra Pradesh	1200
7	Balimela Pumped Storage HEP	Odisha	500
8	Jangi Thopan Powari HEP	Himachal Pradesh	780
9	Upper Indravati HEP	Odisha	600
10	Upper Kolab	Odisha	320

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	Parbati - II HEP	Himachal Pradesh	800
2	Vishnugadh Pipalkoti HEP	Uttrakhand	444
3	Kameng HEP	Arunachal Pradesh	600
4	Lakhwar MPP	Uttrakhand	300

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:

- Russia,
- US,
- Japan,
- China,
- Kenya,
- Switzerland,
- Czech Republic,
- Algeria,
- Tajikistan,
- Germany,
- Norway,
- Nigeria,
- Finland,
- Kazakhstan,
- Denmark,
- SASEC (South Asia Sub regional Economic Cooperation),
- Israel,
- Australia,
- Portugal.

8.5 Design and Consultancy Assignments (Civil Aspects) for Thermal / Hydro / Power Transmission Projects during 2019-20

TCD Division of CEA carried out the following specific works in respect of thermal/hydro/power transmission projects during 2019-20:

8.5.1 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.

8.5.2 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 were examined and necessary advice was communicated to Project Authorities.

(b) Ganol (3 x 7.5 MW), Meghalaya

Designs/drawings of Gantries and Towers were examined and advice was communicated to Project Authorities

(c) DPR for construction of 225 kV Double Circuit and 132 kV Single Circuit transmission line Sierra Leone

Necessary advice on route alignment survey and soil investigation report was communicated to Project Authorities.

8.6 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.

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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.36518.44 Crore as on 31stMarch 2020. The details of outstanding dues payable by power utilities to CPSUs is given as **Annex-9A.**

9.2 Electricity Tariff & Duty and Average Rates of Electricity Supply in India

In-fulfilment 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 2019) contains information on retail electricity tariff applicable in various States / Utilities effective during the year 2018-19.

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 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 2019edition, 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 **Annex-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. Report on Benchmarking of Establishment Expenses of Distribution Utilities submitted to Ministry of Power.
ii. Report on the issue of delayed payments by DISCOMS to GENCOs/IPPs submitted to Ministry of Power.
iii. Drafting of various methodologies for implementation of approval of the Government on the recommendations of Group of Ministers (GoM) constituted to examine the specific recommendations of High Level Empowered Committee (HLEC) on the issues of Stressed Thermal Power Projects.
iv. Examination of Detailed Project Report (DPR) & Revised Cost Estimates (RCE) - DPR of Renuka Dam Project in Himachal Pradesh-HPPCL• DPR of Sunni Dam H.E. Project (382 MW) in Himachal Pradesh - SJVN• Ltd. RCE - Parbati-II HE Project (800 MW) in Himachal Pradesh - NHPC• RCE - Tehri Pumped Storage Plant (1000 MW) in Uttarakhand – THDC• RCE - Visnugad Pipalkoti HEP (444 MW) in Uttarakhand - THDC•
v. Examination of PIB Proposals- Ratle HEP (850 MW) in J•&K - JV of NHPC and JKPDC Dhaulasidh HEP (66 MW) in Himachal Pradesh - SJVNL• Luhri HEP Stage-I (210 MW) in Himachal Pradesh - SJVNL•
vi. Preliminary Project Proposal Report (PPR) in respect of Shongtong Karcham HEP in Himachal Pradesh for AIIB funding.
vii. Preliminary Project Proposal Report (PPR) from Government of Tamil Nadu for proposed TA in the Energy Sector "Power Sub Sector Investments under CKIC Corridor Program" for external assistance from ADB.

viii. Preliminary Project Proposal Report (PPR) from Govt. of Meghalaya "Enhancing the Livelihood of Rural Community of Meghalaya".

ix. Preliminary Project Proposal Report (PPR) from Govt. of Maharashtra "Implementation support for Maharashtra Rural High Voltage Distribution System (HVDS) Expansion Program".

x. Preliminary Project Proposal Report (PPR) from Govt. of Madhya Pradesh "Distribution system strengthening by SCADA enablement of 33/11 kV File No.CEA-EC-11-19(11)/1/2020-FCA Division substations and AMI based smart metering investments in Madhya Pradesh".

xi. Proposal of Govt. of Tripura seeking support for ABD funding for Capacity Augmentation of Rokhia Gas Power Plant.

xii. "Staff Paper on the Methodology for compilation of Coal Price Index" applicable for Power Sector" published by CERC.

xiii. Proposal from the Government of Sierra Leone (GoSL) for Power Projects on Construction of 225kV double circuit and 132 kV single circuit transmission lines and associated substations under GoI Line of Credit of US$ 78 million extended to Govt. of Sierra Leone.

xiv. Draft Guidelines for Tariff Based Competitive Bidding Process for procurement of Power from Grid connected Wind Solar hybrid projects.

xv. Proposal from NTPC for seeking one time grant of Rs. 4000 crores from NLCPR funds for capital investment in Bongaigaon Thermal Power Project for reduction in tariff of the project.

xvi. Proposal from MNRE regarding waiver of ISTS charges and losses for Renewable based Round the Clock power.

xvii. Reference from Chairman, Rajasthan Urja Vikas Nigam Limited (RUVNL) for seeking clarification on clause 5.2 of Tariff Policy.

xviii. Reference of Association of Power Producers on the subject of 24x7 reliable, affordable and sustainable power supply to all-the way forward.

xix. Reference regarding establishment of new Power Exchange by South Asian Energy Exchange Ltd.

xx. Procurement of Aggregated Power of 2500 MW for three years (covered under medium term) through PFC Consulting Limited as Nodal Agency-Pilot Scheme-II.

9.4 Standard Bidding Documents and Competitive Bidding Guidelines

(a) Tariff Based Competitive Bidding Guidelines for Transmission Service.

In order to address the changes in regulations and other statutory documents etc., the Ministry of Power (MoP) had constituted a committee under the Chairmanship of Member (E&C), CEA for modification of Standard Bid Documents/ Guidelines for development of transmission projects through TBCB route. After several round of discussions in the Committee meetings and discussions in Ministry of Power, the committee submitted the draft revised SBDs/Guidelines to MoP which were uploaded on MoP's website in February 2020 for seeking the comments of all stakeholders. Thereafter, all the comments received from various stakeholders were deliberated and accordingly the revised Standard Bidding Documents (SBDs) and Guidelines for the new projects were amended/modified and submitted to the Ministry of Power for further necessary action. Meanwhile, RECTPCL was advised

by MoP to first merge the existing RfQ and RfP documents to facilitate single stage bidding till revised documents get approved and notified. Accordingly, RECTPCL had submitted revised SBDs for single stage bidding as per the existing procedure, which were examined by CEA and communicated to MoP on 23.09.2019.

9.5 Economic Analysis of Policy Issues

CEA has been regularly providing analytical inputs on various policy issues referred by the Ministry of Power such as Achievement / Performance w.r.t. various facets of Power sector, Inputs on Finance Commission matters, Eco Survey 2019-20, OECD issues, matters regarding data pertaining to power sector , comments on 7th Trade Policy Review of India and material for speech of Hon'ble Power Minister at different forums.

9.6 Compilation of Information on Power Purchase Agreement 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 2019-20 (upto 31.03.2020), the information for 123 IPPs with an installed capacity of 87625.81 MW, having tied and untied capacity of 63803.15 MW & 19231.42 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 Expenditure in Power Sector

Investment expenditure in different segments of the Power Sector in the year 2017-18 to 2019-20 (upto 31.03.2020), is shown in the table:

Investment Expenditure in Power Sector in India

(Figures in Rs. Crores)

Sector/Segment	2017-18	2018-19	2019-20 (Provisional)
CENTRAL SECTOR	**56031.05**	**54416.87**	**20094.91**
(i) THERMAL	26097.08	24358.73	17433.17
(ii) HYDRO	4095.51	4193.26	2661.74
(iii) TRANSMISSION	25838.46	25864.88	-
STATE SECTOR	**43252.33**	**24580.83**	**4569.44**
(i) THERMAL	9842.98	9145	3573.78
(ii) HYDRO	1094.88	1566.12	995.66
(iii) TRANSMISSION	17083.20	13869.71	-
(iv) DISTRIBUTION	15231.27	-	-
PRIVATE SECTOR	**4390.41**	**3942.25**	**1993.53**

(i) THERMAL	2712.28	2067.24	1479.58
(ii) HYDRO	527.66	1875.01	513.95
(iii) DISTRIBUTION	1150.47	-	-
GRAND TOTAL SECTOR WISE	**103673.79**	**82939.96**	**26657.88**
(i) THERMAL	38652.34	35570.97	22486.53
(ii) HYDRO	5718.05	7634.4	4171.4
(iii) TRANSMISSION	42921.66	39734.59	-
(iv) DISTRIBUTION	16381.74	-	-
GRAND TOTAL SEGMENT WISE	**103673.79**	**82939.96**	**26657.88**

Note-

A) These figures are as reported by the utilities, which are likely to change with the truing up with audit of their accounts in due course.
B) Data on renewable energy, Nuclear energy and captive generation is not captured.
C) Data on Private Transmission is not available.
D) Figures are updated upto Mar.,2020.

9.9 The Electricity Act, 2003

9.9.1 Amendment to Electricity Act, 2003

The Electricity Act, 2003 was enacted to amalgamate the earlier Electricity Laws, namely, the Indian Electricity Act, 1910, the Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998. The Act was reviewed and amended twice, in the year 2004 and 2007, to give effect to certain changes considered necessary. Based on the experiences gained over the years, it was felt to review the provisions further to bring efficiency and competition in the distribution sector, strengthening grid security and safety, promotion of renewable energy, rationalization of tariff and strengthening & performance oversight of Regulatory Commissions etc. The amendments to Electricity Act, 2003 is in the advance stage of discussion. The salient points of the proposed amendments are as under:

- Separation of Carriage and Content to bring competition in the Distribution sector in line with Generation and Transmission.
- Grid Security to prevent occurrence of grid failures, stringent mechanism has been proposed through ensuring compliance of statutory directions on grid stability and security etc.
- Rationalization of Tariff and making Tariff fixation process more certain and effective.
- Transaction involving charging of battery for E-vehicle, provision of Pre-paid and Smart meter
- Grant of subsidy through Direct Benefit Transfer mechanism
- Obligatory on the part of Distribution companies to supply 24x7 power supply
- Promotion of Renewable Energy.

9.9.2 Amendment to Electricity Rules, 2005

The Amendments to Electricity Rules, 2005, is under finalization. Salient points of proposed amendments are as under:

- In case of non-compliance of consumption pattern, only defaulter captive consumer to be penalized.

- Conversion of a Generating Plant to CPP
- Carving out a separate entity for GCPP
- Power consumption variation up to 30% for wind and solar subject to approval of Appropriate Commission.
- Consumption beyond 51%be in equity proportion.
- Change in shareholding pattern.

9.9.3 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/proposed to be notified 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	07.10.2013

	Generation Resources) Regulations, 2013	
10	Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2020	27.02.2020

B. Notified/proposed to be notified Amendments to the 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 amendments notified by the Authority during previous years since the enactment of the Electricity Act, 2003 are mentioned below. Some Regulations are being in the process of amendments in CEA.

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 below 33 kV) (First amendment) 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	28.06.2019

	and Electric Supply) (Amendment) Regulations, 2019.	
10	3rd Amendment to the Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2019	23.12.2019

9.10 Court Cases

Legal Division of CEA is dealing with the number of Court Cases filed in Supreme Court, High Courts, NGTs and District Courts/Lower Courts across the Country on behalf of Government of India, Ministry of Power & Central Electricity Authority.

Presently, Legal Division is dealing with more than 100 plus court cases which are ongoing/pending at various courts in the country in which Central Electricity Authority or Ministry of Power is/are have been impleaded as respondent (s).

9.11 Assistance to Ministry of Power Comments were furnished to the Ministry of Power on various references received.

The important issues in which the comments were furnished are as under: -

- On payment default of BGR Energy Systems Ltd., Chennai.
- On the Andhra Pradesh Electricity Laws (Andhra Pradesh Amendment) Bill, 2019.
- Advice on the issue of 4000 MW, 2nd UMPP being set up by Tatiya Andhra Mega Power Ltd. (TAMPL) near Nayunipalli village, Prakasm district, Andhra Pradesh.
- In the matter received from CII to include all the hydro projects including commissioned one irrespective of the tied capacity under non-solar RPO.
- On the proposal of MNRE for empowering CERC to discharge the functions of such SERCs that are unable to function due to vacant positions of Chairperson/Members.
- On handing/taking over of the India portion of 132 kV S/C Deothang-Rangia Transmission Line & Associated Bay at Rangia sub-station.
- Reference from Min. of Power regarding non-approval of Power Purchase Agreement signed between M/s Auric Industries Limited and GESCOM (State DISCOM of Karnataka) by Karnataka Electricity Regulatory Commission. Reference from Min. of Power enclosing a representation received from Tata Power Company Limited regarding under recovery of fuel charges/variable charges of their Coastal Gujarat Power Ltd. plant at Mundra (4000 MW) due to scheduling under Security Constrained Economic Dispatch (SCED) pilot scheme.
- Reference from Min. of Power enclosing a letter from PM Office along with a letter received from Shri Nirupam Bajpai, Columbia University, New York" regarding subsidy reforms for BPL families in India in respect of providing free electricity/water up to certain limits to meet their basic needs.
- MoU signed between Ministry of Power, India and Ministry of Energy, Utilities and Climate of the kingdom of Denmark on India-Denmark Energy Cooperation.
- Standing Committee on Energy (2019-20) - Selection of Subjects for detailed examination during the year 2019.
- MoU between Shanghai Cooperation Organization and Eurasian Economic

Commission to promote the development of comprehensive cooperation and mutual understanding, as well as to simplify the interaction between the Parties in areas of mutual interest.

- Reference from Min. of Power regarding comments on draft chapter (section2) under secretariat report for 7th Trade Policy Review of India.

9.12 Legal Assistance/Advice to others

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:-

- On the proposed notification by BEE on criteria and methodology for retirement of old and inefficient thermal power units.
- In the matter of the grid operation activities entrusted to NLDC/RLDCs is an integral part of transmission to be exempted of Services under the GST Act, 2007.
- Reference from NPCIL for exemption from competitive bidding for the sale of power from the proposed 2400 MW Power Plants at Orissa.
- On Long term coal linkage to meet obligation to supply contracted capacity under long term PPA with MP Govt. owned MPPMCL-BLA Power.
- Reference from NITI Ayog pertaining to Group Captive Generating Plant in respect to the proposed amendments to the Electricity Rules, 2005.
- Advice on Nagaland Lokayukta orders for calling upon CEA official to appear before the Lokayukta.
- Reference from Association of Power Producers (APP) for advisory /clarification on change-in-law events in respect of levies/charges imposed by Govt. Instrumentalities.
- Reference from Secretary, MNRE dated 16th October, 2019 regarding stay on Order of POSOCO for not opening LCs to RE Generators by Hon'ble High Court of Andhra Pradesh.

9.13 Legal Division constituent in policy making:

Legal Division has participated in different Committee to finalize/ Frame Policies on important issues concerning power Sector. The important Committees are as under:

- Amendment in Electricity Act, 2003
- Amendment in Electricity Rules,2005

9.14 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 File No.CEA-EC-15-26/1/2018-RA Division Renewable Energy (MNRE), other Ministries, NITI Aayog, Industry Associations etc.

1. IEA report: “In-Depth Review (IDR) of the Energy Policies in India by International Energy Agency (IEA) in coordination with NITI Aayog”.
2. CERC’s Staff paper on the “methodology for compilation of Coal Price Index applicable for Power Sector”.
3. Bundling of power generated from Gas based plants with RE Power
4. Reference received from All India Induction Furnace Association regarding unauthorized use of electricity.

5. Reference received regarding power generated from co-firing of biomass in thermal power plants as renewable energy.
6. 7 th Trade Policy Review of India.
7. Furnished a brief note on “power sector reforms” in India for “The Memorandum of Ministry of Power to Fifteenth Finance Commission”.
8. Standing committee on Energy (2019-20) - Supplementary List of Points in connection with examination of the subject 'Review of Power Tariff Policy-need for uniformity in tariff structure across the Count.
9. Reference received from KERC regarding Procurement of energy from Renewable Sources (Seventh amendment) (regulations, 2019)

9.15 Implementation of 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. WP (Civil) 12260 of 2018 filed by Shri Akash Gahlot vs GoNCT before the Hon'ble High Court of Delhi for abolishing fixed charges from bill of supply of electricity for all categories of consumer in the NCT of Delhi and amending DERC (Supply Code and Performance Standards) Regulation, 2017.
2. WPC 12399 of 2018 filed by Shri Bajrang Power and Ispat Ltd. vs CERC (old WPc 2061/2016) before the Hon’ble High Court of Delhi challenging certain provisions of CERC(Terms and Conditions for recognition and issuance of Renewable Energy Certificate for Renewable Energy Generation) (Fourth Amendment) Regulations, 2016.
3. CWP No. 20861 of 2018 filed by Rajasthan Solar Association Vs the State of Rajasthan and Others before the Hon'ble High Court of Judicature for Rajasthan Bench at Jaipur to grant ex-parte ad-interim stay on the operation and validity of a notification issued under the Rajasthan Electricity Duty Act 1962 regarding the exemptions from payment of electricity duty by captive solar power consumers.
4. Civil Writ Petition No. 9694 of 2017 filed by Tata Steel BSL Ltd. v/s Orissa Electricity Regulatory Commission (OERC) before the Hon’ble High Court of Orissa, Cuttack challenging certain provisions of OERC (Procurement of Energy from Renewable Sources and its Compliance) Regulations, 2015. File No. CEA-EC-15-26/1/2018-RA Division
5. SLP (C) No. 20736 of 2019 filed by UPPCL & Ors Vs Kisan Cold Storage and Ice Factory & others before Hon’ble Supreme Court of India appealing against the final judgement/order dated 03.04.2019 passed by the Full bench of the Hon’ble High Court of Judicature at Allahabad, Lucknow limiting the applicability of the representation/appeal provision to only that of consumers to seek redressal before the Ombudsman.
6. Writ Petition (Civil) No. 10181/2019 & CM Appl. 42045/2019 filed by Shri Ashwani Kumar Sharma Vs Union of India and others before the Hon'ble High Court of Delhi for giving directions to Min. of Power and CEA for ceasing the practice of using domestic linkage coal by the generating companies for generation of power for export to neighboring countries.
7. Writ Appeal No. 223 of 2020 filed by Kerala State Electricity Board and Others Vs. Santosh N C and others before the Hon’ble High Court of

Kerala at Ernakulam to set aside the order dated 24.01.2020 in WP 6410 of 2019, that quashed Regulation 116(1) of CEA (Measure relating to Safety and Electric Supply) Regulations, 2010.

8. WP No. 728 of 2020 filed by Southern Power Distribution Company of Andhra Pradesh Ltd & another Vs National Load Despatch Centre (NLDC) & Ors before the Hon'ble High Court of Andhra Pradesh at Amaravati for issuing RE certificates in respect of the RE power beyond the percentage that was specified by the APERC for FY 2017-18.
9. Nomination of Officers to the Important Committees/ Delivering of lectures/ presentations
10. Chief Engineer (RA) was nominated as Member convener in the committee constituted by Ministry of Power under Chairmanship of Member (E&C), CEA to look into manpower requirement of APTEL. The final report of the committee was sent to Ministry of Power on 23.12.2019.
11. Chief Engineer (RA) gave a detailed presentation on various regulatory, transmission and distribution issues concerning Indian Power Sector before the Hon'ble delegates of Nigerian Electricity Regulatory Commission (NERC) on 12th and 26th June, 2019.
12. MoP has constituted a group for deepening of Power Market in India in which Chief Engineer (F&CA) is one of the member.
13. MoP has constituted a Committee on review/ formulation of bidding Guidelines / Documents for procurement of power from Hydro power plants under
14. Medium Term and Long Term under Member (Hydro), CEA in which Chief Engineer (F&CA) has been co-opted as a Member.
15. MoP has constituted a Committee to look into the issue of delayed payment by DISCOMs to GENCOs/IPPs under Chairperson, CEA wherein Member (E&C), CEA was coopted as a member and Chief Engineer (F&CA) was coopted as Member Secretary.
16. MoP has constituted a Committee on measures to promote Hydro Power Sector under Member (Hydro), CEA in which Chief Engineer (F&CA) has been nominated as one of its Members.
17. CEA has constituted a Committee for preparation of comprehensive and detailed background note regarding contribution of Central Electricity Authority in the balanced development of Electricity Sector under Member (Planning), CEA in which Chief Engineer (F&CA) was one of its Members.h.
18. MoP has constituted an expert group to study the relevance of DVC in its present form in which Director (F&CA) has been nominated as one of its Members.i.
19. CEA has constituted a Local Purchase Committee under Rule 155 of GFR, 2017 for procuring items/articles costing above Rs. 25,000/- in
20. CEA in which Director (F&CA) has been nominated as one of its Members.
21. CEA has constituted a Committee to finalize the design requirement and content for Dynamic website of CEA under Chief Engineer (IT), CEA in which Director (F&CA) has been nominated as one of its Members.

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CHAPTER – 10

POWER GENERATION

10.1 Power Generation

Generation of power from conventional sources (Th, Nu & Hy) by the Central Sector, State Sector, Pvt. utilities & IPPs was 1250783.91 million units during the Year 2019-20. This represents a growth of about 0.12% over the same period during previous year 2018-19 as per details given below:

Power Generation during 2019-20

Category	Programme (MU)	Actual (MU)	Shortfall (-)/ Excess(+)	% of Programme	Growth (%) with respect to previous year Actual Gen.
Thermal	1142130.00	1042747.86	99382.14	91.30	-2.75
Nuclear	44720	46472.45	-1752.45	103.92	22.90
Hydro	136932	155769.12	-18837.12	113.76	15.48
Bhutan Imp	6218	5794.48	423.52	93.19	31.49
TOTAL	**1330000.00**	**1250783.91**	**79216.09**	**94.04**	**0.12**

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 2019-20 are as under:

- Gross annual generation of the country was 1250.78 BU.
- The annual growth in the energy generation during the year was 0.12%.
- Thermal, Nuclear, Hydro and Import from Bhutan achieved a growth rate of -2.75%, 22.90%, 15.48% and 31.49% respectively. The electricity generation during the year 2019-20 from coal based thermal power stations was 961.22 BU showing a growth rate of (-2.68%) against 3.77% over same period last year.
- In North Eastern Region, the growth in thermal generation was 5.51% with respect to last year, which was highest amongst all the regions.
- The national average PLF for thermal stations was 55.99% and92Stations with an aggregate installed capacity of 115692.50 MW, achieved PLF above national average.
  03 number of thermal power stations with an aggregate installed capacity of 4590 MW achieved above 90% PLF.

The Sector-Wise Generation and PLF during 2019-20is given below:

Category / Sectors	Programme (MU)	Actual (MU)	PLF (%)
CENTRAL SECTOR			
THERMAL	375451.00	351166.54	64.21
NUCLEAR	44720.00	46472.45	78.03
HYDRO	56617.00	62628.89	
TOTAL	**476788.00**	**460267.88**	
STATE SECTOR			
THERMAL	374986.00	309668.21	50.24
HYDRO	66805.00	78297.76	
TOTAL	**441791.00**	**387965.972**	
PVT. SECTOR IPP			
THERMAL*	373462.00	364215.16	54.32
HYDRO	12069.00	13354.20	
TOTAL	**385531.00**	**377569.36**	
PVT. SECTOR UTL.			
THERMAL	18231.00	17697.95	62.49
HYDRO	1441.00	1488.27	
TOTAL	**19672.00**	**19186.22**	
TOTAL PVT	**405203.00**	**396755.58**	
BHUTAN IMP	6218.00	5794.48	
ALL INDIA REGION			
THERMAL	1142130.00	1042747.86	55.99
NUCLEAR	44720.00	46472.45	78.03
HYDRO	136932.00	155769.12	
BHUTAN IMP	6218.00	5794.48	
TOTAL	**1330000.00**	**1250783.91**	

***Includes import form some of the Captive Plants

10.2 Plant Load Factor of Thermal Power Stations

During the year 2019-20 the average PLF of Thermal Power Stations was 55.99 % and for Nuclear Power Stations was 78.03%.

92 Thermal power plants achieved PLF higher than the All India average PLF of 55.99% as per details given in the table below:

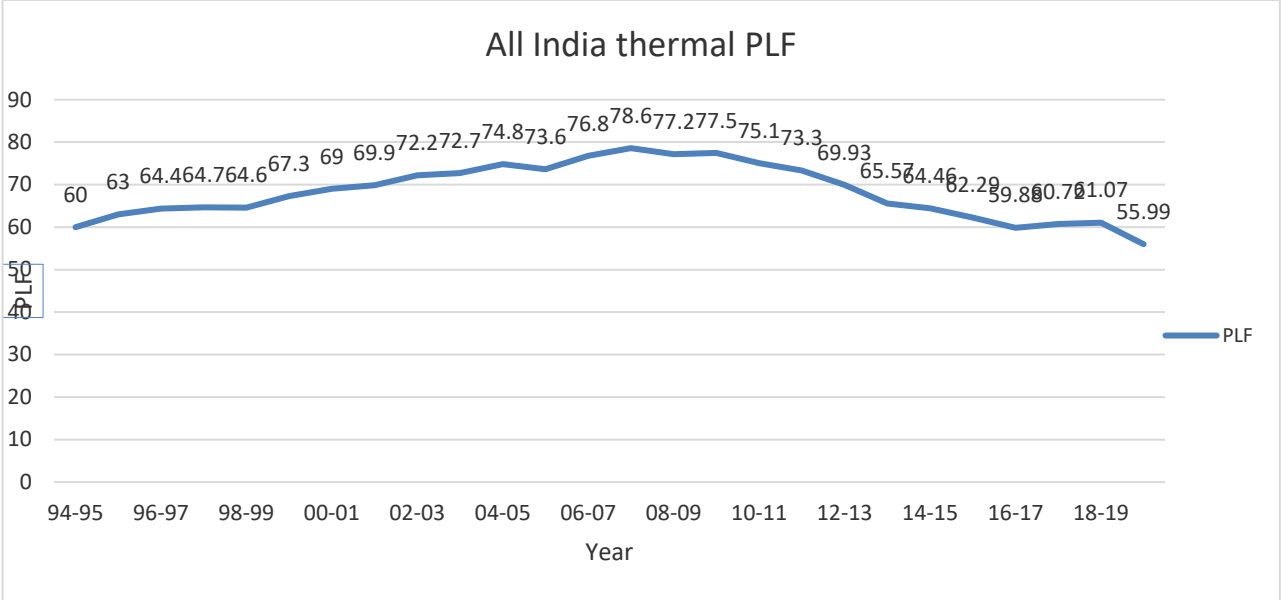
List of Thermal Power Stations (Coal and Lignite based) which have achieved PLF above National Average of 55.99 % during the year 2019-20

S. No.	STATION NAME	CAPACITY (in MW)	SECTOR	STATE	% PLF
1	SASAN UMTPP	3960	IPP SECTOR	Madhya Pradesh	95.85
2	AMARKANTAK EXT TPS	210	STATE SECTOR	Madhya Pradesh	91.7
3	NEYVELI (EXT) TPS	420	CENTRAL SECTOR	Tamil Nadu	90.22
4	CHAKABURA TPP	30	IPP SECTOR	Chhatisgarh	89.31
5	PAINAMPURAM TPP	1320	IPP SECTOR	Andhra Pradesh	88.86
6	RIHAND STPS	3000	CENTRAL SECTOR	Uttar Pradesh	88.64
7	BUDGE BUDGE TPS	750	PVT SECTOR	West Bengal	88.01
8	DSPM TPS	500	STATE SECTOR	Chhatisgarh	87.61
9	SINGARENI TPP	1200	STATE SECTOR	Telangana	87.54
10	SINGRAULI STPS	2000	CENTRAL SECTOR	Uttar Pradesh	87.27
11	KORBA STPS	2600	CENTRAL SECTOR	Chhatisgarh	86.67
12	SIPAT STPS	2980	CENTRAL SECTOR	Chhatisgarh	86.07
13	VINDHYACHAL STPS	4760	CENTRAL SECTOR	Madhya Pradesh	85.29
14	SANTALDIH TPS	500	STATE SECTOR	West Bengal	84.11
15	HALDIA TPP	600	IPP SECTOR	West Bengal	84.06
16	TALCHER (OLD) TPS	460	CENTRAL SECTOR	Odisha	83.61
17	KOTHAGUDEM TPS (NEW)	1000	STATE SECTOR	Telangana	81.6
18	RATIJA TPS	100	IPP SECTOR	Chhatisgarh	81.31
19	KAHALGAON TPS	2340	CENTRAL SECTOR	Bihar	80.3
20	TIRORA TPS	3300	IPP SECTOR	Maharashtra	80.22
21	NEYVELI TPS-II	1470	CENTRAL SECTOR	Tamil Nadu	80.2
22	GMR WARORA TPS	600	IPP SECTOR	Maharashtra	78.53
23	BANDAKHAR TPP	300	IPP SECTOR	Chhatisgarh	78.26
24	KAKATIYA TPS	1100	STATE SECTOR	Telangana	78.19
25	NABINAGAR STPP	660	CENTRAL SECTOR	Bihar	77.56
26	SURAT LIG. TPS	500	IPP SECTOR	Gujarat	76.5
27	DAHANU TPS	500	PVT SECTOR	Maharashtra	76.22
28	BAKRESWAR TPS	1050	STATE SECTOR	West Bengal	75.93
29	MUNDRA UMTPP	4000	IPP SECTOR	Gujarat	75.41

30	RAMAGUNDEM STPS	2600	CENTRAL SECTOR	Telangana	74.99
31	JSW RATNAGIRI TPP	1200	IPP SECTOR	Maharashtra	74.65
32	NABI NAGAR TPP	750	CENTRAL SECTOR	Bihar	74.18
33	KORBA-WEST TPS	1340	STATE SECTOR	Chhatisgarh	73.91
34	ANPARA TPS	2630	STATE SECTOR	Uttar Pradesh	73.79
35	KODARMA TPP	1000	CENTRAL SECTOR	Jharkhand	73.54
36	MUNDRA TPS	4620	IPP SECTOR	Gujarat	73.49
37	TALCHER STPS	3000	CENTRAL SECTOR	Odisha	73.09
38	SABARMATI (D-F STATIONS)	362	PVT SECTOR	Gujarat	72.9
39	RAMAGUNDEM - B TPS	62.5	STATE SECTOR	Telangana	72.51
40	SGPL TPP	1320	IPP SECTOR	Andhra Pradesh	72.48
41	DURGAPUR STEEL TPS	1000	CENTRAL SECTOR	West Bengal	71.94
42	Dr. N.TATA RAO TPS	1760	STATE SECTOR	Andhra Pradesh	71.55
43	ANPARA C TPS	1200	IPP SECTOR	Uttar Pradesh	71.53
44	KASAIPALLI TPP	270	IPP SECTOR	Chhatisgarh	71.5
45	RAJPURA TPP	1400	IPP SECTOR	Punjab	71.21
46	FARAKKA STPS	2100	CENTRAL SECTOR	West Bengal	71.19
47	BARH II	1320	CENTRAL SECTOR	Bihar	70.89
48	MAITHON RB TPP	1050	IPP SECTOR	Jharkhand	70.35
49	BARSINGSAR LIGNITE	250	CENTRAL SECTOR	Rajasthan	69.58
50	JOJOBERA TPS	240	IPP SECTOR	Jharkhand	69.46
51	KAWAI TPS	1320	IPP SECTOR	Rajasthan	69
52	LARA TPP	800	CENTRAL SECTOR	Chhatisgarh	68.73
53	ITPCL TPP	1200	IPP SECTOR	Tamil Nadu	68.64
54	CHHABRA TPP	2320	STATE SECTOR	Rajasthan	66.39
55	BALCO TPS	600	IPP SECTOR	Chhatisgarh	66.37
56	PATHADI TPP	600	IPP SECTOR	Chhatisgarh	66.04
57	TENUGHAT TPS	420	STATE SECTOR	Jharkhand	65.61
58	NEYVELI TPS(Z)	250	IPP SECTOR	Tamil Nadu	65.46
59	AKALTARA TPS	1800	IPP SECTOR	Chhatisgarh	65.21
60	DHARIWAL TPP	600	IPP SECTOR	Maharashtra	64.1
61	MAHADEV PRASAD STPP	540	IPP SECTOR	Jharkhand	63.87
62	KAMALANGA TPS	1050	IPP SECTOR	Odisha	63.59
63	PARAS TPS	500	STATE SECTOR	Maharashtra	63.16
64	UNCHAHAR TPS	1550	CENTRAL SECTOR	Uttar Pradesh	62.62
65	METTUR TPS	840	STATE SECTOR	Tamil Nadu	62.6

66	BHILAI TPS	500	CENTRAL SECTOR	Chhatisgarh	62.52
67	CHANDRAPUR (MAHARASHTRA) STPS	2920	STATE SECTOR	Maharashtra	62.49
68	KOTHAGUDEM TPS	420	STATE SECTOR	Telangana	62.22
69	KORBA-III	240	STATE SECTOR	Chhatisgarh	62.08
70	JALIPA KAPURDI TPP	1080	IPP SECTOR	Rajasthan	61.93
71	CHANDRAPURA(DVC) TPS	630	CENTRAL SECTOR	Jharkhand	61.9
72	NEYVELI TPS- I	500	CENTRAL SECTOR	Tamil Nadu	61.74
73	SIKKA REP. TPS	500	STATE SECTOR	Gujarat	61.73
74	KHAPARKHEDA TPS	1340	STATE SECTOR	Maharashtra	61.68
75	HARDUAGANJ TPS	605	STATE SECTOR	Uttar Pradesh	61.61
76	TANDA TPS	1100	CENTRAL SECTOR	Uttar Pradesh	61.32
77	BOKARO TPS `A` EXP	500	CENTRAL SECTOR	Jharkhand	61.25
78	BARADARHA TPS	1200	IPP SECTOR	Chhatisgarh	61.09
79	MEJIA TPS	2340	CENTRAL SECTOR	West Bengal	61.01
80	SIMHADRI	2000	CENTRAL SECTOR	Andhra Pradesh	60.62
81	KOTA TPS	1240	STATE SECTOR	Rajasthan	59.8
82	BONGAIGAON TPP	750	CENTRAL SECTOR	Assam	59.65
83	ANUPPUR TPP	1200	IPP SECTOR	Madhya Pradesh	59.46
84	UKAI TPS	1110	STATE SECTOR	Gujarat	59.29
85	TUTICORIN TPS	1050	STATE SECTOR	Tamil Nadu	57.5
86	ROSA TPP Ph-I	1200	IPP SECTOR	Uttar Pradesh	57.3
87	BINA TPS	500	IPP SECTOR	Madhya Pradesh	57.23
88	SVPL TPP	63	IPP SECTOR	Chhatisgarh	56.58
89	IB VALLEY TPS	1740	STATE SECTOR	Odisha	56.57
90	RAICHUR TPS	1720	STATE SECTOR	Karnataka	56.48
91	NORTH CHENNAI TPS	1830	STATE SECTOR	Tamil Nadu	56.29
92	SANJAY GANDHI TPS	1340	STATE SECTOR	Madhya Pradesh	56.11

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 2019-20 is at the **Annex-10A.**

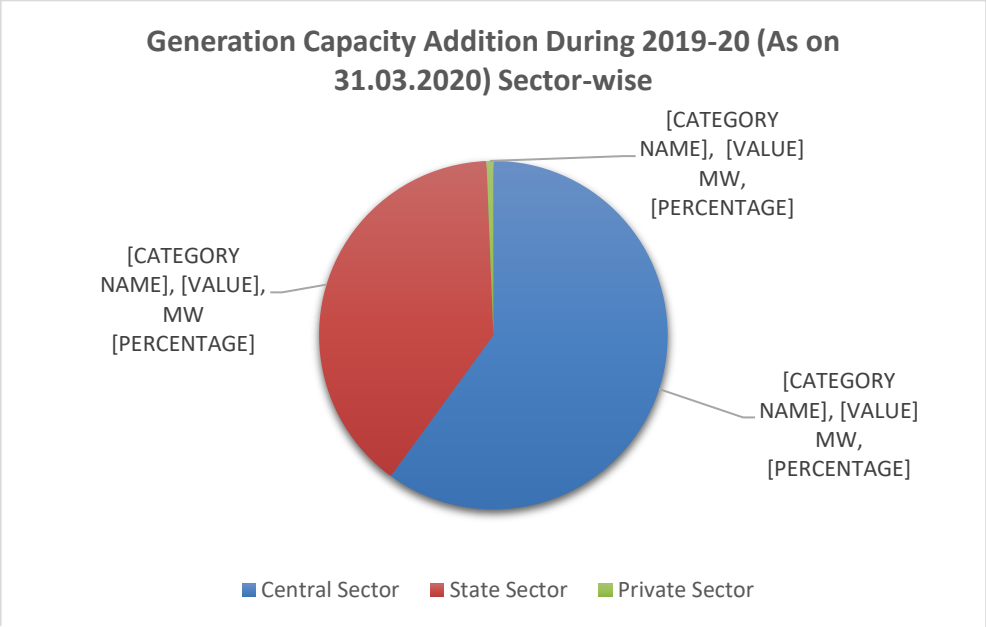
10.3 Generating Capacity Addition

During the year 2019-20, a total of 7065 MW generation capacity was added from conventional sources till 31.03.2020. 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

Year	Central Sector	State Sector	Private Sector	Total
2009-10	2430.00	3418.00	3737.00	9585.00
2010-11	3330.00	2209.00	6621.50	12160.50
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

*As on 31.03.2020.

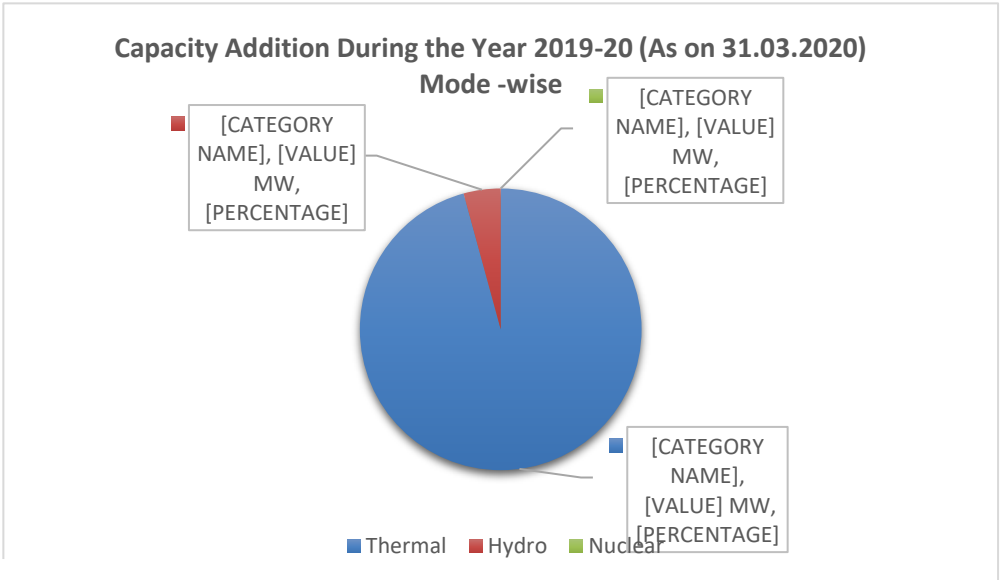


TOTAL 7065 MW

Capacity addition during the last 10 years – Mode-wise

Year	Thermal	Hydro	Nuclear	Total
2009-10	9106.00	39.00	440.00	9585.00
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

*As on 31.03.2020.



TOTAL 7065 MW

10.4 Installed Electricity Generating Capacity

Total All India Installed Electricity Generating Capacity as on 31.03.2020 is 370106.46 MW comprising of Thermal 230599.57 MW, Hydro 45699.22 MW, Nuclear 6780.00 MW and 87027.68 MW from Renewable Energy Sources (RES). All India Installed Capacity (In MW) of Power Stations located in the Regions of main land and islands (As on 31.03.2020) is given at **Annex-10B**. 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	69717.91	74006.21	86875.45			230599.57
HYDRO	15346.72	26958.50	3394.00			45699.22
NUCLEAR	6780.00	0.00	0.00			6780.00
RES	1632.30	2357.03	83038.35			87027.68
Total	**93476.93**	**103321.74**	**173307.79**			**370106.46**

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

Note:
*Renewable Energy Sources (RES) includes Small Hydro Project (≤ 25 MW), Biomass Power, Urban& Industrial Waste Power&Solar Power.
** Total Figures may not tally due to rounding off

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CHAPTER – 11

POWER DEVELOPMENT IN NORTH-EASTERN REGION

11.1 Hydro-electric Potential in N.E. Region

As per Re-assessment studies 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, 1727 MW (above 25 MW capacity) have been harnessed so far while projects amounting to 2300 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	0
Nagaland	1574	1452	75	0
Ar. Pradesh	50,328	50,064	815	2300
Mizoram	2196	2131	60	0
Total(NER):	**58,971**	**58,356**	**1727**	**2300**

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 ropped du to basin tudy/ other reasons (MW)	
Meghalaya	270	85	210	210	620	0	1312
Tripura	0	0	0	0	0	0	0
Manipur	66	0	0	0	0	1500	936
Assam	120	0	60	0	0	0	185
Nagaland	186	0	0	0	0	0	1272
Ar. Pradesh	18,578	0	6403	3165	7407	3998	14,999
Mizoram	0	0	0	0	0	460	2076
Total(NER)	**19,220**	**85**	**6673**	**3375**	**8027**	**5958**	**20,780**

11.2 Survey & Investigation of Hydro Projects

The Government approved a Three Stage Clearance procedure for hydro projects to be executed by CPSUs in consultation with MoF and MoEF. Under Stage-I, the CPSUs will incur expenditure on survey & investigation and preparation of pre-feasibility report.

Under Stage-II, the CPSUs will undertake activities relating to detailed investigation and preparation of Detailed Project Report. During this Stage, pre-construction activities and infrastructure development including land acquisition will also be undertaken. Under Stage-III, approval of PIB/CCEA would be sought for investment decision in respect of construction of the projects.

11.3 Status of development

Some of the major Hydro Electric Projects being planned in the North Eastern Region is 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.
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	Hirong (500 MW)	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.04.2013.
9	Etalin (3097 MW)	Etalin H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 12.07.2013.
10	Talong Londa (225 MW)	GMR	Arunachal Pradesh	Concurrence accorded by CEA on 16.08.2013.
11	Naying (1000 MW)	D.S. Construction Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 11.09.2013.
12	Siyom (1000 MW)	Siyota Hydro power Pvt. Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 17.12.13.
13	Dikhu (186 MW)	Naga Manu Power Private Ltd.	Nagaland	Concurrence accorded by CEA on 31.03.14.

S. No.	Name of Project	Agency	State	Present Status
14	Kalai-II (1200 MW)	Kalai Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 27.03.2015.
15	Kynshi – I (270 MW)	Athena Kynshi power Pvt.Ltd.	Meghalaya	Concurrence accorded by CEA on 31.3.2015.
16	Heo (240 MW)	Heo Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.07.15.
17	Tato-I (186 MW)	Siyota Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.10.15.
18	Lower Kopili (120 MW)	Assam Power Generation Corporation Ltd.	Assam	Concurrence accorded by CEA on 24.05.2016.
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	DPR is under examination in CEA.
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	Kangtang Shiri Hydro Project	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of

S. No.	Name of Project	Agency	State	Present Status
	(80 MW)	Pvt. Ltd		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	Umngot (210 MW)	Meghalaya Power Generation Corporation Ltd.	Meghalaya	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	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.
34	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.
35	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.
36	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.
37	Demwe (Upper) (1080 MW)	Athena Energy Venture (P) Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
38	Teesta St-IV (520 MW)	NHPC	Sikkim	Concurrence accorded by CEA on 13.05.10
39	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

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1.4 Status of various Under Construction Hydro Power Projects in North Eastern Region:

11.4.1 Central Sector Projects

NEEPCO Project (Hydro):

(i) Kameng HEP (4 x 150 = 600 MW), Arunachal Pradesh

Kameng H.E. Project is located in West Kameng District of Arunachal Pradesh with an installed capacity of 4x150 MW. The project is being executed by NEEPCO Ltd. The project envisages utilization of flows of Bichom & Tenga rivers (both tributaries of river Kameng) at a head of about 500 m available in an U – bend of the river, down stream of confluence of river Bichom with Kameng. The TEC was accorded by CEA on 11.10.1991 & revised TEC in 31.10.2003 . The CCEA clearance was accorded on 02.12.2004. The approved cost of the project is Rs. 2496.90 crores (March, 2003 price level). The design annual energy is 3353 Gwh in a 90% dependable year. The environmental and forest clearance was obtained on 29.03.2001 & 03.8.2000 respectively. The proposed revised cost of the project is Rs. 6179.96 crores (Sept. 2018 price level).

The project envisages construction of 2 nos. concrete gravity dams i.e. Bichom Dam and Tenga Dam, Head Race Tunnel, surge shaft, and surface power house having vertical Francis Turbines for 4 units of 150 MW each.

All major Civil works related to commissioning of project completed. Erection of Radial Gates of Bichom Dam completed. All Units Boxed up. Leakage observed in penstocks during water filling in March'18. Rectification of defects in penstocks is in progress.

The two units of the project (i.e. 300 MW) have been added in the hydro capacity during 2019-20 and remaining two units are scheduled for commissioning by August 2020.

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. 18559 crores at April-2017 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 8 nos. generating sets of 250 MW each. 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.

River diverted on 25.12.2007. Civil works of Dam, HRT, surge tunnel, pressure shaft, Power House etc. were in progress. Works had been stalled (except emergency maintenance work of safety and protection of the public and the property as per the Hon'ble NGT order dated 11.12.2015) from 16.12.2011 to 31.07.2019 due to agitation launched by various activists against construction of Subansiri Lower HEP. The matter was heard by Hon'ble NGT. Hon'ble NGT

pronounced the judgement in the matter on 31.07.2019 and dismissed the application. The works have now been re-started w.e.f. August, 2019. The project is planned to be commissioned 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. M/s Teesta Hydro Power Ltd has come under Corporate Insolvency Resolution Process in pursuant to an order of Hon'ble National Company Law Tribunal (NCLT), Hyderabad branchdated 16.03.2018. M/s NHPC had submitted Resolution Plan on 15.10.18 and emerged as H1 Bidder. LoI issued to M/s NHPC on 05.12.2018. Feasibility Report cleared by CEA on 14.12.2018. CCEA approved for acquisition of M/s LTHPL and execution of balance work of Teesta VI HEP has been conveyed to NHPC by MoP on 08.03.2019. Award of works is under process.

11.4.2 Private Sector Projects

i) 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 and it is understood that bids have been submitted by prospective bidders.

ii) 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.

iii) 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 crunched with the developer.

iv) Rongnichu HEP (2x48=96 MW), Sikkim

The project is located in East Sikkim district of Sikkim state on river Rongnichu. The project was Techno-Economically cleared by State Govt. on 01.10.2008 to M/s Madhya Bharat Power Corp. Ltd (MBPCL), at an estimated cost of Rs 491.32 Crs with the schedule commissioning of the project in the year 2015-16. The design energy is 383.87 Gwh. The revised cost of the project is Rs. 1453.34 crores at Mar.-2019 price level. The project envisages construction of 14m high and 120m long Barrage, 1 no. of HRT of 4.0m diameter and 12.3 Km long, Surge Shaft 10m dia and 85m height,1 no. Pressure shaft of 3m dia and 415m long.

Major Civil works were awarded to M/s Sew Infrastructure Ltd. in April, 2010 and re-awarded to M/s Moshvaraya Infrastructure Ltd. in Sept.,14 & Jan.,15. E&M works to M/s Voith Hydro Power Pvt. Ltd. in Sept.,2011 and re-awarded to M/s Litostroj Power (Turbine & Auxiliaries) & M/s Electric System Hungary Zrt. (Generator & Auxiliaries) in Feb., 2017. Project works are going smoothly & overall about 80% project works were completed till Dec, 2019. The project is likely to be completed by October, 2020.

v) 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.

On dismissal of the case in NGT on 21.08.17, the developer has made an application to PCCF cum-Secretary, Forests, Environment & Wild Life Management Department for grant of NOC, in NWLB angle. Review petition is filed against the final judgement. NOC is awaited, once the review petition is adjudicated. In view of the new hydro policy announced by Ministry of Power, GOI, which will help in convincing the investors to release the funds to start the project works wherever possible once GoS takes a decision on issuance of NWLB clearance and draining of Mantham Lake or alternative road to the Upper Dzongu/ Dam site. 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 = 680 MW)in Ar. 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 Grant from DoNER amounting to ₹300 crores.

(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 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.

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.

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.

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.

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.

(iv) Teesta Stage- IV HE project (4x130= 520 MW)-Sikkim

The project was concurred by CEA on 13.05.2010 at an estimated cost of ₹ 3594.74 Crores at July, 2009 price level.

Project was accorded environment clearance on 09.01.2014. MoEF&CC vide letter dated 26.02.2013 has accorded Forest Clearance (Stage- I) for the project. Forest clearance stage-II yet to be obtained.

(B) State Sector Projects

(i) Lower Kopili HE Project (2x55+1x5+2x2.5 = 120MW) in Assam By M/s APGCL

Lower Kopili H.E. Project was accorded concurrence by CEA on 24.5.2016 at an estimated completed cost of ₹ 1115.91 Crores.

Project was accorded environment clearance on 04.09.2019 . FC- I accorded on 05.02.2019 and Fc-II yet to be obtained.

(C) 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).

MoEF&CC has accorded Environmental clearance to the project on 12.2.10. Forest clearances stage-II has been accorded on 03.05.2013. As per NGT order dated 24.10.2017, NBWL issue to be reconsidered by MoEF&CC.

(ii) Lower Siang HE Project (9x300=2700 MW), Ar. Pradesh by 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)Dibbin H.E. Project (2x60=120MW) in Arunachal Pradesh by M/s KSK Dibbin Hydro Power Private Limited

Dibbin H.E. Project was accorded concurrence on 4.02.2009 for an estimated completed cost of ₹728.54 Crores.

MoEF&CC has accorded environmental clearance to the project on 23.7.2012.

Forest clearance (Stage-I) was accorded by MoEF&CC on 7th Feb,

2012. Forest clearance Stage – II awaited.

iv)Nafra H.E. Project (2x60=120 MW)-Arunachal Pradesh by M/s SEW Nafra Power Corporation Private Limited

Nafra H.E. Project was accorded concurrence by CEA on 11th Febuary,2011 at an Estimated completed cost of 848.22 Crores including IDC & FC of 106.60 Crores and 5.94 Crores.

Project was accorded environmental clearance by MOE&F on 17.01.2011 and Forest clearance in June, 2012. PPA yet to be signed. Thereafter Financial agreement to be made to resume works.

v) Nyamjang Chhu H.E. Project (6x130=780MW) in Arunachal Pradesh by M/s NJC Hydro power Limited

Nyamjang Chhu H.E. Project was accorded concurrence by CEA on 24.03.2011 for an estimated completed cost of ₹ 6268.26 Crores (without Mega Power Project status) and ₹ 6115.60 Crores (with Mega Power Project status).

MoEF&CC accorded environmental clearance on 19.04.2012. Forest clearance (Stage-I) was accorded by MoEF&CC on 9.4.2012. Stage – II clearance awaited. NGT vide judgement dated 07.04.2016, has suspended Environment clearance till the time the studies as directed are to be carried out.

vi)Tato-II H.E Project (4x175=700MW) in Arunachal Pradesh By M/s THPPL

Tato-II H.E. Project was accorded concurrence by CEA on 22nd May, 2012 at an Estimated completed cost of ₹5616.20 crores.

MoEF&CC accorded environmental clearance on 27.6.2011. Forest clearance Stage-I is awaited. FC is linked to Cumulative Impact Assessment Study of Siang Basin which has been carried out and accepted by MoEF&CC. Installed Capacity of the project will revise due to change in e-flows recommended in BSR and hence fresh DPR to be prepared by developer.

vii) 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.

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**.**

viii) 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.
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.

ix) 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.
Environment clearance accorded on 07.08.15.Forest clearance stage-I& II are yet to be obtained.

x) 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.
Environment clearance and Forest clearance are yet to be obtained. Environment clearance is linked with Siang Basin Study Report.

xi) Siyom HE Project (6x166.67 = 1000 MW)in Arunachal Pradesh By SHPPL

Siyom H.E. Project was accorded concurrence by CEA on 17th Dec, 2013 at an estimated completed cost of ₹ 12100.00 Crores.
Environment clearance accorded on 31.01.08. Forest clearance yet to be obtained. Installed Capacity of the project will revise due to change in e-flows recommended in BSR and hence fresh DPR to be prepared by developer.

xii) 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.
Environment clearance has been accorded on 20.05.2015. Forest clearance Stage -I&II are yet to be obtained.

xiii) Kynshi-I HE Project (2x135 = 270MW)in Meghalya by M/s AKPPL

Kynshi-I H.E. Project was accorded concurrence by CEA on 31st March, 2015 at an estimated completed cost of ₹3154.37 Crores.

Environment clearance and Forest clearance are yet to be obtained.

xiv) Heo HE Project (3x80 = 240MW)in Ar. 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.

Environmental Clearance accorded on 10.11.15. Forest clearance stage-I accorded on 27.10.15. Forest clearance stage-II yet to be obtained.

xv) Tato – I HE Project (3x62 = 186MW)in Ar. 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.

Environmental Clearance accorded on 10.11.15. Forest clearance stage-I accorded on 27.10.15. Forest clearance stage-II yet to be obtained.

xvi) 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.

Environmental Clearance and Forest clearance are yet to be obtained.

xvii) 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.

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 were examined:

i) WahUmiam Stage-III HEP (Erstwhile Mawphu HEP, Stage-II (85 MW) in Meghalaya by NEEPCO Ltd-Vetting of Salient Features.ii)Examination and vetting of Updated cost estimates of Dibang Multi-Purpose Project (2880 MW) in Arunachal Pradesh by M/s. NHPC Ltd

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

NIL

11.6.3 Grant of prior approval of Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2019-20.

To M/s POWERGRID Corporation of India Ltd. (PGCIL) through Regulated Tariff Mechanism for "North Eastern Region Strengthening Scheme-X (NERSS-X)"

11.6.4 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2018-19.

NIL

Standing Committee/NERPC (TP) meetings held during 2019-20:

1st meeting of North Eastern Regional Power Committee (Transmission Planning) [NERPC(TP)] was held on 08.11.2019.
The transmission systems firmed-up in the meeting are given in **Annexure – 11(A).**

11.7 Hydro Power Generation Performance

Hydro Power generation during the year 2019-20 (as on 31.03.2020) in the North Eastern Region was 4828 MU against a target of 6852 MU, which is about 30 % less.

11.8 R&M Schemes (Hydro) of North Eastern Region

Ten (10) existing hydro schemes of North Eastern Region with an aggregate installed capacity of 524 MW have been identified for R&M works to accrue a benefit of 292 MW. The R&M activities of eight (8) schemes have already been completed at an actual expenditure of about Rs. 295 Crores to accrue a benefit of 121 MW. The remaining two (2) schemes having an aggregate installed capacity of 165 MW are under various stages of implementation and are likely to accrue a benefit of 171 MW at an estimated cost of about Rs. 605 Crores. The scheme-wise status of the R&M works of the hydro schemes of North Eastern Region as on 31.03.2017is 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, Meghalaya	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, Meghalaya	2x25	3.35	-	R&M works completed in 2003-04
4.	Umium St.I, MePGCL, Meghalaya		84.21	36 (LE)	RM&LE works completed in 2002-03
5.	Loktak, NHPC, Manipur	3x30 (Derated)	18.55	15 (Res.)	R&M works completed in 2011-12
6.	Umium St.II, MePGCL, Meghalaya	2x9	90.467	18(LE) +	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**	**294.79**	**121**	

B. Ongoing – Under Implementation

S. No.	Name of Scheme, Agency, State	Installed Cap. (MW)	Est. cost (Rs. Crs.)	Benefits (MW)	Status
9.	Kyrdemkulai (Umium St.III), MePGCL, Meghalaya	2x30	344	60(LE) +	DPR for life extension is under preparation. R&M works planned for completion in 2021-22
10.	Loktak, NHPC, Manipur	3x35	260.47	105 (LE)	DPR for life extension is under preparation. R&M works planned for completion in 2022-23
11.	Umiam-Umtru Stage-IV, MePGCL, Meghalaya	2x30	-	-	RLA studies to be taken up. R&M works planned for completion in 2022-27 period.
	Sub Total(B)	**165**	**604.47**	**171**	
	Total(A+B)	**524**	**899.26**	**292**	

*Tentative

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

11.9 Installed Capacity in the N.E. Region

The total installed capacity in the Region is as under:

Sector	Installed Capacity (MW)
Hydro	1727.00
Thermal	2581.83
RES	364.20
Nuclear	-
Total	**4673.03**

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CHAPTER-12

TRAINING AND 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 tobring 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 fulfil 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-Authority. 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 technologiesin 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 3rdBatch comprising of 32 nos.of Assistant Directors of CEA was concluded in May 2019 and the Induction Training of 4thBatch comprising of 25nos.of Assistant Directors of CEA for a

duration of 26 weeks started from 4th November 2019.Under this training programme the officers have under gone classroom training at various centres ofNational Power Training Institute, Simulator trainings, Plant visits and practical exposuresat 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, ESCI, DPC, NPC,NPTI, CRPI, IIT Kanpur,IIM and IEEE. The officers/officials were deputed for various in-service refresher training programmes, technical courses, workshops, seminars, conferences etc. at above institutes. The Man-days for all refresher training programmes conducted during the financial year 2019-20are 97.

12.5 In-house Presentations

During the year 2019-20, thefollowing11 technical presentations were arranged from various industries/organizations in CEA to keep CEA officers abreast ofthe latest technologies:

S.No	Topic of presentation	Organization
1	Plasma Ignition and Combustion system	L Y Power/ S&S Water & Power Projects Pvt Ltd
2	Battery Energy Storage System	AES-India Pvt Ltd
3	Bio Conversion & Flexibility and Efficiency of thermal Power Plants	Ramboll India Pvt Ltd
4	Capabilities of Data Analysis software	STATCRAFT-Govt Team
5	Asset Management for Hydro and Thermal Power Plant	TATA Consulting Engineers Limited
6	Static Synchronous Compensator (STATCOM)	NR Energy Solutions Pvt Ltd
7	Capability and experience of hydro power projects executed world over equipped with different types of turbines	Harbin Electric International Company Ltd
8	Surge Protection Devices and EV Charging	Phoenix Contact (India) Pvt Ltd
9	STATCOM, Synchronous compensator & G3 green gas	GE T&D
10	Smart molded Case Circuit Breaker (MCCB) System	Spectrum infra ventures (P) Ltd.
11	Smart Grid Operation Technology	Spectrum infra ventures (P) Ltd.

12.6 Foreign Visits/Training pro-grammes 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 2019-20, a total of 43 nos. officers of CEA at various levels visited foreign nations under

29programmes. The details of the foreign visits undertaken by the CEA officers are given in the **Annexure-12A**.

12.7 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 2019-20, 05nos. Graduate Engineer and 02nos. Diploma Engineer have undergone training in CEA under the Apprentice Act 1961..

2.8 Summer Training/Winter Training

During the financial year 2019-20, summer and winter training was given to 31 number students from reputed institutes.

12.9 Recognition of Training Institutes

For ensuring the development of the training infrastructure in Power Sector and the implementation of statutory requirements of training as per Central Electricity Authority (Measures relating to the Safety and Electric Supply) Regulations 2010, Power Training Institutes/Centres of various Central/State Utilities as well as Private Sector were visited by CEA officers for their assessment and recognition.

During the period 2019-20, the following 15 nos. training institutes/Centres were visited and assessed for recognition:-

S.No	Name of the Institute
1	NPTI, Durgapur (West Bengal)
2	Adani Technical Training Centre, Dahanu, Palghar(Maharashtra)
3	IPMA, Bhopal (M.P.)
4	EDC, NTPC, Farakka (West Bengal)
5	DVC Training Institute,Chandrapura TPS, Bokaro (Jharkhand)
6	NPTI, Badarpur, New Delhi (Delhi)
7	TTI,Obra,UPRVUNL, Sonebhadra(U.P.)
8	APGENCO Training Institute, Dr. NTTPS ,Vijayawada (A. P.)
9	Technical Training & Management Development Centre, HINDALCO, Renusagar, (U.P.)
10	Plant Training Centre, Southern Generating Station(SGS),CESC Ltd., Kolkata(West Bengal)
11	O & M Training Institute, CESCLtd., P-18, Taratala Road, Kolkata(West Bengal)
12	NPTI, Southern Region,Neyveli (T.N.)
13	NPTI, NER, Guwahati (Assam)
14	Tata Power Skill Development Institute(TPSDI), Shahad, Thane (Maharashtra)
15	HLTC-NPTI, Bengaluru(Karnatka)

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ANNEXURE

Annex-2A

(Item No. 2.9.2.2)

Plant-wise Coal Receipt and Consumption during 2019-20

			RECEIPT OF COAL ('000 Tonnes)						CON-SUMPTION ('000 Tonnes)
Sl. No	Name of Station	Capa-city (MW)	CIL	SCCL	Captive	e-Auction	Import	Total Receipt	
1	RAJGHAT TPS	0	0	0	0	0	0	0	0
2	INDIRA GANDHI STPP	1500	2775	8	0	0	379	3162	2619
3	MAHATMA GANDHI TPS	1320	3751	0	0	0	0	3751	3629
4	PANIPAT TPS	920	1449	0	0	0	0	1449	1261
5	RAJIV GANDHI TPS	1200	1816	0	0	0	0	1816	1634
6	YAMUNA NAGAR TPS	600	2153	0	0	0	0	2153	1803
7	GH TPS (LEH.MOH.)	920	562	0	0	0	0	562	647
8	GOINDWAL SAHIB TPP	540	1028	0	0	110	0	1138	893
9	RAJPURA TPP	1400	3659	97	0	0	934	4689	4365
10	ROPAR TPS	840	448	27	0	0	0	476	737
11	TALWANDI SABO TPP	1980	4749	0	0	0	894	5643	5449
12	CHHABRA TPP	2320	1781	0	6323	0	0	8104	6557
13	KAWAI TPS	1320	4167	0	0	513	73	4753	4488
14	KOTA TPS	1240	4522	154	231	0	0	4907	4831
15	SURATGARH TPS	2160	2233	0	964	0	0	3198	3124
16	KALISINDH TPS	1200	153	0	3157	0	0	3309	3261
17	ANPARA C TPS	1200	4637	0	0	41	0	4678	4388
18	ANPARA TPS	2630	11004	0	0	0	0	11004	10861
19	BARKHERA TPS	90	76	0	0	0	0	76	75
20	DADRI (NCTPP)	1820	4422	0	0	15	290	4727	4423
21	HARDUAGANJ TPS	605	2324	0	0	0	0	2324	2116
22	KHAMBARKHERA TPS	90	61	0	0	0	0	61	64
23	KUNDARKI TPS	90	100	0	0	0	0	100	92
24	LALITPUR TPS	1980	3854	0	0	98	0	3952	4263
25	MAQSOODPUR TPS	90	84	0	0	0	0	84	85
26	MEJA STPP	660	804	4	16	0	0	824	643
27	OBRA TPS	1094	2823	0	0	0	0	2823	2740
28	PARICHHA TPS	1140	3020	0	0	0	0	3020	2651
29	PRAYAGRAJ TPP	1980	6399	0	0	0	0	6399	5814

30	RIHAND STPS	3000	13132	0	0	0	0	13132	13778
31	ROSA TPP Ph-I	1200	3683	0	0	0	0	3683	3620
32	SINGRAULI STPS	2000	9898	0	0	0	0	9898	9834
33	TANDA TPS	1100	2561	0	174	0	0	2735	2785
34	UNCHAHAR TPS	1550	5352	0	309	0	154	5815	5686
35	UTRAULA TPS	90	97	0	0	0	0	97	97
36	AKALTARA TPS	1800	4105	0	0	2426	243	6775	6525
37	BALCO TPS	600	1048	0	0	721	512	2281	2177
38	BANDAKHAR TPP	300	1501	0	0	124	50	1675	1705
39	BARADARHA TPS	1200	1783	0	0	2816	0	4599	4602
40	BHILAI TPS	500	1204	262	0	757	0	2223	1779
41	BINJKOTE TPP	600	997	0	0	1065	0	2062	2070
42	DSPM TPS	500	2507	0	0	0	0	2507	2653
43	KORBA STPS	2600	14084	3	0	0	0	14087	13722
44	KORBA-II	0	393	0	0	0	0	393	383
45	KORBA-III	240	704	0	0	0	0	704	669
46	KORBA-WEST TPS	1340	6281	0	0	0	0	6281	6227
47	LARA TPP	800	330	4	2161	0	0	2494	2368
48	MARWA TPS	1000	2987	0	0	0	0	2987	3156
49	NAWAPARA TPP	600	1352	0	0	166	0	1518	1495
50	PATHADI TPP	600	2214	0	0	248	0	2461	2338
51	SIPAT STPS	2980	13508	131	286	0	101	14026	14060
52	TAMNAR TPP	2400	2675	0	0	2873	1	5549	5518
53	UCHPINDA TPP	1440	1313	0	0	755	0	2069	2090
54	AVANTHA BHANDAR	600	0	0	0	199	0	199	199
55	OP JINDAL TPS	1000	322	0	0	1430	118	1871	1831
56	RAIKHEDA TPP	1370	2391	0	0	951	0	3342	3293
57	SALORA TPP	135	0	0	0	0	0	0	0
58	GANDHI NAGAR TPS	630	883	156	0	0	0	1039	1160
59	SABARMATI (C STATION)	0	358	0	0	0	184	543	545
60	SABARMATI (D-F STATIONS)	362	575	0	0	0	172	747	724
61	UKAI TPS	1110	3868	0	0	0	4	3872	3748
62	WANAKBORI TPS	2270	4002	0	0	0	0	4002	3733
63	AMARKANTAK EXT TPS	210	1059	0	0	0	0	1059	988
64	ANUPPUR TPP	1200	2957	0	0	1825	32	4814	4707
65	BINA TPS	500	1393	0	0	523	0	1916	1783
66	GADARWARA TPP	800	531	4	99	0	0	633	553
67	KHARGONE STPP	1320	61	0	283	0	0	344	290

68	SANJAY GANDHI TPS	1340	4493	0	0	0	0	4493	4626
69	SATPURA TPS	1330	3696	0	0	0	0	3696	3814
70	SEIONI TPP	600	1696	0	0	531	0	2228	2110
71	SHREE SINGAJI TPP	2520	6296	166	0	0	0	6462	6076
72	VINDHYACHAL STPS	4760	24778	0	0	0	0	24778	25289
73	MAHAN TPP	1200	0	0	0	2280	0	2280	2207
74	NIGRI TPP	1320	0	0	2887	1090	0	3978	3665
75	SASAN UMTPP	3960	0	0	18781	0	0	18781	18530
76	AMARAVATI TPS	1350	2096	0	0	0	0	2096	2001
77	BELA TPS	270	0	0	0	0	0	0	0
78	BHUSAWAL TPS	1210	3855	11	0	0	373	4239	4073
79	BUTIBORI TPP	600	0	0	0	0	0	0	0
80	CHANDRAPUR(MAHARASHTRA) STPS	2920	9582	2195	0	0	914	12691	12665
81	DAHANU TPS	500	1282	0	0	0	863	2145	1905
82	DHARIWAL TPP	600	1583	0	0	620	26	2229	2205
83	GMR WARORA TPS	600	2171	0	0	594	0	2765	2623
84	KHAPARKHEDA TPS	1340	6110	176	0	0	362	6649	6148
85	KORADI TPS	2400	4211	2247	0	0	989	7447	7144
86	MAUDA TPS	2320	5558	744	522	223	503	7551	6895
87	NASIK TPS	630	2042	15	0	0	0	2057	1916
88	PARAS TPS	500	2190	30	0	0	0	2220	2087
89	PARLI TPS	750	1079	686	0	0	0	1766	1892
90	SOLAPUR	1320	521	136	873	47	371	1949	523
91	TIRORA TPS	3300	13586	0	0	625	548	14759	14865
92	WARDHA WARORA TPP	540	46	0	0	88	0	134	122
93	MIHAN TPS	246	0	0	0	0	0	0	0
94	NASIK (P) TPS	1350	0	0	0	0	0	0	0
95	SHIRPUR TPP	150	0	0	0	0	0	0	0
96	DAMODARAM SANJEEVAIAH TPS	1600	4584	0	0	0	197	4781	4573
97	Dr. N.TATA RAO TPS	1760	4710	4388	0	0	0	9099	9041
98	PAINAMPURAM TPP	1320	2601	0	0	0	3238	5840	5865
99	RAYALASEEMA TPS	1650	2257	2931	0	0	0	5187	4916
100	SIMHADRI	2000	6396	983	132	0	310	7820	7477
101	VIZAG TPP	1040	2186	0	0	34	0	2220	2256
102	SGPL TPP	1320	0	0	0	0	4429	4429	4316

103	BELLARY TPS	1700	670	2584	0	0	0	3254	2792
104	KUDGI STPP	2400	572	407	1388	43	235	2644	2504
105	RAICHUR TPS	1720	2527	2410	0	0	0	4937	6144
106	YERMARUS TPP	1600	0	1854	0	0	0	1854	487
107	METTUR TPS	840	2437	0	0	0	907	3344	3350
108	METTUR TPS - II	600	1060	0	0	0	699	1759	1837
109	NORTH CHENNAI TPS	1830	4976	0	0	0	1606	6583	6466
110	TUTICORIN (JV) TPP	1000	2049	0	0	0	1099	3148	3060
111	TUTICORIN TPS	1050	2903	0	0	0	990	3892	3999
112	VALLUR TPP	1500	2930	1274	0	0	0	4205	4221
113	TUTICORIN (P) TPP	300	0	0	0	0	0	0	0
114	BHADRADRI TPP	0	0	0	0	0	0	0	0
115	KAKATIYA TPS	1100	0	4216	0	0	0	4216	4101
116	KOTHAGUDEM TPS	420	0	1830	0	0	0	1830	2163
117	KOTHAGUDEM TPS (NEW)	1000	0	4979	0	0	0	4979	4979
118	KOTHAGUDEM TPS (STAGE-7)	800	0	1943	0	0	0	1943	1846
119	RAMAGUNDEM - B TPS	63	0	287	0	0	0	287	286
120	RAMAGUNDEM STPS	2600	0	10488	0	0	0	10488	10576
121	SINGARENI TPP	1200	0	5898	0	0	0	5898	5917
122	BARAUNI TPS	710	18	0	3	0	0	23	48
123	BARH II	1320	3522	0	1992	0	0	5515	5368
124	KAHALGAON TPS	2340	13180	0	132	0	0	13313	13463
125	MUZAFFARPUR TPS	610	2044	0	0	0	0	2044	2083
126	NABI NAGAR TPP	750	3321	0	0	0	0	3321	3197
127	NABINAGAR STPP	660	865	0	465	0	0	1330	1163
128	BOKARO `B` TPS	210	705	0	0	0	0	705	708
129	BOKARO TPS `A` EXP	500	1012	0	0	0	0	1012	905
130	CHANDRAPURA(DVC) TPS	630	2076	0	0	0	0	2076	2124
131	KODARMA TPP	1000	4249	0	0	0	0	4249	3933
132	MAHADEV PRASAD STPP	540	768	0	0	1324	0	2092	2114
133	MAITHON RB TPP	1050	3451	0	0	414	29	3894	3820
134	TENUGHAT TPS	420	1729	0	0	0	0	1729	1710
135	JOJOBERA TPS	240	742	0	0	178	60	980	963
136	DARLIPALI STPS	800	0	0	123	0	0	123	248
137	DERANG TPP	1200	2060	0	0	2611	10	4681	4254

138	IB VALLEY TPS	1740	4813	0	0	0	0	4813	4728
139	KAMALANGA TPS	1050	3168	0	0	554	160	3882	4337
140	TALCHER (OLD) TPS	460	2875	0	0	0	0	2875	3043
141	TALCHER STPS	3000	14952	576	186	0	598	16312	16060
142	STERLITE TPP	1200	447	0	0	46	8	500	473
143	UTKAL TPP (IND BARATH)	350	0	0	0	0	0	0	0
144	BAKRESWAR TPS	1050	4141	0	11	392	0	4545	4268
145	BANDEL TPS	330	608	0	0	170	0	778	750
146	BUDGE BUDGE TPS	750	1124	0	1486	734	0	3344	3354
147	D.P.L. TPS	550	1671	0	0	0	0	1671	1549
148	DURGAPUR STEEL TPS	1000	4120	0	0	0	0	4120	3984
149	DURGAPUR TPS	210	425	0	0	0	0	425	364
150	FARAKKA STPS	2100	9446	24	75	0	0	9544	9130
151	HALDIA TPP	600	2310	0	0	692	36	3039	2975
152	KOLAGHAT TPS	1260	2164	0	0	357	11	2532	2531
153	MEJIA TPS	2340	9060	0	0	0	0	9060	8385
154	RAGHUNATHPUR TPP	1200	3444	0	0	0	0	3444	3086
155	SAGARDIGHI TPS	1600	2806	0	0	1672	0	4478	4278
156	SANTALDIH TPS	500	2094	0	0	77	0	2171	2385
157	SOUTHERN REPL. TPS	135	199	0	7	51	0	258	235
158	TITAGARH TPS	240	0	0	0	0	0	0	0
159	HIRANMAYE TPP	300	0	0	0	0	0	0	0
160	BONGAIGAON TPP	750	2235	0	419	0	39	2693	2325
161	MUNDRA TPS	4620	0	0	0	0	16436	16436	16224
162	MUNDRA UMTPP	4000	0	0	0	0	11031	11031	11011
163	SALAYA TPP	1200	0	0	0	0	2355	2355	2355
164	SIKKA REP. TPS	500	0	0	0	0	1263	1263	1301
165	JSW RATNAGIRI TPP	1200	0	0	0	0	3427	3427	3298
166	TROMBAY TPS	750	0	0	0	0	2307	2307	2367
167	SIMHAPURI TPS	600	0	0	0	0	0	0	0
168	THAMMINAPATNAM TPS	300	0	0	0	0	0	0	0
169	TORANGALLU TPS(SBU-I)	260	0	0	0	0	330	330	330
170	TORANGALLU TPS(SBU-II)	600	0	0	0	0	801	801	863
171	UDUPI TPP	1200	0	0	0	0	1542	1542	1403
172	ITPCL TPP	1200	0	0	0	0	3832	3832	3525
173	MUTHIARA TPP	1200	0	0	0	0	2142	2142	2247

Annex-3A
(Item no. 3.2)

Details of Inter-regional Transmission lines as on 31.03.2020

Details of Inter-regional transmission lines	Transmission Capacity in MW (As on 31.03.2020)
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 BiswanathChariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole at new pooling station in Alipurduar and addition of second 3000 MW module	3,000
Biharsharif-Varanasi 400kV D/c line (Quad)	1,600
Sub-total	**22,530**
EAST-WEST	
Budhipadar-Korba 220 kV 3 ckts.	390
Rourkela-Raipur 400 kV D/c with series comp.+TCSC	1,400
Ranchi –Sipat 400 kV D/c with series comp.	1,200
Rourkela-Raipur 400 kV D/c (2nd) with series comp.	1,400
Ranchi - Dharamjayagarh - WR Pooiling Station 765kV S/c line	2,100
Ranchi - Dharamjaygarh 765kV 2nd S/c	2,100
Jharsuguda-Dharamjaygarh 765kV D/c line	4,200
Jharsuguda-Dharamjaygarh 765kV 2nd D/c line	4,200
Jharsuguda- Raipur 765kV D/c line	4,200
Sub-total	**21,190**
WEST- NORTH	
Auriya-Malanpur 220 KV D/c	260
Kota - Ujjain 220 KV D/c	260

Vindhyachal HVDC back-to-back	500
Gwalier-Agra 765 kV 2 x S/c	4,200
Zerda-Kankroli 400kV D/c	1,000
Champa Pool- Kurukshetra HVDC Bipole	3,000
Gwalior-Jaipur 765kV 2xS/c lines	4,200
RAPP-Sujalpur 400kV D/c	1,000
Adani(Mundra) - Mahendranagar HVDC bipole	2,500
Upgradation of Champa Pool- Kurukshetra HVDC Bipole	3,000
Jabalpur - Orai 765kV D/c line	4,200
LILO of Satna - Gwalior 765kV 2xS/c line at Orai	4,200
Banaskantha-Chittorgarh 765kV D/c line	4,200
Sub-total	**32,520**
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
Sub-total	**12,120**
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	
BiswanathChariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole$	3,000
Sub-total	**3,000**
TOTAL (CUMULATIVE)	**102,050**

Annex-3B
(Item no. 3.3.2)

ISSUES PERTAINING TO TRANSMISSION SYSTEM PLANNING TAKEN UP DURING 2019-20

A. 3rd Meeting of Northern Region Standing Committee on Transmission

1. Proposal for establishment of 765/400 kV Pooling Station at Kishtwar, J&K.
2. Approval of charging of 220kV and 400kV Intra-State Transmission Systems of RVPNL.
3. Commissioning of newly constructed/under construction intra-State transmission lines of Punjab State Transmission Corporation Limited (PSTCL).
4. PSTCL proposal regarding (i)Upgradation of 132kV Alawalpur S/s at 220kV along with LILO of one circuit of 220 kV BBMB Jalandhar- 220 kV Pong D/c line at Alawalpur 220 kV substation and (ii) Upgradation of 132kV Badhnikalan S/s at 220kV along with LILO of 220 kV Himmatpura- PGCIL Moga line at 220 kV Badhnikalan.
5. 2 nos. of 220kV bays at Mainpuri(PG) 400/220kVsubstation for providing connectivity to Railway Traction GSS.
6. Addition 1x500 MVA 400/220kV Transformer at Balachak.
7. RVPNL proposal regarding Up-rating and refurbishment of existing 132kV lines using HTLS conductor with associated works in Jaipur EHV Network.
8. Up-gradation and Strengthening of Delhi transmission system Phase-I.
9. Issues related to transmission system for evacuation of power for Bajoli Holi HEP (180MW) of M/s GMR Energy Ltd. in Himachal Pradesh.
10. Additional intra-state transmission works proposed by HPPTCL to be included under “Himachal Pradesh Clean Energy Transmission Investment Program”.
11. UPPTCL’ agenda regarding strengthening of intra-State network for additional loads and reliability.
12. Augmentation of 400 kV substation at Nawada.
13. Transfer of Connectivity of Malana-II HEP.
14. Utilization of 2 nos. 220 kV Feeder Bays at 400 kV GSS Sikar (PGCIL) by RVPN.
15. Stringing of 2nd Circuit on 220 kV Khodri-Majri S/C line on D/C towers-reg.
16. LILO of BaghpatPG(400)-Muradnagar-II (400)220 kV, SC UPPTCL line at MadolaVihar 220 /33kV, 3x60 MVA UPPTCL substation.
17. Approval for charging of 10 MVA 220/11 kV Power Transformer Captive Bay at Salal Power Station (6 x 115 MW), NHPC.
18. Proposal for adding new Transmission element i.e. 400kV/22kV, 25MVA Station Transformer at existing 420kV GIS System of 1500MW NathpaJhakri Hydro Power Station Hydro Power Station.
19. Transmission System for evacuation of Power from potential solar energy zones (20 GW) in Northern Region.
20. Transmission schemes referred back to Standing Committee on Transmission/ CEA by the NRPC in their 44th meeting held on 19.03.2019.
21. Transmission system for Solar Energy Zones in Rajasthan (8.9 GW) - Provision of spare ICT/Reactors and 240 MVAR bus reactor at Phagi 765/400 substation of RVPN in the already agreed transmission scheme.
22. Construction of 132/33 kV s/s Padartha(Patanjali), Haridwar and LILO of 132kV Chilla – Nazibadad line at proposed 132/33 kV S/s Padartha(Patanjali), Haridwar.
23. Construction of LILO of 1stckt. of 220 kV D/c Jhajhra(PTCUL) – Sherpur(PGCIL) line at under construction Vyasi HEPP, 120 MW UJVNL.
24. Creation of new 400 kV S/s, 2 x 500 MVA ICTs at Ropar in the premises of existing 220

kV Guru Gobind Singh Super Thermal Plant (GGSSTP) Ropar.
25. Revision in scope of works of 400 kV Dhanansu.
26. New transmission lines of PSTCL.
27. Augmentation of 400/220 kVS/s Rajpura.
28. Switchgear for Neemrana (PG)- Dhanonda (HVPNL) 400 kV D/c (HTLS) line at Dhanonda end.
29. Scheme to control Fault level in Northern Region(Phase-II).
30. Establishment of 400/220kV Substations in NCT of Delhi during 12th Plan Period - Change of Scope of 400/220 kV Tughlakabad& Dwarka Substations between POWERGRID & DTL.
31. LTA/Connectivity for hydro projects in Uttarakhand.
32. Down Stream network by State utilities from ISTS Station.
33. Operational Feedback (NR Region).
34. Connectivity for Thermal/Hydro Projects, Stage-I/Stage-II for RE Projects and LTA.

B. 4th Meeting of Northern Region Standing Committee on Transmission (NRSCT)

1. Transmission scheme for controlling high loading and high short circuit level at Moga substation.
2. Transmission System for evacuation of Power from potential solar energy zones – Phase -II in Northern Region.
3. Modifications in the Transmission schemes for Solar Energy Zones (SEZs) in Rajasthan (8.9 GW).
4. HPPTCL's proposal for transmission elements to be included in GEC-II.
5. Intra-State transmission works of HPPTCL posed for funding from Multilateral Development Banks.
6. Construction of 2 nos. of 400 kV bays under ISTS at 765/400 kV PGCIL substation, Varanasi.
7. Up-gradation and Strengthening of Delhi transmission system Phase-I.
8. Additional 1x500 MVA 400/220kV Transformer at Amritsar Substation, Balachak.
9. UPPTCL's proposal for intra-State works to strengthen the UP transmission network.
10. Connectivity for Thermal/Hydro Projects, Stage-I/Stage-II for RE Projects and LTA.

C. 5th Meeting of Northern Region Standing Committee on Transmission

1. Transmission System Strengthening for potential solar energy zones –Phase -II in Northern Region.
2. Agenda by PTCUL: Interim Power evacuaton arrangement for under construction TapovanVishnugarh and SingoliBhatwari HEP.

D. 1st meeting of Northern Regional Power Committee (Transmission Planning) (NRPCTP)

1. Constitution of Northern Regional Power Committee (Transmission Planning) (NRPCTP) for planning of Transmission System in the Region.
2. Agenda by HVPNL: Creation of 132/66kV S/s at Nanakpura with LILO of Ropar – Pinjore 132kV line at Nanakpura and LILO of Pinjore-Solan 66kV line at Kalka 66kV S/s.
3. Augmentation of transformation capacity at 400/220 kV Math, Mathura(UPPTCL) substation from 2x315 MVA to 1x500+2x315MVA.
4. Proposal of DTL to replace an ICT of 315 MVA with 500 MVA ICT at Bawana 400 kV

substation.

5. Evacuation system for Singrauli STPP Stage III (2x800 MW).
6. Transmission system for evacuation of power from Pakaldul (1000MW), Kiru (624 MW) and Kwar (540 MW) HEPs of CVPPL.
7. Establishment of 400 kV switching station at Kishtwar(GIS) under ISTS.
8. RVPN's proposal regarding uprating, updating and strengthening intra-State transmission schemes for Renewable Energy Evacuation in Western Rajasthan to be implemented by RVPN.
9. Connectivity of 220kV transmission line from 400kV GSS Ajmer to 220/25kV TSS Kishengarh through 2 phase line on double circuit towers and associated bay at 400kV GSS Ajmer.
10. Additional transmission system proposed for obviating the evacuation constraints in Kalisindh- Chhabra- Kawai generation which includes (i) Construction of 400/220kV, 2X500MVA GSS at Sangod with 220/132kV, 160 MVA transformer and associated lines (ii) Revised interconnections at Kalisindh TPS".
11. Charging of second Bus Reactor of 125 MVAr, 400KV at SSCTPP, RVUNL, Suratgarh.
12. Creation of 400/220 kV, 2x315 MVA S/S at Akhnoor/Rajouri as ISTS.
13. Transmission works to be implemented in Jammu Region under Intra –State transmission system.
14. New Butwal (Nepal) – Gorakhpur PG (India) cross border 400kV D/c (Quad) line.
15. Transmission system for grant of LTA & Connectivity to Nuclear Power Plant (4X700 MW) of NPCIL in Haryana.
16. Long Term Access (LTA) to NTPC Ltd. for 356.78 MW for its proposed Tanda TPS Stage-II (1320MW).
17. Transmission scheme for Solar Energy Zones (SEZs) in Rajasthan (11.1 GW – 8.1 GW ISTS + 3 GW Intra state) under Phase-II.
18. 220kV Outlets at Neemrana, Kotputli& Jaipur (South) 400/220 kV POWERGRID substations.
19. Up-gradation of Tehri Pooling Station–Meerut 765kV 2xS/c lines (operated at 400 kV) at its rated voltage.
20. Operational feedback of POSOCO.
21. Agenda for charging of Fatehgarh-II – Bhadla Section (After LILO of Fatehgarh – Bhadla 765kV D/c line (to be operated at 400kV) at Fatehgarh-II).
22. Interim arrangement at Moga substation for the intermediate period between commissioning of Bikaner-Moga 765 kV D/c line and implementation of proposed 400 kV bus splitting at Moga.
23. Data Requirements from STUs for Transmission Planning.
24. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II - Provision of spare ICT/Reactors and future space in the already agreed transmission scheme.
25. Down Stream network by State utilities from ISTS Station.
26. Summary of LTA/Connectivity granted in Bhadla/Fatehgarh/Bikaner Complex.
27. Evacuation arrangement of ShongtongKarcham (450MW) in Himachal Pradesh.
28. Transmission works to be implemented in UP under Intra-State transmission system.
29. Additional 220 kV downstream to 400 kV Kursi Road, Lucknow and Shahjahanpur PGCIL substations.
30. Approval for charging of 132/33 kV, 1x20/25 MVA substation at KuwaKhera in Chittorgarh district, Rajasthan by LILO of one circuit of 132 kV D/C Rana Pratap Sagar (RPS) [Rajasthan]- Gandhi Sagar (GS) [MP] line (RAPP-Gandhi Sagar section).

E. 2nd meeting of Western Region Standing Committee on Transmission

1. Installation of 1X315 MVA, 400/220 kV (3rd) transformer at Pithampur 400 kV substation – Agenda by MPPTCL.
2. Extension of 220 kV supply from Satna (PG) 765/400 kV substation to Kotar 220 kV S/s of MPPTCL by using existing interconnector-IV between Satna (PG) – Satna (MPPTCL) S/s.
3. Implementation of Connectivity lines by RE project developers on D/c or M/c towers.
4. Revised Intra-State Transmission scheme of Gujarat under Green Energy Corridor-I.
5. Intra state transmission schemes for state of Gujarat for consideration under Green Energy Corridor-II.
6. Revised Intra-StateTransmission scheme of Maharashtra under Green EnergyCorridor-I.
7. Intra state transmission schemes for state of Maharashtra for consideration under Green Energy Corridor-II.
8. Establishment of 400/220 kV Intra State substation at Pimpalgaon (Nashik) by MSETCL.
9. Connectivity of 50 MW solar park being established by South East Central (SEC) Railways for meeting its RPO obligations as a distribution licensee and change of its connectivity agreed at Raipur (Kumhari) 400/220 kV PGCIL substation from bulk consumer to Licensee.
10. MSETCL proposal for STU connectivity of M/s GWEL generation plant situated at Warora.
11. Inter-State Transmission System Strengthening in Chattarpur area in Madhya Pradesh.
12. Review of Reactive compensation on account of LILO of Satna – Bina ckt#3 at Sagar(MP) substation.
13. Establishment of 132/33 kV Sironcha Substation, Tal. – Sironcha, District – Gadchiroli and interconnection with Kistampeth 132 kV substation in Telangana.
14. Bhuj 400/220kV ICT bay being implemented as Hybrid/MTS on account of bay swapping with ReNew Wind Energy (AP2) Pvt. Ltd.
15. 400kV ICT bay for Installation of 1x500MVA ICT (3rd) at Itarsi 400/220kV substation.
16. Grant of ISTS connectivity to LARA STPP Stage-II (2x800MW) of NTPC Ltd. for its Lara STPP-I generation project (2x800MW) located in Chhattisgarh.
17. 604 MW LTOA granted to Chattisgarh State Power Trading Company Ltd. (CSPTrCL).
18. STU and CTU interconnections proposed by GETCO.
19. Progress of downstream network whose terminating bays are under construction by PGCIL.
20. Western Region Strengthening Scheme- XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme- IX (NERSS-IX).
21. Additional 400 kV feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool by M/s Goa Tamnar Transmission Projects Limited through TBCB route.
22. Operational Feedback of NLDC.
23. Transmission System for evacuation of Power from potential solar and wind energy zones (10.5 GW= 3 GW Solar + 7.5 GW Wind) in Western Region under Phase-I.
24. Transmission System for evacuation of Power from potential solar and wind energy zones (17.5 GW=12.5 GW Solar + 5 GW Wind) in Western Region under Phase-II.
25. 763MW LTOA granted to Karnataka Power Corporation Limited (2x800 MW) – agenda by CTU.
26. Requirement of Transformer Augmentation in Western Region – agenda by CTU.
27. Requirement of additional 765kV Bus Reactors at Vadodara GIS & Raipur Pool Substations – agenda by CTU.
28. Commissioning of Solar Farms without Power Plant Controllers (PPC)- agenda by

POSOCO.
29. High Voltages in the WR System- agenda by POSOCO.
30. Commissioning of Switchable Line reactors with NGR Bypass & CSD- agenda by POSOCO.
31. Early commissioning of bus splitting works at Raigarh (Kotra) and Dharamjaygarh substations of POWERGRID.
32. Charging of 400 kV Wardha – Aurangabad (1200 kV Wardha – Aurangabad) Line Reactor as Bus reactor.

F. 1st meeting of Western Region Power Committee (Transmission Planning) (WRPCTP)

1. Associated Transmission System for evacuation of power from Solar Parks proposed to be developed by M/s RUMS Ltd. at Agar (550MW) and Shajapur (450MW) districts of Madhya Pradesh – Agenda by MPPTCL.
2. Review of the transmission system for 10 GW solar RE projects in Gujarat under Phase-II and immediate connectivity to Dholera UMSP.
3. Establishment of the proposed Kistampeth – Sironcha 132 kV SCDC line as ISTS – Agenda by MSETCL.
4. Requirement of Transformer Augmentation in Western Region.
5. High voltages in WR system.
6. Grant of ISTS connectivity to LARA STPP Stage-II (2x800MW) of NTPC Ltd. for its Lara STPP-I generation project (2x800MW) located in Chhattisgarh.
7. Progress of downstream network whose terminating bays are under construction by PGCIL.
8. Connectivity of 50 MW solar park being established by South East Central (SEC) Railways for meeting its RPO obligations as a distribution licensee and change of its connectivity agreed at Raipur (Kumhari) 400/220 kV PGCIL substation from bulk consumer to Licensee.
9. Augmentation of transmission system for evacuation of power from M/s Essar Power M.P. Limited (EPMPL).
10. Summary of the connectivity and LTA granted in the connectivity and LTA meetings of WR.
11. Readiness of Transmission system for evacuation of power from Khargone STPS (2X660MW).
12. Connectivity of 325MW wind project of SBESS at 220kV level of Indore (existing) S/s.
13. Requirement of DGEN – Vadodara 400kV D/c line for power evacuation from DGEN Power plant (3x400MW).
14. Data requirements from STUs for Transmission Planning.
15. LILO of two circuits of 400 kV Bhadravati – Chandrapur-I 2xD/c line at Chandrapur-II – Agenda by MSETCL.
16. Proposal for Establishment of 132 kV Dharani – Pipalpani line by 2nd ckt stringing along with end bays at 132 Dharni S/s under MSETCL and 132 kV Pipalpani S/s under MPTRANSCO – Agenda by MSETCL.

G. 2nd meeting of Eastern Region Standing Committee on Transmission (ERSCT).

1. Termination of 400kV lines at Jeerat (WBSETCL) substation under the ERSS-XV and ERSS-XVIII schemes

2. Replacement of existing SMT bus scheme with DM at 132kV level at Malda (POWERGRID) S/s in GIS along with new 132kV bays
3. Conversion of 50MVAr bus reactor at Farakka generation switchyard to switchable line reactor under ERSS-15
4. Augmentation of transformation capacity at Muzaffarpur (POWERGRID) S/s
5. Additional 400kV connectivity at 400/220/132kV Saharsa (new) S/s being implemented under ERSS-XXI through TBCB
6. Establishment of Goraul 220/132/33kV S/s and construction of Muzaffarpur (POWERGRID) – Goraul 220kV D/c by BSPTCL as intra state scheme
7. New 220 kV and 132 kV infrastructure in Bihar under intra-state project.
8. Implementation of one 132kV line bay at Baripada (POWERGRID) S/s by OPTCL
9. Establishment of 400/132 kV GIS at Laxmikantapur with 3x200 MVA ICTs by D/c LILO of HEL – Subhasgram (PG) 400 kV D/C line of CESC by WBSETCL.
10. Scheme for limiting of fault current level at 400kV level at Farakka generation switchyard.
11. Modification in transmission system associated with North Karanpura (3x660MW) generation project of NTPC.
12. LTA application for transmission system for power evacuation of Odisha Integrated Power Ltd. (Odisha UMPP-4000MW).
13. Extension of completion schedule for installation of ICT-2 at Farakka (NTPC) under ERSS-XII.
14. Realignment of existing 132kV configuration of Rangpo bus for facilitating termination of 132kV Rangpo-Chuzachen 132kV D/C line.

H. 1st meeting of Eastern Region Power Committee (Transmission Planning) (ERPCTP).

1. Modification in construction of 220 kV D/C Barjora-Burdwan line of DVC.
2. Durgapur (POWERGRID) – Parulia (DVC) 220kV D/c line
3. Re-conductoring of Purnea – Malda section of Bongaigaon – Malda 400kV D/c line
4. Establishment of 132/33 kV sub-station at Nabinagar.
5. Proposal for construction of 132/33 kV Grid sub-stations at Bagha, Bhore, Barahchatti, Daudnagar, Barari and Murliganj in Bihar.
6. Replacement of existing Zebra conductor of Joda-JSPL 220kV line.
7. Construction of 400/220/132 kV Chhapra GSS by BSPTCL.
8. Uprating of bay equipment at Kahalgaon switchyard matching with capacity of Kahalgaon-Patna 400kV (Quad) D/C line- by POWERGRID.
9. Evacuation system of Buxar Thermal Power Station (2x660 MW).
10. Modification in ISTS scheme namely – “Associated Transmission System for Nabinagar-II TPS (3x660MW)”.
11. Modification in ISTS scheme namely – “Eastern Region Strengthening Scheme-III (ERSS-III).
12. Cross Border Transmission system for power evacuation from Arun-3 (900MW) HEP, Nepal of M/s SAPDC to India was modified as Dhalkebar – Sitamadhi 400kV D/C line
13. Upgradation of existing 220/132kV Sahupuri S/s to 400/220kV, 2x500MVA
14. ISTS connectivity by Railways at Sasaram (Pasauli)
15. Scheme Modification and additional source at Bakhtiyarpur, Dumraon, Barsoi and Piro-
16. Closing of Bus sectionaliser between U-3 & U-4 of OPGC (Connectivity/LTA/Evacuation System for OPGC lb TPS(2x660MW) in Odisha).
17. Modification in scheme for limiting of fault current level at 400kV level at Farakka generation switchyard.

18. Re-conductoring of Siliguri-Bongaigaon 400kV D/c Twin Moose line with Twin HTLS conductor, reconductoring of Alipurduar – Salakati (Bongaigaon) 220kV D/c line with Single HTLS.

I. 2nd Meeting of the Southern Region Standing Committee on Transmission (SRSCT)

1. Intra-State transmission projects proposed for Green Energy Corridor Ph-II in Karnataka.
2. Providing additional feed to 3x500 MVA, 400/220 kV substation at Mylasandra, (Electronic City) Bengaluru and establishment of 2x500 MVA, 400/220 kV substation at Dommasandra in Bengaluru
3. Establishment of 400/230 kV substation at Vadamadurai, Tamil Nadu, along with associated transmission lines.
4. Establishment of 400/110 kV substation at Vishwanathapuram, Tamil Nadu.
5. Phase-II Solar & Wind Energy Zone Transmission schemes.
6. Erection of 400/220/132 kV Chilakaluripet S/S near KukkapalliVaripalem village in Guntur district.
7. Extension of EHT power supply of 582 MW for Godavari-Penna Interlink Phase-I Lift Irrigation Scheme in Guntur District, Andhra Pradesh.
8. Erection of 400/220 kV Atchuthapuram GIS and associated transmission network in Vishakhapatanam District Andhra Pradesh.
9. Transmission scheme for evacuation of 960 MW (12x80 MW) power from Polavaram Hydro Electric Project of APGENCO in East Godavari district and system improvement network connected to 400 kV Guddigudem SS and inter connection of 220 kV lines.
10. Extension of total power of 450 MVA, 210 MVA power for establishment of Petrochemical Complex by M/s GAIL (India) Ltd and 240 MVA power supply at 220 kV level in Kakinada SEZ Andhra Pradesh.
11. LILO of one circuit of existing 220 kV Srisailam-Dindi DC line to the proposed 220/33 kV Domalapenta SS in Telangana State.
12. Modification in earlier approved connectivity for Kaleshwaram Lift Irrigation Scheme.
13. Revised proposal by TSTRANSCO for earlier approved transmission scheme of Yadadri (Damaracherla) TPP (5x800 MW).
14. 220 kV connectivity to Bhadradari TPP, Telangana.
15. Establishing 2x500 MVA, 400/220 kV sub-station at Kadakola, Mysuru District
16. Permanent de-linking of LILO portion of 400 kV 'RTPS-BTPS-JSW-GUTTUR' Twin Moose line at JSW generating station.
17. Power evacuation scheme by KPTCL for the proposed 2000 MW Sharavathy Pumped Storage Project.
18. N-1 criteria getting violated for 400/220 kV ICTs at UPCL, Karnataka.
19. Udupi - Kasargod D/C line- RoW issues
20. Enhancement of 400/110 kV ICT capacity from 2x200 MVA to 3x200 MVA at the existing Alamathy 400/230-110 kV SS.

21. Proposal for grant of connectivity to NLC India Ltd for TPS-II 2nd expansion (2x660 MW) in Cuddalore, Tamil Nadu, and to control high short circuit fault level in Neyveli Generation complex.
22. High short circuit current level at 765/400 kV Thiruvalam S/s.
23. High loading of Nellore – Nellore PS 400 kV (Quad) D/c line
24. Utilization of 2x240 MVAR line reactors of Vemagiri – Chilakaluripeta 765kV D/c as bus reactors at Vemagiri end.
25. Construction of one 220 kV bay at Palakkad 400/220 kV Substation for grant of Stage-II connectivity to Sindphal Power Development Private Limited.
26. Allocation of one 220 kV bay at Hiriyur 400/220 kV (POWERGRID) substation to KPTCL for termination of 220 kV S/c line.
27. Proposal of TANTRANSCO for establishing a 230/110 kV SS at Vembakkam by LILO of 230 kV MAPS – Echur line.
28. Proposal of TANTRANSCO for erecting 400 kV Bus reactors at different locations.
29. Proposal of TANTRANSCO for Thiruvalam 400/110 kV Ratio Introduction.
30. Proposal for erection of 2x80 MVAR reactor at Stage- 1 (2x800 MW) Sri DamodaramSanjeevaiah Thermal Power Station, Krishnapatnam, Nellore district.
31. Connectivity Transmission system agreed in earlier Connectivity/LTA meetings of Southern Region.

J. 1st meeting of Southern Regional Power Committee (Transmission Planning)

1. Revised proposal by TSTRANSCO for earlier approved transmission scheme of Yadadri (Damaracherla) TPP (5x800 MW)
2. Revised transmission scheme by TSTRANSCO for PalamuruRangareddy Lift Irrigation Scheme.
3. Permanent de-linking of LILO portion of 400 kV 'RTPS-BTPS-JSW-GUTTUR' Twin Moose line at JSW generating station.
4. Modifications in 220 kV transmission system proposed by KPTCL at Yalwar (associated transmission lines of 400/220 kV Yalwar Substation.)
5. Proposal for grant of connectivity to NLC India Ltd for TPS-II 2nd Expansion (2x660 MW) in Cuddalore, Tamil Nadu, and to control high short circuit fault level in Neyveli Generation complex.
6. Overloading of 400 kV NP Kunta-Kolar S/C line.
7. Augmentation of 4th 500 MVA ICT at existing 400/220 kV substation at Manubolu (Nellore)
8. Augmentation of 4th 500 MVA ICT at existing 400/220 kV substation at Kalpaka, Visakhapatnam District.
9. Proposal by APTRANSCO for erection of 220/132/33 kV Tiruvuru SS, 132/33 kV Mylavaram SS & 132/33 kV Gampalagudem SS and associated 220 kV & 132 kV transmission lines in Krishna district.

10. Sita Rama Lift Irrigation Scheme - proposal for LILO of 220 kV KTPS (TS) - Lower Sileru (AP)- I line at 220/11 kV V.K. Ramavaram LI SS and also at 400/220 kV Asupaka SS for providing additional source.
11. Bus reactor at 400/220 kV Jagalur substation.
12. Establishing 2x500 MVA, 400/220 kV GIS A-Station at Anand Rao circle (adjacent to existing 220/66/11 kV A Station) in Bengaluru.
13. Additional works proposed by KPTCL under Intra-state transmission schemes under Green Energy Corridor Phase-2.
14. Dynamic reactive support by utilizing STATCOMs at Hoody and Neelamangala.
15. Providing alternate source to the proposed 220/66 kV Pavagada sub-station (feeding from 220/66 kV Madhugiri S/S) by constructing new 220 kV DC line on DC tower with Drake conductor, from existing 400/220 kV Kyathaganacherlu (PGCIL) station to proposed 220/66 kV Pavagada substation for a distance of 32 km in the new corridor.
16. Provision of additional 400/110 kV ICT (3rd unit of 200 MVA) at the existing 400/230-110 kV Kayathar substation and 400/230 kV & 400/110 kV ICTs provision for the ongoing 400/230- 110 kV Thennampatty S/S.
17. Enhancement of ICT capacity by 1x500 MVA, 400/230 kV ICT along with the existing 2x315 MVA, 400/230 kV ICTs at Sunguvarchatram 400/230-110 kV SS.
18. Re-Conductoring of existing 110 kV D/C Theni-Sembatty feeder I & II and Theni-Periyar feeder I& II.
19. System studies for identification of transmission system for grant of connectivity and LTA to NPCIL for Kaiga APP expansion Unit 5&6 (2x700 MW).
20. System studies for identification of transmission system for grant of connectivity to NPCIL for Kudankulam NPP Unit 3&4 (2x1000 MW).
21. Allocation of two 230 kV bays at 400/230 kV Pugalur (PGCIL-existing) to TANTRANSCO.
22. Development of common facilities at Tuticorin-II GIS for RE Integration.
23. Additional connectivity at 400 kV or 230 kV at NTPL, Tuticorin, to enhance the reliability in power evacuation during contingent conditions.
24. Proposal for erection of 80 MVAR bus reactor at Podili 400 kV S/s by APTRANSCO.
25. Proposal for erection of 132/33 kV S/S at T. Narasapuram by APTRANSCO.
26. Requirement of power at 400 kV level for MRPL (Mangalore Refinery & Petrochemicals Limited).
27. Implementation of bays at Edayarpalayam 400/230/110 kV S/s of TANTRANSCO.
28. Establishment of 400/230-110kV S/S at Ulagam instead of at Vishwanathapuram by TANTRANSCO.
29. Phase-II Solar & Wind Energy Zone Transmission Schemes.
30. Connectivity transmission system agreed in Connectivity/LTA meetings of Southern Region

K. 1st meeting of North Eastern Regional Power Committee (Transmission Planning) [NERPC(TP)]

1. Installation of 420 kV, 80 MVAr bus reactor at Ranganadi HEP.
2. Interconnection of 132 kV substations in upper Assam (below Brahmaputra) with neighbouring substations in Arunachal Pradesh
3. Scheme for relieving congestion in Agia substation of Assam
4. Reconductoring of Dimapur-Imphal and Leimatak (Loktak)-Jiribam 132kV lines
5. Re-conductoring of the 132 kV line from Khliehriat to Panchgram by HTLS conductor
6. Re-conductoring and strengthening of the 132 kV D/C line from Umiam Stage-I to Umiam Stage-III by HTLS conductor
7. Modifications in enhancement of Intra-state Transmission system of Assam
8. New Proposals of Assam considering load forecast for the year 2030
9. Establishment of 7x167 MVA, 400/220 kV GIS substation at New Kohima in place of conventional substation under NERSS-VI
10. Modifications in NERSS-V scheme and Surajmaninagar- Comilla (North) 400 kV link
11. Utilisation of spare 132kV ISTS bays at Silchar (POWERGRID), P.K.Bari (TSECL), Palatana (OTPC), and Surajmaninagar (TSECL)
12. Reconductoring of Siliguri-Bongaigaon 400kV D/c Twin Moose line with Twin HTLS conductor, reconductoring of Alipurduar – Salakati (Bongaigaon) 220kV D/c line with Single HTLS, and establishment of Bornagar S/s
13. Conversion of 2 nos. 63 MVAR Line Reactors at BishwanathChariali end of BiswanathChariali – Lower Subansiri 400kV (2nd) D/c line to Bus Reactors
14. Conversion of 132kV Khliehriat and 132/33kV Nirjuli substations from single main transfer scheme to double main transfer scheme on completion of 25 years age
15. Charging of 400 kV Silchar (PG) - Melriat (PG) I (Future) Main Bay for completing GIS Dia of 420 kV, 125 MVAR Bus Reactor at 400/132 kV Silchar Substation

Annex – 3C
(Item 3.4.2)

Details of the Schemes notified through Tariff Based Competitive Bidding (TBCB) during 2019-20

a) Schemes under bidding process by Bid Process Coordinators: (14 Nos.)

1. Evacuation of power from RE sources in Karur / Tiruppur Wind Energy Zone (Tamil Nadu)(2500MW)
2. Evacuation of power from RE sources in Koppal Wind Energy Zone (Karnataka)(2500MW)
3. Transmission scheme for Solar Energy Zone in Ananthpuram (Ananthapur) (2500 MW) and Kurnool (1000 MW), Andhra Pradesh
4. Transmission system for evacuation for power from RE projects in Osmanabad area (1 GW) in Maharashtra
5. Transmission system for evacuation for power from RE projects in Rajgarh (2500 MW) in Madhya Pradesh
6. Transmission system for solar energy zone in Gadag (2500 MW), Karnataka- Part A
7. Transmission system for solar energy zone in Bidar (2500 MW), Karnataka
8. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II- Part A
9. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II- Part B
10. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase II- Part C
11. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-D
12. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-E
13. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-F
14. Transmission system strengthening scheme for evacuation of power from solar energy zones in Rajasthan (8.1 GW) under Phase-II Part-G

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Annex – 3D
(Item 3.4.3)

Issues Pertaining to Transmission System Planning taken up in National Committee on Transmission during 2019-20

4th Meeting of National Committee on Transmission held on 31st July, 2019

1. Modifications in the transmission schemes already recommended by NCT and ECT
2. Denotification/Dropping of the Transmission Scheme "Connectivity System for Lanco Vidarbha Thermal Power Pvt. Ltd. (LVTPPL) and Inter State Transmission system strengthening in Chhattarpur area in Madhya Pradesh"
3. Status of transmission schemes under bidding process - briefing by BPCs
4. Cost estimates for the transmission projects to be implemented through tariff based competitive bidding (TBCB)
5. New Inter-State Transmission Schemes in Western Region
6. New Inter-State Transmission Schemes in Southern Region
7. New Inter-State Transmission Schemes in North Eastern Region

5th Meeting of National Committee on Transmission held on 21st August, 2019

1. Modifications in the transmission schemes already recommended by NCT and ECT
2. Status of transmission schemes under bidding process - briefing by BPCs
3. Cost estimates for the transmission projects to be implemented through tariff based competitive bidding (TBCB)
4. New Inter-State Transmission Schemes in Northern Region

6th Meeting of National Committee on Transmission held on 30th September, 2019

1. Status of transmission schemes under bidding process - briefing by BPCs
2. Cost estimates for the transmission projects to be implemented through tariff based competitive bidding (TBCB)
3. New Inter-State Transmission Schemes in Northern Region
4. New Inter-State Transmission Schemes in Eastern Region

1st Meeting of reconstituted National Committee on Transmission held on 3rd January, 2020

1. Reconstitution of the "National Committee on Transmission" (NCT)
2. Status of transmission schemes under bidding by BPCs
3. Advice sought by Bid Evaluation Committee for Selection of Successful Bidder based on e-RA for the transmission scheme "Western Region Strengthening Scheme-XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme-IX (NERSS-IX)

2nd Meeting of reconstituted National Committee on Transmission held on 22nd January, 2020

1. Advice sought by Bid Evaluation Committee for Selection of Successful Bidder based on e-RA for the transmission scheme "Western Region Strengthening Scheme-XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme-IX (NERSS-IX)"

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Annex – 3E
(Item 3.4.4)

Progress under Green Energy Corridor during 2019-20

A. Status of Inter State Schemes under Green Energy Corridor-I (upto March, 2020)

-	GEC ISTS Scheme	Estimated Cost (Rs. Crore)	NIT Status	Target comm. Schedule
1	GEC- Part A (KfW Tranche-I)	1479 (9 packages)	All Awarded	Commissioned
2	GEC- Part B (KfW Tranche-II)	3705 (22 Packages)		commissioned
3	GEC- Part C (KfW Tranche-III)	2247 (16 Packages)		commissioned
4	GEC- Part D (ADB)	3938 (24 Packages)		Commissioned
	Total (Transmission Schemes)	11,369		
	Control Infrastructure ➢ Dynamic Compensation: Rs 1204 Cr ➢ Real time monitoring: Rs. 473 Cr. ➢ Energy Storage: Rs. 2000 Cr.	3677		
	REMC (in 11 locations)	409 (Revised) [Rs. 138 Cr- awarded cost of REMC in 11 locations including PMC @ Rs 8.3 Cr. plus taxes]	All awarded	Commissioned
	Aggregate	**15455 (revised)**		

B. Status of Intra state Schemes under Green Energy Corridor-I (upto March 2020)

-	Name of the State	Estimated Cost (Rs. Crore)	Current Estimated Cost (Rs. Crore)	NIT Status	Award Status
1	Tamil Nadu (for tranche –I)	1593	1462.69	Done for all 5 packages (Rs. 1462.69 Cr)	Done for all 5 packages DPR Cost: Rs. 1462.69 Cr. Award Cost : Rs 1733.83 Cr
2	Rajasthan (for tranche –I) (Package 5-11 (revised) & Package 8 & 10))	1018.30	888.18+	NIT published for 11 packages (Rs 800.49 Cr.)	Done for 11 packages. DPR Cost: Rs. 800.49 Cr Award Cost: Rs. 661.23 Cr.
3	Andhra Pradesh	1289	1147.58#	NIT for 8 packages and 2 additional elements published (Rs 1147.58 Cr)	Done for 7 packages and 2 additional elements DPR Cost: Rs. 1192.16 Cr. Award Cost: Rs. 957.978 Cr.
4	Himachal Pradesh	910.52	909.86 $	Done for all 17 packages (Rs 909.86) $	Done for 9 packages. (HPPTCL) and sub-packages of 4 packages by HPSEBL. DPR Cost: Rs. 716.66 Cr. Award Cost: Rs. 641.58 Cr.
5	Gujarat	1962.12	2187	NIT for 28 packages done. (Rs. 2106.51)	Done for 28 packages DPR Cost: Rs. 2106.51Cr. Award Cost: Rs. 1643.91 Cr.
6	Karnataka	906	906	NIT for 6 packages done out of 7 packages (Rs. 611.43 Cr.)	Done for 6 packages DPR Cost: Rs. 611.43 Cr. Award Cost: Rs724.71 Cr.
7	Madhya Pradesh	2100	2026.92	NIT for 8 packages issued out of 8 packages (Rs. 2026.92 cr.)	Done for 8 packages DPR Cost: Rs.2026.92Cr Award Cost : Rs 1543.06 Cr.

8	Maharashtra	361.61	264	NIT for 17 Packages done (Rs, 240.13 Cr.)	Done for 17 packages DPR Cost :Rs. 240.13 Cr. Award Cost: 148.83
	Total	**10140.55**	**9792.23**	**9305.61**	**DPR*: 9156.99 Awarded* : 8055.128**

[#] One of the package (09th no.) was earlier dropped. Subsequently, 7 no. of additional transmission (Rs. 292 Cr) elements have been approved in addition to the 8 Packages (Pk-I to-VIII).

[+] DPR cost of 11 packages was Rs1018.30 crore. Out of 11 packages, 6 packages were awarded with DPR cost of Rs 768.46 crore. Subsequently, 7 packages (Package no. 5 to 11), deferred by RRVPNL include already awarded package no. 5 & 6 with DPR cost of Rs 236.482 crore. In lieu, 7 new revised packages (with DPR cost of Rs 261.95 crore) included in the scheme. Also, 2 Packages (8 & 10) were awarded with DPR cost of94.22 crore.

$ Three packages with DPR cost of 115.7 crore have been dropped.

^ Out of 27 transmission schemes approved in DPR (Rs 333.43 Cr without IDC), 8 no. of transmission schemes have been dropped by MSETCL, thus estimated DPR cost without IDC is now 263.98 Cr.

*Actual cost of the awarded schemes is Rs. 8085.128Cr. The corresponding DPR cost was Rs.9156.99 Cr.

Annex-3F
Item no. 3.10.1

Details of failure of EHV transmission line towers (220 kV and above) reported to CEA by various utilities:

Sl. No.	Name of Transmission line	Name of utility	Date of failure
1.	400kV D/C Sundargarh- Raigarh transmission line	PGCIL	01-04-2018
2	765 kV S/C Bilaspur – Dharamjaygarh (Ckt-I) transmission line	PGCIL	27.04.2018
3.	220 kV D/C Auraiya- Sikandara (Agra) transmission line	PGCIL	06.05.2018
4	400 kV D/C Maithon-Maithon transmission line	PGCIL	10.05.2018
5.	400 kV S/C Farakka-Durgapur II transmission line	PGCIL	10.05.2018
6.	765 kV S/C Gaya- Varanasi- transmission line	PGCIL	13.05.2018
7.	765 kV S/C Fatehpur – Agra-I transmission line	PGCIL	13.05.2018
8.	765 kV S/C Jhatikara-Bhiwani transmission line	PGCIL	16.05.2018
9.	765 kV S/C Gaya- Varanasi- transmission line	PGCIL	8.05.2018
10.	765 kV S/C Satna - Bina transmission line	PGCIL	30.05.2018
11.	400 kV D/C Sasaram - Daltonganj transmission line	PGCIL	31.05.2018
12.	400 kV D/C Hisar - Kaithal transmission line	PGCIL	09.06.2018
13.	400 kV D/C Damoh - Birsinghipur transmission line	PGCIL	12.06.2018
14.	400 kV S/C Kishenpur-Chamera Line	PGCIL	01.09.2018
15	400 kV D/C (Quad) Patna-Kishanganj Line	PGCIL	02.09.2018
16.	±500kV HVDC Talcher-Kolar Line	PGCIL	11.10.2018
17.	400 kV D/C Srikakulum-Garivadi Line	PGCIL	11.10.2018
18.	765 kV S/C Bhopal - Jabalpur transmission line	Sterlite Power	18.05.2018
19.	400kV D/C Purnea- Biharsharif Line	Sterlite Power	10.08.2018
20.	400kV D/C Purnea- Biharsharif Line	Sterlite Power	21.08.2018
21.	400kV BBLR Dhule D/C (Ckt-1 and Ckt-2) line	MSETCL	01.06.2018
22.	220kV D/C Chalisgaon – Kopargaon/ BBLR DC line	MSETCL	01.06.2018
23.	400 kV Katni – Damoh DCDS Line	MPPTCL	24.06.2018

Annex-3G
Item no. 3.14

Details of failure of EHV transformers and reactors (220 kV and above) reported to CEA by various utilities:

S. No.	Rating of Transformer/Reactor	Name of Utility	Date of Failure
1	315 MVA, 420 kV, ICT-II at Gwalior Substation	PGCIL	17.04.2018
	400/230/33kV, 3 Ph, 315 MVA ICT-II at Puducherry Substation	PGCIL	16.09.2018
3	2 nos. 100MVA, 220/22-22kV Power Transformer at Chinchwad substation	MSETCL	23.04.2018 16.05.2018
4	200 MVA, 400/220kV R-ph& Y-ph unit of 600MVA ICT-II at Kalwa Substation	MSETCL	01.06.2018 01.06.2018
5	50MVA, 220/33kV Transformer at Buttibori Substation	MSETCL	12.09.2018
6	100MVA, 220/22-22kV Transformer at Mulund Substation	MSETCL	25.09.2018
7	100MVA, 220/22kV Power Transformer at Kamba Substation	MSETCL	14.07.2018
8	50MVA, 220/22kV Power Transformer at Colourchem Substation	MSETCL	01.11.2018
9	105 MVA, 400kV Power Transformer at Padghe Substation	MSETCL	15.11.2018
10	167 MVA, 400/220/33kV Transformer at Padghe Substation	MSETCL	25.11.2018
11	500 MVA, 400/220/33kV Power Transformer at GSS Akal Jaisalmer Substation	RVPN	05.08.2018
12	315 MVA, 400/200/33 kV Power Transformer at GSS Akal Jaisalmer Substation	RVPN	22.08.2018
13	2 nos. 100 MVA, 220/33/11 kV Power Transformer at Rajghat Substation	DTL	03.09.2018 12.03.2019
14	100 MVA, 220/66-33/11 kV Power Transformer at Okhla Substation	DTL	27.09.2018
15	160 MVA, 220/66/11 kV at Vasant Kunj Substation	DTL	26.04.2018
16	125 MVA, 220/132kV Transformer at Bhilai Substation	CSPTCL	28.09.2018
17	160 MVA, 400 kV Transformer at Ashta substation	MPPTCL	23.07.2018
18	50 MVA, 220/6.9/6.9 kV Station Transformer at Raichur TPS	KPCL	31.12.2018
19	292.4 MVA, 420/16.5kV Generator Transformer of STG-2 at CCPP, PPS-III, Bawana station	PPCL	19.03.2019
20	3 nos. 60 MVA, 220/33 kV Transformer at Indirapuram S/s	WUPPTCL	14.02.2019 02.03.2019 02.03.2019
21	146 MVA, 240/10.5 kV GT at Gas Turbine Power Station, Uran	MSPGCL	09.06.2018
22	150 MVA, 240/10.5 kV GT at Gas Turbine Power Station, Uran	MSPGCL	27.08.2018
23	105 MVA, 400/√3 / 220/√3 / 33kV ICT at KTPS substation	WBPDCL	17.04.2018
24	420 kV, 63 MVAR Reactor at BiswanathChariali substation	PGCIL	02.05.2018

Annex-3H
(Item 3.14)

Transmission Lines Completed During FY- 2019-20

As on 31-Mar-2020

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 (new) - Bikaner line	D/C	PGCIL	526	JUL-19
2	Bhadla - Bikaner line	D/C	PGCIL	340	SEP-19
3	Chilkaluripeta - Cudappah (PSITL - TBCB)	D/C	PGCIL	577	JAN-20
4	Vemagiri - Chilkaluripeta (PSITL -TBCB)	D/C	PGCIL	558	JAN-20
5	Bikaner - Moga (PG) line	D/C	PGCIL	734	MAR-20
Total of CENTRAL SECTOR				**2735**	
PRIVATE SECTOR					
6	LILO of One Circuit of 765 kV Aurangabad - Padghe D/C (hexa) line at Pune (C-WRTL - TBCB	D/C	APL	129	AUG-19
7	Khandwa Pool - Indore (KTL - TBCB)	D/C	SGL	180	MAR-20
Total of PRIVATE SECTOR				**309**	
Total of 765 kV				**3044**	
400 kV					
CENTRAL SECTOR					
8	Bhadla (PG) - Bhadla (RVPN) line	D/C	PGCIL	53	APR-19
9	LILO of Lonikhand (MSETCL)- Kalwa at Navi Mumbai	S/C	PGCIL	16	JUN-19

10	Chilkaluraipeta - Narasaraopeta (QM) (PSITL - TBCB)	D/C	PGCIL	60	JUL-19
11	LILO of One ckt. of Bhadla (RVPN) - Bikaner (RVPN) line at Bikaner (New)	D/C	PGCIL	18	JUL-19
12	Nabinagar-II - Patna line (Q)	D/C	PGCIL	282	JUL-19
13	Edamon (KSEB) - Muvattupuzha (PG) Quad) line (1st Ckt.)	D/C	PGCIL	149	SEP-19
14	Singrauli - Allahabad line	S/C	PGCIL	155	OCT-19
15	400 kV S/C New Purnear - Gokarna line and 400 kV S/C New Purnear - Farakka line (part of Rajarhat - Purnea line)	S/C	PGCIL	302	NOV-19
16	Edaomon (KSEB) - Muvattupuzha (PG) (Quad) line (2nd Ckt.)	D/C	PGCIL	148	DEC-19
17	Madhugiri - Yelhanka line (Quad) line (1st Ckt.)	D/C	PGCIL	66	DEC-19
18	Madhugiri - Yelhanka line (Quad) line (2nd Ckts) line	D/C	PGCIL	65	FEB-20
Total of CENTRAL SECTOR				**1314**	
STATE SECTOR					
19	LILO of one ckt. Jhanor - Navsari at Vav S/s	D/C	GETCO	20	APR-19
20	Barmer-Bhinmal line	D/C	RVPNL	288	MAY-19
21	Kayathar - Thennampatty	D/C	TANTRANSCO	48	MAY-19
22	Jangaon - Tippapur LI	D/C	TSTRANSCO	138	MAY-19
23	Julurupadu - Jangaon	D/C	TSTRANSCO	349	JUN-19
24	Rampura - Jagalur (Hiremallanahole)	D/C	KPTCL	130	JUL-19
25	LILO of Arambag - Durgapur at N. Chanditala	D/C	WBSETCL	97	JUL-19
26	LILO of Wanakbori -Soja line at Dehgam (PG) S/S	D/C	GETCO	13	OCT-19

27	Common point A of Thervaikandigai - Manali (8a)	D/C	TANTRANSCO	54	NOV-19
28	NCTPS - Alamathy Common Point - B (8b1)	D/C	TANTRANSCO	4	NOV-19
29	Julurupadu - Manuguru TPP	D/C	TSTRANSCO	225	NOV-19
30	LILO of Raita - Jagdalpur at Kurud	D/C	CSPTCL	2	DEC-19
31	Nirmal - Dichpally at Jangaon (QM) line	D/C	TSTRANSCO	120	JAN-20
32	Tervaikandigai - Korattur common point to Kovilpathagai OH-UG Junction Point (Portion of Thervaikandigai - Korattur 400 kV S/C line)	D/C	TANTRANSCO	19	FEB-20
33	Sector-148 t Sector-123 Noida	D/C	UPPTCL	40	FEB-20
34	Vadavi-Halvad (Pkg 1) (Vadavi to AP-41)	D/C	GETCO	149	MAR-20
Total of STATE SECTOR				**1696**	
PRIVATE SECTOR					
35	Aligarh - Prithala (GPTL - TBCB)	D/C	SGL	99	JUL-19
36	Prithala - Kadarpur HTLS line (GPTL - TBCB)	D/C	SGL	58	NOV-19
37	Ghatampur - Kanpur line	D/C	APL	98	JAN-20
38	Alipurduar (PG) - Siliguri (PG) (ATL - TBCB)	D/C	KPTL	231	FEB-20
39	Hiriyur - Mysore line (Ckt-I)	D/C	PGCIL	206	MAR-20
40	Kadarpur - Sohna Road (GPTL - TBCB)	D/C	SGL	21	MAR-20
41	Khargone TPP - Khandwa Pool (Q) (KTL - TBCB)	D/C	SGL	50	MAR-20
42	LILO of Gurgaon - Manesar at Sohna Road (GPTL - TBCB)	D/C	SGL	2	MAR-20

Total of PRIVATE SECTOR				**765**	
Total of 400 kV				**3775**	
230 kV					
STATE SECTOR					
43	Guindy - R.A.Puram (UG Cable)	S/C	TANTRANSCO	8	JUN-19
44	Shoolagiri - Hosur S/s	S/C	TANTRANSCO	19	AUG-19
45	Shoolagiri - Uddanapalli	S/C	TANTRANSCO	18	AUG-19
46	Periapanachery - Porur (UG Cable)	S/C	TANTRANSCO	7	NOV-19
47	TPS-II - Neyveli 230kV S/S	D/C	TANTRANSCO	10	DEC-19
48	Ulundurpet 230 kV SS to the proposed Sankarapuram 230 kV SS	S/C on D/C	TANTRANSCO	58	MAR-20
Total of STATE SECTOR				**120**	
Total of 230 kV				**120**	
220 kV					
CENTRAL SECTOR					
49	Kishanganga - Wagoora line	D/C	PGCIL	232	JUL-19
50	Re-conductoring of New Purnea - Purnea line	D/C	PGCIL	2	DEC-19
Total of CENTRAL SECTOR				**234**	
STATE SECTOR					
51	Kalikiri - Madanapalli line	D/C	APTRANSCO	60	APR-19
52	LILO of one Ckt. of Badshahpur Pali at Sec.-65 Gurgaon	D/C	HVPNL	3	APR-19
53	Banda-Chitrakoot Line	D/C	UPPTCL	226	APR-19
54	Gorakhpur (PG)-Gola line	D/C	UPPTCL	82	APR-19
55	Hapur(765) - Faridnagar line	S/C	UPPTCL	11	APR-19
56	LILO of Gr .Noida -Noida Sec-129 at Noida Sec-148	D/C	UPPTCL	1	APR-19

57	Sultanpur-Sangipur LILO Section at Amethi	D/C	UPPTCL	18	APR-19
58	LILO of both Ckt. of 220kV Mobha - Mangrol line at 220kV Amod (Balanced portion)	D/C	GETCO	46	MAY-19
59	Bhanjanagar - Aska	D/C	OPTCL	57	MAY-19
60	Bareilly (400) - PilibhitCkt.-II	S/C	UPPTCL	39	MAY-19
61	LILO of Gr. Noida (400) - Noida Sec-148 line at R.C. Green	D/C	UPPTCL	9	MAY-19
62	LILO of Hathras - Gokul at Mathura	D/C	UPPTCL	120	MAY-19
63	Sohawal - Tanda	D/C	UPPTCL	232	MAY-19
64	Hadala - Khorana	D/C	GETCO	37	JUN-19
65	LILO of one Ckt. Bastara - Kaul at Bhadson	D/C	HVPNL	60	JUN-19
66	Betul - Gudgaon (GEC-I)	D/C	MPPTCL	94	JUN-19
67	Kumbhari (PGCIL) - Bale	D/C	MSETCL	58	JUN-19
68	Bareilly - C.B. Ganj	S/C	UPPTCL	24	JUN-19
69	Bareilly -Dohna	S/C	UPPTCL	10	JUN-19
70	LILO of Noida Sec-20-BTPS line at Botanical Garden	D/C	UPPTCL	3	JUN-19
71	Jagalur (Hiremallanahole) - Thallak	D/C	KPTCL	55	JUL-19
72	LILO of one ckt of Indravati - Thervali line at Jaypatna	D/C	OPTCL	32	JUL-19
73	LILO of Mainpuri-Sikandrarao at Jawarharpur TPS	S/C	UPPTCL	22	JUL-19
74	Sahupuri -Raja ka Talab	S/C	UPPTCL	65	JUL-19
75	LILO of Malda (PG) - Dalkhola (PG) at Gozol	D/C	WBSETCL	6	JUL-19
76	Moti Paneli - Open wind line with AL-59 Conductor	D/C	GETCO	28	AUG-19

77	Vasanthanarasapura - Madhugiri line	D/C	KPTCL	89	AUG-19
78	Satna - Chhatarpur (2nd ckt)	S/C	MPPTCL	160	AUG-19
79	LILO of one ckt. Paras - Balapur at Malkapur s/s	M/C	MSETCL	144	AUG-19
80	Nakodar - Ladhowal	D/C	PSTCL	70	AUG-19
81	Deoria - Rasra	S/C	UPPTCL	83	AUG-19
82	LILO of 220 kV Baghpat - Muradnagar-II at Mandola Vihar	D/C	UPPTCL	20	AUG-19
83	LILO of 220kV Dunara - Laitpur TPS Ckt-II at Babina	D/C	UPPTCL	15	AUG-19
84	Mator PG (400) - Partapur (JagritiVihar) line	S/C	UPPTCL	28	AUG-19
85	Boksampalli - KIA Motors Switching Station and 220/33kV S/S Ammavaripalli in Anantapur District	D/C	APTRANSCO	35	SEP-19
86	LILO of Nannur - Regumanugadda line at 220/11kV Brahmmanakokur s/s	D/C	APTRANSCO	27	SEP-19
87	LILO of Tadikonda - Ongole line to 220/132kV Prathipadu	D/C	APTRANSCO	4	SEP-19
88	Sattenapalli - Guntur	D/C	APTRANSCO	96	SEP-19
89	LILO of both ckts. Palla - Palli at Sector- 46 Faridabad S/S	D/C	HVPNL	9	SEP-19
90	B3 - B4 - Brindavan Alloyas line	D/C	KPTCL	1	SEP-19
91	Badnera - Ner line	S/C + D/C	MSETCL	43	SEP-19
92	Shevgaon - Pathardi line at Amrapur S/S	D/C	MSETCL	4	SEP-19
93	Charla - Meerut line	S/C	UPPTCL	5	SEP-19
94	Partapur (JagritiVihar) - Hapur	D/C	UPPTCL	53	SEP-19

95	Patna (PG) - Khagaul (BSPTCL)	D/C	BSPTCL	26	OCT-19
96	LILO of Gurur - Barsoor at Narayanpur	D/C	CSPTCL	1	OCT-19
97	LILO of Mopka - Bharatpur and Mopka - Siltara at Dherdehi 220 kV S/S (Bilaspur)(on Multi circuit tower)	D/C	CSPTCL	128	OCT-19
98	Soja - Joumang (DFCC) line	D/C	GETCO	44	OCT-19
99	Charor -Banala	D/C	HPPTCL	36	OCT-19
100	Govindpur - Dumka	D/C	JUSNL	203	OCT-19
101	LILO of Hebbal - Hoody Sc line to proposed ITI S/s	S/C	KPTCL	5	OCT-19
102	LILO of one ckt. of KTPS-Manuguru - proposed Pump House-1 at B.G. Kottur line	D/C	TSTRANSCO	1	OCT-19
103	LILO of Sultanpur - Sangipur First Ckt. at Amethi	D/C	UPPTCL	7	OCT-19
104	Unnao - Phoolbagh (Kanpur) line	D/C	UPPTCL	57	OCT-19
105	LILO of Gokarna - Krishnanagar at Rejinagar	D/C	WBSETCL	9	OCT-19
106	Bongaigaon TPS - Rangia (Salakati)	D/C	AEGCL	324	NOV-19
107	LILO of Vapi - Khadoli line at Vaghchhipa s/s	D/C	DNH	5	NOV-19
108	LILO of T.K. Halli - Madhuvanahally - proposed 220/66 kV SFC S/s at Shivanasamudra (Hebbani Village)	D/C	KPTCL	9	NOV-19
109	LILO of both Ckt. of Badnagar- Ratlam At Badnawar 400 kV S/S	D/C	MPPTCL	28	NOV-19
110	LILO of Ratlam-Daloda line at Jaora (GEC-I) (one ckt.)	D/C	MPPTCL	4	NOV-19

111	Second circuiting of Ratlam - Daloda line (GEC-I)	D/C	MPPTCL	37	NOV-19
112	GCR Chandrapur - Sicom line	D/C	MSETCL	13	NOV-19
113	LILO on both cktParli - Harangul line at Parli (PG)	D/C	MSETCL	25	NOV-19
114	DCDS Barsoor - Jagdalpur line	D/C	CSPTCL	177	DEC-19
115	LILO of both ckt. Fatehabad - Rania line at 220kV MehnaKhera	D/C	HVPNL	92	DEC-19
116	Hatia (JUSNL) - Namkum (PGCIL)	D/C	JUSNL	65	DEC-19
117	2nd Ckt. of 220 kV Tilwani - Miraj line (From loc no 4 to 43)	S/C on D/C	MSETCL	13	DEC-19
118	Kavanoor - Karaikudi (Existing)	D/C	TANTRANSCO	176	DEC-19
119	LILO of 220 kV KTS- Lower Sileru-I line at 220/11kV VK Ramavaram LI SS	D/C	TSTRANSCO	3	DEC-19
120	LILO of Savarkundla - Sagapara line at Gariyadhar S/s	D/C	GETCO	15	JAN-20
121	Sabalgarh - Sheopurline (1st Ckt.)	D/C	MPPTCL	106	JAN-20
122	Balimela - Malkangiri 2nd Ckt.	S/C	OPTCL	21	JAN-20
123	Makhu - Rashiana	D/C	PSTCL	92	JAN-20
124	LILO of existing KTS - Shapurnagar at Waddekothapally (Jangaon District)	S/C	TSTRANSCO	17	JAN-20
125	LILO of existing KTS-Shapurnagar proposed line at Jangaon	S/C	TSTRANSCO	45	JAN-20
126	LILO of existing Waddekothapally - Bhongir (Both Ckts.) to proposed at	M/C	TSTRANSCO	104	JAN-20

	Jangaon (Jangaon District)				
127	Shivarampally - Asifnagar 2nd ckt.	S/C	TSTRANSCO	4	JAN-20
128	Abdullapur (PG) – Rajokheri	D/C	HVPNL	44	FEB-20
129	LILO of both ckts of RangalaRajpur - Palwal at Prithala	M/C	HVPNL	25	FEB-20
130	(PMDP - Kashmir) LILO of Zainkote - Delina at Kunzar (Sterlite S/S)	D/C	JKPDD	20	FEB-20
131	Zainakote - Alusteng (Portion of Zainkote -Alusteng - Mirbazar 220 kV D/C line)	D/C	JKPDD	92	FEB-20
132	Neemuch - Ratangarh line (GEC-I)	D/C	MPPTCL	88	FEB-20
133	LILO of Bareilly - Shahjahanpur line at Faridpur	D/C	UPPTCL	8	FEB-20
134	LILO of 220kV Vapi - Tarapur line at 220kV Sarigam	M/C	GETCO	13	MAR-20
135	LILO of one ckt. of 220KV Humbran - Ferozpur Road (Ludhiana) at 220KV Ladowal	D/C	PSTCL	25	MAR-20
Total of STATE SECTOR				**4491**	
Total of 220 kV				**4725**	
Grand Total				**11664**	

Annex-3I
(Item 3.27)

Sub-Stations Completed During FY - 2019-20

As on 31-Mar-2020

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	Champa and Kurukshetra HVDC Station (Pole- 4)	800	PGCIL	1500	MAR-20
2	Champa and Kurukshetra HVDC Station (Addl.) (Pole-3)	800	PGCIL	1500	NOV-19
	TOTAL CENTRAL SECTOR			**3000**	
	TOTAL 800 kV			**3000**	
		765 kV			
CENTRAL SECTOR					
3	Aligarh (PG) 765 kV GIS (Creation of 400 kV level) (ICT-II)	765/400	PGCIL	1500	DEC-19
4	Chilakaluripeta S/S (PSITL - TBCB)	765/400	PGCIL	3000	JAN-20
5	Bikaner S/S (2x1500 MVA)	765/400	PGCIL	3000	JUL-19
6	Jharsuguda (Sundargarh) S/S (Addl.)	765/400	PGCIL	3000	NOV-19
7	Aligarh (PG) 765kV GIS (creation of 400kV Level)	765/400	PGCIL	1500	OCT-19
8	Bhadla S/S (ICTs I II and III)	765/400/220	PGCIL	4500	SEP-19
	TOTAL CENTRAL SECTOR			**16500**	
	TOTAL 765 kV			**16500**	
		400 kV			
CENTRAL SECTOR					
9	Bongaigaon (2nd ICT) S/s.	400/220	PGCIL	315	APR-19
10	Extn. at Tumkur (Pavagada) PS (2x500 MVA)	400/220	PGCIL	500	APR-19

11	Bhadla S/S (3x500) ICT I	400/220	PGCIL	500	APR-19
12	Misa (2x500 MVA) ICT-II	400/220	PGCIL	500	AUG-19
13	Rajarhat (GIS) S/S (2x500 MVA) ICT-II	400/220	PGCIL	500	AUG-19
14	Extn. at Banka s/s	400/132	PGCIL	315	DEC-19
15	Extn. at Lakhisarai s/s	400/132	PGCIL	315	DEC-19
16	Repl. of 1x315 MVA ICT with 1x500 MVA ICT at Pusauli s/s (ICT-II)	400/220	PGCIL	185	JAN-20
17	Navi Mumbai (GIS)	400/220	PGCIL	630	JUN-19
18	Extn at Durgapur S/s (3rd ICT)	400/220	PGCIL	315	JUN-19
19	Extn. at Tumkur (Vasantnarrsapur) S/S	400/220	PGCIL	500	JUN-19
20	Bhadla S/S (3x1500 3x500 MVA) (500 MVA ICTs- II and III)	400/220	PGCIL	1000	MAY-19
21	Alipurduar HVDC S/S	400/220	PGCIL	630	NOV-19
22	Uttra (Pindiabil) S/S	400/220	PGCIL	1000	NOV-19
23	Extn at Dehgam s/s (3rd ICT)	400/220	PGCIL	500	NOV-19
24	Kurukshetra S/S	400/220	PGCIL	1000	NOV-19
25	Yelahanka (GIS)	400/220	PGCIL	1000	NOV-19
26	Augmentation at Bhuj S/S	400/220	PGCIL	1000	OCT-19
27	Extn. at Biharshariff	400/220	PGCIL	500	SEP-19
	TOTAL CENTRAL SECTOR			**11205**	
	TOTAL 400 kV			**11205**	
		220 kV			
CENTRAL SECTOR					
28	Dhanbad (Auto-Xmer) T/F-I	220/132	DVC	160	JAN-20
29	Repl. at Malda (50-160)	220/132	PGCIL	110	OCT-19
	TOTAL CENTRAL SECTOR			**270**	
	TOTAL 220 kV			**270**	
		400 kV			

STATE SECTOR					
30	Nawada S/S	400/220	HVPNL	315	APR-19
31	Motiram Adda Gorakhpur (Aug.) (Additional T/F)	400/220	UPPTCL	240	APR-19
32	Muradnagar-II Ghaziabad (Aug) (Additional T/F)	400/220	UPPTCL	240	APR-19
33	Unnao (Aug) T/F-III	400/220	UPPTCL	315	APR-19
34	Noida Sec- 148 G.B.Nagar (New)	400/220	UPPTCL	500	APR-19
35	Sarojininagar Lucknow Aug) T/F- II (500-315)	400/220	UPPTCL	185	APR-19
36	Sarnath Varanasi (Aug) T/F- II (500-315)	400/220	UPPTCL	185	APR-19
37	Muktsar (Aug) Addl T/F	400/220	PSTCL	500	AUG-19
38	Lapanga S/S (ICT-II)	400/220	OPTCL	315	AUG-19
39	Ramadugu s/s	400/220	TSTRANSCO	1000	JAN-20
40	Noida Sec-148 G.B Nagar (New)T/F-II	400/220	UPPTCL	500	JUN-19
41	Uravakonda (Aug.) ICT-II	400/220	APTRANSCO	500	MAY-19
42	Moradabad(Aug.) (Additional T/F)	400/220	UPPTCL	240	MAY-19
43	Jangaon s/s (3x500) (ICT-I)	400/220	TSTRANSCO	500	MAY-19
44	MasauliPrayagraj (New) T/F-III	400/132	UPPTCL	200	MAY-19
45	Talaricheruvu S/s	400/220	APTRANSCO	945	MAY-19
46	NSPCL (ICT-II)	400/220	CSPTCL	315	NOV-19
47	Charanka S/S	400/220	GETCO	630	NOV-19
48	Thoppankundu s/s	400/110	TANTRANSCO	600	NOV-19
49	Thennamapatty s/s	400/230/110	TANTRANSCO	1030	NOV-19
50	Jangaon S/S (ICT II and III)	400/220	TSTRANSCO	1000	NOV-19
51	Hadala (Aug.)	400/220	GETCO	500	NOV-19
52	Wangtoo (GIS) S/S	400/220	HPPTCL	630	OCT-19
	TOTAL STATE SECTOR			**11385**	
	TOTAL 400 kV			**11385**	

230 kV					
STATE SECTOR					
53	Ulundurpettai (Addl T/F)	230/110	TANTRANSCO	100	AUG-19
54	Guruparapally (Addl)	230/110	TANTRANSCO	100	FEB-20
55	Savasapuram (Addl)	230/110	TANTRANSCO	100	FEB-20
56	Thiruchuli (Addl T/F)	230/110	TANTRANSCO	50	JAN-20
57	NimmeliThippiakudi (Addl T/F)	230/110	TANTRANSCO	100	JAN-20
58	AraniAddl T/F	230/110	TANTRANSCO	80	JUL-19
59	PorurAddl T/F	230/33	TANTRANSCO	50	JUL-19
60	Uddanapally S/S	230/110	TANTRANSCO	200	JUN-19
61	Tiruppur (JICA) (ICT-I)	230/110	TANTRANSCO	100	MAR-20
62	Kurukathi (Addl T/F)	230/110	TANTRANSCO	100	NOV-19
63	Othakkalmandapam s/s (Enhancement)	230/110	TANTRANSCO	100	OCT-19
64	Villupura (Aug.) (160-100)	230/110	TANTRANSCO	60	SEP-19
	TOTAL STATE SECTOR			**1140**	
	TOTAL 230 kV			**1140**	
220 kV					
STATE SECTOR					
65	Gola Gorakhpur (New)	220/132	UPPTCL	160	APR-19
66	KhurjaBulandshahr (Aug) T/F- II (200-160)	220/132	UPPTCL	40	APR-19
67	Kharepatan S/S	220/33	MSETCL	25	APR-19
68	Pali S/s	220/66	HVPNL	160	APR-19
69	A-5 Faridabad S/s	220/66	HVPNL	60	APR-19
70	SohawalAyodhya (Aug) T/F-II (160-100)	220/132	UPPTCL	60	APR-19
71	Sitapur (Aug.) (Additional T/F)	220/132	UPPTCL	160	APR-19
72	SikandrabadBulandshahr (Aug) (Additional T/F)	220/132	UPPTCL	160	APR-19
73	Prathipadu S/S	220/132	APTRANSCO	100	APR-19
74	Rentachintala S/s Aug.(3X100-2x100)	220/132	APTRANSCO	100	APR-19

75	Amethi S/s	220/132	UPPTCL	160	APR-19
76	Gajokhar Varanasi (Aug) T/F- II (160-100)	220/132	UPPTCL	60	APR-19
77	R.C. Green G.B. Nagar (Aug.) T/F-II (160-100)	220/132	UPPTCL	60	APR-19
78	Mandola Vihar (New) ICT-II and III (2x60 MVA)	220/33	UPPTCL	120	AUG-19
79	Bachhrawan Rae Bareli (New) T/F-II	220/132	UPPTCL	160	AUG-19
80	Kalwan s/s (Additional T/F)	220/132	MSETCL	100	AUG-19
81	Hingoli s/s (Additional T/F)	220/132	MSETCL	100	AUG-19
82	Jagdalpur	220/132	CSPTCL	160	AUG-19
83	Samalkha s/s (Aug)	220/132	HVPNL	160	AUG-19
84	Fatehpur (Aug) T/F-II (200-160)	220/132	UPPTCL	40	AUG-19
85	Partapur (JagritiVihar) Meerut (New) T/F I and II (2x160 MVA)	220/132	UPPTCL	320	AUG-19
86	Mohana s/s (Aug)	220/33	HVPNL	100	AUG-19
87	Malkapur (New s/s) ICT-I	220/132	MSETCL	100	AUG-19
88	Gudgaon (GEC-I)	220/132	MPPTCL	160	DEC-19
89	Sailana (GEC-I)	220/132	MPPTCL	160	DEC-19
90	Pilibhit T/F-I (Aug.)(160 -100)	220/132	UPPTCL	60	DEC-19
91	Saharanpur (Aug.) (200-160)	220/132	UPPTCL	40	DEC-19
92	Sarojininagar Lucknow (Aug) T/F-II (200-160)	220/132	UPPTCL	40	DEC-19
93	Sector 52A Gurugram	220/66	HVPNL	160	DEC-19
94	Prayagraj Cantt (Aug.) T/F-II (200-160)	220/66	UPPTCL	40	DEC-19
95	Alusteng S/S	220/132	JKPDD	320	FEB-20
96	MehnaKhera S/s	220/132	HVPNL	100	FEB-20
97	Sector -85 Gurugram (2nd T/F)	220/33	HVPNL	100	FEB-20
98	Ashta (Addl T/F)	220/33	MPPTCL	50	FEB-20
99	Chhajpur (Addl.)	220/132	HVPNL	100	FEB-20
100	Naganathapura (Aug.) (T/F-I)	220/66	KPTCL	100	FEB-20

101	Sailana (2nd Unit)	220/132	MPPTCL	160	FEB-20
102	Sheopurkalan (1st unit)	220/132	MPPTCL	160	FEB-20
103	Bolangir S/S	220/132	OPTCL	160	FEB-20
104	Bahraich (Aug.) T/F	220/132	UPPTCL	160	FEB-20
105	Azamgarh (Aug. T/F-I (200-160)	220/132	UPPTCL	40	FEB-20
106	Gola Gorakhpur (New) T/F-II	220/132	UPPTCL	160	FEB-20
107	Morti Ghaziabad (Aug.) T/F-II	220/132	UPPTCL	160	FEB-20
108	Unnao (Aug) T/F-II (160-100)	220/132	UPPTCL	60	JAN-20
109	Rewa Road Prayagraj (Aug) T/F-II (200-160)	220/132	UPPTCL	40	JAN-20
110	Jaora S/s (Balance 2nd X-mer))	220/132	MPPTCL	160	JAN-20
111	Malanpur S/s (Addl. X-mer)	220/132	MPPTCL	160	JAN-20
112	Morena S/s (Addl. X-mer)	220/132	MPPTCL	160	JAN-20
113	Uppalwadi (220/33 kV 50 MVA T/F)	220/33	MSETCL	50	JAN-20
114	Pratap Vihar Ghaziabad (New) T/F-I	220/132	UPPTCL	160	JAN-20
115	Muradnagar-II (Aug) T/F-II	220/132	UPPTCL	100	JAN-20
116	Satna S/s (Addl. X-mer)	220/132	MPPTCL	160	JAN-20
117	Narangwadi (100 MVA ICT-II and 25 MVA 220/33 kV T/F-III)	220/132/33	MSETCL	150	JAN-20
118	Chardava (Aug) (1x160 2x100) - (2x100)	220/22	GETCO	160	JAN-20
119	Morbi (Aug) (2x160 2x100) - (1x160 3x100)	220/66	GETCO	60	JAN-20
120	Otha (Aug) (1x160 2x100) - (2x100)	220/66	GETCO	160	JAN-20
121	Vadavi (Aug) (1x160 3x100) - (3x100)	220/66	GETCO	160	JAN-20
122	Vallabhipur (Aug) (1x160 2x100) - (2x100)	220/66	GETCO	160	JAN-20
123	Wangtoo (2x100 MVA T/F of 220/66 kV)	220/66	HPPTCL	200	JAN-20
124	Up-gradation of existing 132 kV Pandharkawda substation to 220 kV level	220/132	MSETCL	100	JAN-20
125	Jaypatna T/F-II	220/132	OPTCL	160	JAN-20
126	Banda (Aug) T/F-II (200-160)	220/132	UPPTCL	40	JAN-20

127	Deoria (Aug) T/F-II (160-100)	220/132	UPPTCL	60	JAN-20
128	Gonda (Aug) T/F-I (200-160)	220/132	UPPTCL	40	JAN-20
129	Hathras (Aug) T/F-II (200-160)	220/132	UPPTCL	40	JAN-20
130	JhunsiPrayagraj (Aug) T/F-II (200-160)	220/132	UPPTCL	40	JAN-20
131	Kursi Road (Aug) (Additional T/F)	220/132	UPPTCL	160	JAN-20
132	Georai S/S (ICT-II)	220/132	MSETCL	100	JAN-20
133	Karanja (1x25 MVA 220/33 kV T/F)	220/132/33	MSETCL	25	JAN-20
134	Jamla (Aug) (1x160 2x100 1x50) - (2x100 1x50)	220/66	GETCO	160	JAN-20
135	Jetpur (Aug) (1x160 2x100) - (3x100)	220/66	GETCO	60	JAN-20
136	Motigop T/F-II	220/66	GETCO	160	JAN-20
137	Kashipur S/S	220/33	OPTCL	20	JUL-19
138	Motigop T/F-I	220/66	GETCO	160	JUL-19
139	Dohna Bareilly (Aug.) T/F-II (160-100)	220/132	UPPTCL	60	JUL-19
140	Faridnagar Ghaziabad (Aug.) Addl T/F	220/132	UPPTCL	160	JUL-19
141	Jansath Muzaffarnagar (Aug.) T/F-I (160-100)	220/132	UPPTCL	60	JUL-19
142	Shivanasamudra (Hebbani Village limits)	220/66	KPTCL	200	JUL-19
143	Koramangala	220/66	KPTCL	300	JUL-19
144	Jaypatna S/S	220/132	OPTCL	160	JUL-19
145	Raja ka Talab S/S (Varanasi)	220/132	UPPTCL	160	JUL-19
146	Gazol GIS	220/132	WBSETCL	320	JUL-19
147	New Haldia NIZ GIS	220/132	WBSETCL	160	JUN-19
148	Botanical Garden Sec-38a Noida (New) T/F-I	220/33	UPPTCL	60	JUN-19
149	DahiChoki Unnao (New) T/F-I	220/33	UPPTCL	60	JUN-19
150	Achhalia S/s	220/66	GETCO	160	JUN-19
151	Savarkundla Aug.	220/66	GETCO	60	JUN-19
152	Waghodia Aug.	220/66	GETCO	110	JUN-19
153	Rampur (Aug.) Addl T/F	220/132	UPPTCL	100	JUN-19

154	Neebkarori Farrukhabad (Aug. T/F-I (160-100)	220/132	UPPTCL	60	JUN-19
155	Shatabdinnagar Meerut (Aug.) Addl T/F	220/132	UPPTCL	160	JUN-19
156	Rajkot (Nyara) Aug.	220/132	GETCO	50	JUN-19
157	Aska S/S	220/132	OPTCL	320	JUN-19
158	BarautBaghpat (Aug.) Addl T/F	220/132	UPPTCL	160	JUN-19
159	C.B. Ganj Bareiilley (Aug.) T/F-I (200-160)	220/132	UPPTCL	40	JUN-19
160	Etah (Aug.) T/F-II (160-100)	220/132	UPPTCL	60	JUN-19
161	Brindavan Alloys	220/66	KPTCL	300	MAR-20
162	Vijapur (Aug) (1x160)	220/66	GETCO	160	MAR-20
163	Timbdi(Aug) (100-50)	220/66	GETCO	50	MAR-20
164	Sankhari (Aug) (100-50)	220/66	GETCO	50	MAR-20
165	Mitha (Aug) (100-50)	220/66	GETCO	50	MAR-20
166	Chandrapura (Aug) (160-50)	220/66	GETCO	110	MAR-20
167	Bhutiya (Aug) (3x100 - 2x100)	220/66	GETCO	100	MAR-20
168	Dhuvaran (Aug) (100-50)	220/132	GETCO	50	MAR-20
169	Alawalpur s/s	220/66	PSTCL	100	MAY-19
170	Jaunpur (Aug.) (Additional T/F)	220/132	UPPTCL	160	MAY-19
171	Hathras (Aug.)T/-I(200-160)	220/132	UPPTCL	40	MAY-19
172	Chinhat Lucknow (Aug.) T/F-II (200-160)	220/132	UPPTCL	40	MAY-19
173	Sector- 95 Gurgaon	220/33	HVPNL	100	MAY-19
174	Laukahi (Supaul new)	220/132/33	BSPTCL	320	MAY-19
175	Sultanpur Lodhi (Addl T/F)	220/66	PSTCL	100	NOV-19
176	Kukumara S/S (2x50)	220/132	AEGCL	100	NOV-19
177	Rangia S/S (2x100)	220/132	AEGCL	200	NOV-19
178	Sonapur (2x100)	220/132	AEGCL	200	NOV-19
179	Sector -65 GIS Gurgaon S/s	220/132	HVPNL	200	NOV-19
180	Jaora (Upgradation) (GEC-I)	220/132	MPPTCL	160	NOV-19
181	Karanja s/s	220/132	MSETCL	200	NOV-19

182	BharthanaEtawah (Aug) (Additional T/F)	220/132	UPPTCL	160	NOV-19
183	Muradnagar-II (Aug) T/F-I	220/132	UPPTCL	100	NOV-19
184	Sec-20 Noida (Aug) (Additional T/F)	220/132	UPPTCL	160	NOV-19
185	Govindpur GSS (PGCIL)	220/132/33	JUSNL	400	NOV-19
186	Badnagar (Additional T/F)	220/33	MPPTCL	50	NOV-19
187	BarsitadeshRewa Pooling S/s	220/33	MPPTCL	300	NOV-19
188	Sagar (Additional T/F)	220/33	MPPTCL	50	NOV-19
189	Sicom (Additional T/F)	220/33	MSETCL	25	NOV-19
190	Phoolbagh Kanpur (New) T/F-I	220/33	UPPTCL	60	NOV-19
191	SikandrabadBulandshahr (Aug) T/-I	220/33	UPPTCL	60	NOV-19
192	Charanka s/s (8x100 MVA) T/F 6-7 and 8	220/66	GETCO	300	NOV-19
193	Suva s/s	220/66	GETCO	200	NOV-19
194	Vondh s/s	220/66	GETCO	200	NOV-19
195	Vyankatpura s/s	220/66	GETCO	200	NOV-19
196	Nani Hamirpur S/S	220/11	GETCO	50	NOV-19
197	Sector-85 Gurugram	220/33	HVPNL	100	OCT-19
198	Dherdehi (Bilaspur) s/s	220/132	CSPTCL	320	OCT-19
199	ITI S/S	220/66	KPTCL	300	OCT-19
200	Pratap Vihar Ghaziabad (New) T/F-I	220/33	UPPTCL	60	OCT-19
201	Dahi Chowki Unnao (New) T/F-II	220/33	UPPTCL	60	OCT-19
202	Rejinagar S/S	220/132	WBSETCL	320	OCT-19
203	C. B. Ganj Bareilly (Aug) T/F -II (200-160)	220/132	UPPTCL	40	OCT-19
204	Maihar (Addl T/F)	220/132	MPPTCL	160	OCT-19
205	Narayanpur s/s	220/132	CSPTCL	160	OCT-19
206	Koppal S/S	220/110	KPTCL	200	SEP-19
207	GIS Sector -46 Faridabad S/s	220/66	HVPNL	320	SEP-19
208	220 kV Sachin (Talangpore) (Aug.)	220/66	GETCO	60	SEP-19
209	220kV Nakhatrana (Aug.)	220/66	GETCO	60	SEP-19

210	220kV Dhanagadhra (Aug.)	220/66	GETCO	60	SEP-19
211	Cantt Prayagraj (Aug.) (200-160)	220/33	UPPTCL	40	SEP-19
212	Ner S/S (T/F-II)	220/33	MSETCL	25	SEP-19
213	NunaMajra (Aug.)	220/33	HVPNL	100	SEP-19
214	Ammavaripalli S/S	220/33	APTRANSCO	150	SEP-19
215	Rachaunneri S/S in Chittoor District (Aug.)	220/132	APTRANSCO	60	SEP-19
216	Ongole S/S in Prakasam District (Aug.)	220/132	APTRANSCO	60	SEP-19
217	Bommuru S/S in East Godavari District (Aug.)	220/132	APTRANSCO	60	SEP-19
218	Unispur (Aug.)	220/132	HVPNL	160	SEP-19
219	Lula Ahir (Aug.)	220/132	HVPNL	100	SEP-19
220	Batta (Aug.)	220/132	HVPNL	100	SEP-19
221	220 kV Limbdi (Aug)	220/132	GETCO	50	SEP-19
	TOTAL STATE SECTOR			**19730**	
	TOTAL 220 kV			**19730**	
	765 kV				
	PRIVATE SECTOR				
222	Khandwa PS (KTL - TBCB)	765/400	SGL	3000	MAR-20
	TOTAL PRIVATE SECTOR			**3000**	
	TOTAL 765 kV			**3000**	
	400 kV				
	PRIVATE SECTOR				
223	Prithala (Palwal) (GIS) (GPTL - TBCB)	400/220	SGL	1000	JUL-19
224	Kadarpur (Gurgaon) (GIS) (GPTL - TBCB)	400/220	SGL	1000	NOV-19
	TOTAL PRIVATE SECTOR			**2000**	
	TOTAL 400 kV			**2000**	
	GRAND TOTAL			**68230**	

Annex-4A
(Item No. 4.2)

Power Supply Position for 2019-20

State / System / Region	ENERGY				PEAK			
	April, 2019 - March,2020				April, 2019 - March,2020			
	Energy Requirement	Energy Supplied	Energy not Supplied		Peak Demand	Peak Met	Demand not Met	
	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
Chandigarh	1,732	1,732	0	0.0	431	431	0	0.0
Delhi	33,086	33,077	9	0.0	7,409	7,409	0	0.0
Haryana	54,505	54,492	13	0.0	11,001	11,001	0	0.0
Himachal Pradesh	10,424	10,353	71	0.7	1,786	1,786	0	0.0
UT of J&K and Ladakh	20,025	16,259	3,767	18.8	3,405	2,724	681	20.0
Punjab	56,776	56,770	6	0.0	13,606	13,606	0	0.0
Rajasthan	81,281	81,222	58	0.1	14,277	14,277	0	0.0
Uttar Pradesh	1,22,549	1,21,004	1,545	1.3	22,599	22,057	542	2.4
Uttarakhand	14,472	14,376	96	0.7	2,233	2,233	0	0.0
Northern Region	**3,94,851**	**3,89,285**	**5,566**	**1.4**	**66,559**	**65,865**	**694**	**1.0**
Chattisgarh	30,111	30,107	4	0.0	4,746	4,736	10	0.2
Gujarat	1,13,940	1,13,939	1	0.0	18,437	18,424	13	0.1
Madhya Pradesh	76,172	76,172	0	0.0	14,886	14,855	31	0.2
Maharashtra	1,55,167	1,55,166	0	0.0	24,550	24,550	0	0.0
Daman & Diu	2,574	2,574	0	0.0	351	350	1	0.2
Dadar Nagar Haveli	6,528	6,528	0	0.0	826	826	0	0.0
Goa	4,350	4,350	0	0.0	625	625	0	0.0
Western Region	**3,88,841**	**3,88,836**	**5**	**0.0**	**59,416**	**59,416**	**0**	**0.0**
Andhra Pradesh	65,452	65,414	38	0.1	10,225	10,207	18	0.2
Telangana	68,306	68,303	3	0.0	13,168	13,168	0	0.0
Karnataka	72,799	72,796	3	0.0	13,272	13,258	14	0.1
Kerala	26,315	26,265	50	0.2	4,487	4,300	186	4.2
Tamil Nadu	1,08,816	1,08,812	4	0.0	15,727	15,668	59	0.4
Puducherry	2,847	2,846	1	0.0	470	470	0	0.0
Lakshadweep#	46	46	0	0	8	8	0	0
Southern Region	**3,44,535**	**3,44,436**	**99**	**0.0**	**53,579**	**53,465**	**114**	**0.2**
Bihar	31,627	31,533	94	0.3	5,835	5,789	46	0.8
DVC	22,429	22,427	2	0.0	3,014	3,014	0	0.0
Jharkhand	8,941	8,872	69	0.8	1,396	1,389	6	0.5
Odisha	29,692	29,692	0	0.0	5,292	5,292	0	0.0
West Bengal	52,948	52,824	124	0.2	9,263	9,088	175	1.9
Sikkim	554	554	0	0.0	115	115	0	0.0
Andaman-Nicobar #	346	323	23	6.7	58	54	4	6.9
Eastern Region	**1,46,191**	**1,45,902**	**289**	**0.2**	**23,421**	**23,398**	**22**	**0.1**
Arunachal Pradesh	753	749	4	0.5	158	152	6	3.5
Assam	9,804	9,288	516	5.3	2,193	1,956	237	10.8

Manipur	924	917	6	0.7	226	218	8	3.6
Meghalaya	2,112	2,064	48	2.3	371	371	0	0.0
Mizoram	647	643	4	0.7	133	132	0	0.1
Nagaland	814	809	5	0.7	186	169	17	9.3
Tripura *	1,538	1,515	23	1.5	320	311	9	2.7
NE Region	**16,591**	**15,984**	**607**	**3.7**	**2,989**	**2,878**	**111**	**3.7**
All India	**12,91,010**	**12,84,444**	**6,566**	**0.5**	**1,83,804**	**1,82,533**	**1,271**	**0.7**

 # 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 StateUtilities/ Electricity Departments.

Annex-4B
(Item No. 4.2)

Allocation from Conventional Central Generating Stations as on 31.03.2020

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*	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	162.5	3.0	0.0	165.5	0.7	0.2	0.0	120.8	4.9	1.5	0.0	120.8	4.4	1.3	286.2	1.0	0.3
2	Delhi	3818.8	741.7	0.0	4560.5	19.6	6.3	0.0	0.0	0.0	0.0	30.0	30.0	1.1	0.3	4590.5	16.7	5.1
3	Haryana	1997.7	405.3	48.0	2450.9	10.6	3.4	431.0	0.0	0.0	0.0	15.0	15.0	0.5	0.2	2896.9	10.5	3.3
4	Himachal Pradesh	1443.6	23.0	0.0	1466.5	6.3	2.0	0.0	15.0	0.6	0.2	0.0	15.0	0.5	0.2	1481.5	5.4	1.7
5	Jammu & Kashmir	1560.4	127.9	35.0	1723.3	7.4	2.4	89.0	1002.9	40.8	12.3	118.1	1120.9	40.7	11.9	2933.2	10.7	3.3
6	Punjab	1915.8	820.3	100.0	2836.1	12.2	3.9	0.0	37.0	1.5	0.5	30.0	67.0	2.4	0.7	2903.1	10.6	3.3
7	Rajasthan	1935.9	143.2	125.0	2204.1	9.5	3.1	550.0	672.0	27.4	8.2	15.0	687.0	24.9	7.3	3441.1	12.5	3.9
8	Uttar Pradesh	6114.2	430.5	66.0	6610.7	28.5	9.2	440.0	450.0	18.3	5.5	90.6	540.7	19.6	5.7	7591.4	27.6	8.6
9	Uttarakhand	910.5	28.1	0.0	938.6	4.0	1.3	0.0	154.4	6.3	1.9	0.0	154.4	5.6	1.6	1093.0	4.0	1.2
10	PowerGrid	7.5	0.0	0.0	7.5	0.0	0.0	0.0	4.1	0.2	0.1	0.0	4.1	0.1	0.0	11.6	0.0	0.0
11	Railways NR	0.0	245.0	0.0	245.0	1.1	0.3	0.0	0.0			0.0				245.0		0.1
12	BTPS	0.0	2.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0
	Northern Region	**19866.8**	**2969.9**	**374.0**	**23210.7**	**100.0**	**32.2**	**1510.0**	**2456.2**	**100.0**	**30.0**	**298.7**	**2754.9**	**100.0**	**29.3**	**27475.6**	**100.0**	**30.1**
13	Chhattisgarh	1861.6	130.0	0.0	1991.6	11.4	2.8	50.0	25.0	1.3	0.3	0.0	25.0	1.2	0.3	2066.6	8.8	2.3
14	Gujarat	4047.3	141.0	0.0	4188.3	24.1	5.8	160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4348.3	18.5	4.8
15	Madhya Pradesh	4122.9	574.0	0.0	4696.9	27.0	6.5	1520.0	440.6	22.4	5.4	40.0	480.6	23.9	5.1	6697.5	28.6	7.9
16	Maharashtra	5478.6	148.1	0.0	5626.7	32.3	7.8	2028.7	422.9	21.5	5.2	0.0	422.9	21.1	4.5	8078.3	34.5	9.6
17	Daman & Diu	86.6	2.0	0.0	88.6	0.5	0.1	109.3	150.4	7.6	1.8	0.0	150.4	7.5	1.6	348.3	1.5	0.4
18	D.N.Haveli	137.1	3.0	0.0	140.1	0.8	0.2	139.3	800.3	40.7	9.8	0.0	800.3	39.9	8.5	1079.8	4.6	1.3
19	Goa	401.5	100.0	0.0	501.5	2.9	0.7	19.7	100.0	5.1	1.2	0.0	100.0	5.0	1.1	621.2	2.6	0.7
20	PowerGrid	5.4	0.0	0.0	5.4	0.0	0.0	0.0	4.3	0.2	0.1	0.0	4.3	0.2	0.0	9.7	0.0	0.0
21	HWP of DAE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	0.7	0.2	0.0	14.0	0.7	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	0.5	0.1	0.0	10.0	0.5	0.1	10.0	0.0	0.0
23	Railways WR	0.0	170.0	0.0	170.0	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	170.0	0.7	0.2
	Western Region	**16141.0**	**1267.9**	**0.0**	**17408.9**	**100.0**	**24.1**	**4027.1**	**1967.6**	**100.0**	**24.0**	**40.0**	**2007.6**	**100.0**	**21.3**	**23443.6**	**100.0**	**26.2**
24	Andhra Pradesh	1828.1	0.0	0.0	1828.1	11.6	2.5	0.0	517.1	22.8	6.3	200.0	717.1	24.2	7.6	2545.2	13.0	2.9
25	Telangana	2135.6	0.0	0.0	2135.6	13.5	3.0	0.0	220.7	9.7	2.7	200.0	420.7	14.2	4.5	2556.3	13.0	2.9
26	Karnataka	3562.5	450.0	0.0	4012.5	25.4	5.6	0.0	582.0	25.7	7.1	300.0	882.0	29.8	9.4	4894.5	25.0	5.6
27	Kerala	1521.3	150.0	0.0	1671.3	10.6	2.3	360.0	220.7	9.7	2.7	0.0	220.7	7.4	2.3	2252.0	11.5	2.6
28	Tamil Nadu	5629.0	35.0	0.0	5664.1	35.9	7.9	500.0	501.2	22.1	6.1	0.0	501.2	16.9	5.3	6665.2	34.0	7.6
29	Puducherry	336.5	0.0	0.0	336.5	2.1	0.5	0.0	215.1	9.5	2.6	0.0	215.1	7.3	2.3	551.6	2.8	0.6
30	NLC	133.0	0.0	0.0	133.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	133.0	0.7	0.2
31	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	0.2	0.1	7.3	0.0	0.0
	Southern Region	**15146.0**	**635.0**	**0.0**	**15781.0**	**100.0**	**21.9**	**860.0**	**2264.0**	**100.0**	**27.7**	**700.0**	**2964.0**	**100.0**	**31.5**	**19605.0**	**100.0**	**21.1**
32	Bihar	3697.0	0.0	0.0	3697.0	28.5	5.1	690.0	635.3	54.0	7.8	0.0	635.3	54.0	6.8	5022.3	32.2	5.6
33	DVC	3732.2	0.0	0.0	3732.2	28.8	5.2	0.0	36.9	3.1	0.5	0.0	36.9	3.1	0.4	3769.2	24.2	4.2
34	Jharkhand	1428.5	50.0	0.0	1478.5	11.4	2.0	0.0	188.9	16.1	2.3	0.0	188.9	16.1	2.0	1667.4	10.7	1.9
35	Odisha	1442.1	200.0	0.0	1642.1	12.7	2.3	460.0	137.7	11.7	1.7	0.0	137.7	11.7	1.5	2239.9	14.4	2.5
36	West Bengal	2048.3	0.0	0.0	2048.3	15.8	2.8	292.0	158.6	13.5	1.9	0.0	158.6	13.5	1.7	2498.9	16.0	2.8
37	Sikkim	171.3	0.0	0.0	171.3	1.3	0.2	0.0	14.9	1.3	0.2	0.0	14.9	1.3	0.2	186.2	1.2	0.2
38	PowerGrid	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.3	0.0	0.0	3.8	0.3	0.0	3.8	0.0	0.0
39	Railways	210.0	0.0	0.0	210.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	210.0	1.3	0.3
	Eastern Region	**12729.5**	**250.0**	**0.0**	**12979.5**	**100.0**	**18.0**	**1442.0**	**1176.1**	**100.0**	**14.4**	**0.0**	**1176.1**	**100.0**	**12.5**	**15597.6**	**100.0**	**17.3**
40	Arunachal Pradesh	201.5	0.0	0.0	201.5	7.3	0.3	0.0	8.6	2.7	0.1	9.4	18.0	3.6	0.2	219.5	6.7	0.2
41	Assam	1183.0	142.5	0.0	1325.5	48.1	1.8	0.0	119.0	37.3	1.5	164.9	283.9	56.6	3.0	1609.5	49.4	1.8
42	Manipur	215.0	0.0	0.0	215.0	7.8	0.3	0.0	33.8	10.6	0.4	0.0	33.8	6.7	0.4	248.8	7.6	0.3
43	Meghalaya	234.3	0.0	0.0	234.3	8.5	0.3	0.0	101.9	31.9	1.2	0.0	101.9	20.3	1.1	336.2	10.3	0.4
44	Mizoram	170.4	0.0	0.0	170.4	6.2	0.2	0.0	27.1	8.5	0.3	7.5	34.6	6.9	0.4	205.0	6.3	0.2
45	Nagaland	139.3	0.0	0.0	139.3	5.1	0.2	0.0	11.2	3.5	0.1	0.8	11.9	2.4	0.1	151.3	4.6	0.1
46	Tripura	464.8	0.0	0.0	464.8	16.9	0.6	0.0	17.6	5.5	0.2	0.0	17.6	3.5	0.2	482.3	14.8	0.5
47	PowerGrid	2.5	0.0	0.0	2.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.1	0.0
	North-Eastern	**2610.8**	**142.5**	**0.0**	**2753.4**	**100.0**	**3.8**	**0.0**	**319.2**	**100.0**	**3.9**	**182.5**	**501.7**	**100.0**	**5.3**	**3255.1**	**100.0**	**3.9**
	All India	**66,494**	**5,265**	**374**	**72,134**	**100**	**100**	**7,839**	**8,183**	**100**	**100**	**1,221**	**9,404**	**100**	**100**	**89,377**	**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.

Annex-5A
(Item No. 5.2)

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	######	3.51
3	Amulin	NHPC	3	140	420	132.00	######	3.37
4	Ashupani	NHPC	2	15	30	395.00	126.45	8.75
5	Attunli	NHPC	4	125	500	264.00	######	2.35
6	Badao	NEEPCO	4	30	120	154.50	441.00	2.32
7	Bhareli-I	NEEPCO	8	140	1120	97.00	######	1.85
8	Bhareli-II	NEEPCO	5	120	600	51.00	######	1.67
9	Chanda	NEEPCO	4	27.5	110	175.67	401.91	2.67
10	Demwe	NHPC	12	250	3000	138.00	######	1.97
11	Dengser	NHPC	4	138	552	120.00	######	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	######	3.51
16	Emra-II	NHPC	3	130	390	278.00	######	3.02
17	Etabue	NHPC	3	55	165	378.00	683.66	3.43
18	Etalin	NHPC	16	250	4000	385.00	######	1.70
19	Hirong	NHPC	4	125	500	285.00	######	1.62
20	Hutong	WAPCOS	12	250	3000	166.77	######	1.28
21	Kalai	WAPCOS	10	260	2600	193.21	######	1.01
22	Kameng Dam	NEEPCO	5	120	600	65.00	######	2.29
23	Kapak-leyak	NEEPCO	4	40	160	245.00	627.95	1.74
24	Kurung I &II	NHPC	3	110	330	151.00	######	4.04
25	Mihum-don	NHPC	4	100	400	286.00	######	3.60
26	Mirak	NHPC	3	47	141	136.40	748.44	3.42
27	Naba	NHPC	4	250	1000	221.00	######	2.14
28	Nalo	NHPC	4	90	360	221.00	######	3.27
29	Naying	NHPC	4	250	1000	245.00	######	1.18
30	Niare	NHPC	4	200	800	205.00	######	2.02

31	Oju-I	NHPC	4	175	700	257.00	######	2.08
32	Oju-II	NHPC	4	250	1000	322.00	######	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	######	1.48
42	Tenga	NEEPCO	4	150	600	875.00	######	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	######	2.00
56	Khab-I	SJVNL	3	150	450	170.00	######	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	######	2.41
60	Thopan Powari	HPSEB	3	160	480	161.14	######	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	######	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	######	1.09
70	Khalsi	NHPC	3	20	60	33.00	272.60	4.10
71	Kiru	WAPCOS	4	107.5	430	105.33	######	0.77
72	Ratle	WAPCOS	4	140	560	92.33	######	1.40
73	Shamnot	WAPCOS	4	92.5	370	56.33	######	1.69
74	Shuas	WAPCOS	2	115	230	115.70	######	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	######	1.07
78	Gangavali	KPCL	2	200	400	378.30	759.00	1.46
79	Gundia	KPCL	2	150	300	600.00	616.00	1.41
80	Kalinadi Stage-III	KPCL	2	150	300	407.67	610.00	1.67
81	Tamankal	KPCL	2	150	300	87.29	401.00	3.32
	Total (Karnataka) - 5 schemes		**12**		**1900**			
Kerala								
82	Karappara Kuriarkutty	WAPCOS	2	18	66	390.00	126.10	7.88
			2	15		307.00		
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	400.3	303.7	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	332.9	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	114.6	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	158.7	1119	4.83
111	Lungleng	WAPCOS	5	163	815	219.7	1169	4.17
112	Tlawng	WAPCOS	2	22.5	45	123.7	151.7	5.84
	Total(Mizoram) - 3 Nos. schemes		**11**		**1500**			
Nagaland								
113	Dikhu	NEEPCO	4	35	140	79.44	513.4	2.8
114	Tizu	NEEPCO	3	50	150	64.19	568.4	2.56
115	Yangnyu	NEEPCO	2	20	40	115	176.5	4.48
	Total (Nagaland) - 3 Nos. schemes		**9**		**330**			
Orissa								
116	Baljori	WAPCOS	2	89	178	165.8	479.8	5.9
117	Lower Kolab	WAPCOS	3	155	465	196.9	845.9	7.1
118	Naraj	WAPCOS	7	41	287	16.14	759.3	4.92
119	Tikarpara	WAPCOS	7	37	259	16.97	828.4	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	865.9	2.35
122	Lingza	NHPC	3	40	120	736	477.5	2.85
123	Panan	NHPC	4	50	200	312	762	2.15
124	Rangyong	NHPC	3	47	141	723.2	639.5	2.7
125	Ringpi	NHPC	2	35	70	1106	317.4	3.17
126	Rongni Storage	NHPC	3	65	195	442	**510.4**	8.6
127	Rukel	NHPC	3	11	33	537.1	149.4	5.48
128	Talem	NHPC	3	25	75	393.2	305.5	4.34
129	Teesta-I	NHPC	4	80	320	576.9	1298	1.8
	Total (Sikkim) - 10 Nos. schemes		**31**		**1469**			
Uttaranchal								
130		Arakot Tiuni	UJVNL	3	24	72	250.2	382.9
131	Badrinath	WAPCOS	2	70	140	459.7	702.7	0.81
132	Bagoli Dam	UJVNL	3	24	72	139.5	340.7	4.1
133	Bhairon-ghati	WAPCOS	2	32.5	65	108.9	293.2	1.8
134	Bogudiyar - Sirkari Bhyal	WAPCOS	2	85	170	344.5	744	1.99
135	Bokang Baling	WAPCOS	3	110	330	455.2	1125	1.68
136	Chhunger - Chal	WAPCOS	2	120	240	292.8	853.3	1.13
137	Deodi	WAPCOS	2	30	60	560.3	296.8	1.37
138	Devsari	WAPCOS	3	100	300	227.5	878.5	2.77
139	Gangotri	WAPCOS	1	55	55	336.3	264.8	1.62
140	Garba Tawaghat	WAPCOS	3	210	630	471	2483	0.9
141	Gohana Tal	WAPCOS	2	30	60	584.5	269.4	1.64
142	Harsil	WAPCOS	3	70	210	281.3	920.6	1.1
143	Jadh Ganga	WAPCOS	2	25	50	142.6	220.9	2.19
144	Jakhol Sankri	UJVNL	3	11	33	364	**144.2**	1.71
145	Jelam Tamak	WAPCOS	2	30	60	195.6	268.1	1.71
146	Kalika Dantu	WAPCOS	2	115	230	**99.75**	1067	2.95
147	Karmoli	WAPCOS	2	70	140	**419.7**	**621.3**	1.3
148	Khartoi Lumti Talli	WAPCOS	2	27.5	55	56.6	241.5	3
149	Lata Tapovan	UJVNL	4	77.5	310	265	1123	2.21
150	Maleri Jelam	WAPCOS	2	27.5	55	200.3	243.1	1.8
151	Mapang - Bogidiyar	WAPCOS	2	100	200	465.1	882	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	536.2	327.3	1.18
156	Rishi Ganga - II	WAPCOS	1	35	35	237	164.6	2.22

157	Rupsia-bagar Khasiya-bara	WAPCOS	2	130	260	449.5	1196	1.59
158	Sela Urthing	WAPCOS	2	115	230	255.5	816.7	1.4
159	Sirkari Bhyol Rupsia-bagar	WAPCOS	3	70	210	389	968	1.55
160	Taluka Sankri	UJVNL	2	70	140	564.9	559.5	1.33
161	Tamak Lata	UJVNL	4	70	280	291.4	1041	2.3
162	Urthing Sobla	UJVNL	4	70	280	415	**1360**	1.49
	Total (Uttaranchal) - 33 Nos. Schemes		**81**		**5282**			
	Grand Total - 162 Nos. Schemes		**525**		**47930**			

Annex-5B
(Item No 5.4)

Hydro Capacity addition during 2018-19

Sl. No.	Particular	Unit Nos.	Cap. (MW)	Commissioning As programmed	Commissioning Actual(A)/ Anticipated
A.	**Central Sector**				
1	**Pare** NEEPCO, Arunachal Pradesh 2x55=110 MW	Unit # 1 Unit # 2	55 55	May 18 May 18	**24.05.2018** **16.05.2018**
2	**Kameng** NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit # 1 Unit # 2 Unit # 3 Unit # 4	150 150 150 150	Nov. 18 Nov. 18 Dec. 18 Dec. 18	2019-20 (slipped)
	Sub- Total (A):		**710 MW**		**110 MW**
B.	**State Sector**				
3	**Uhl - III** BVPCL, H.P. 3x33.33=100 MW	Unit #1 Unit # 2 Unit # 3	33.33 33.33 33.33	Aug. 18 Aug.18 Sep.18	2019-20 (slipped)
4	**Pulichintala** TSGENCO,Telangana 4x30=120 MW	Unit # 4	30	Sept. 18	**08.09.2018**
	Sub- Total (B):		**130**		**30 MW**
	Total (A+B)		**840 MW**		**140 MW**

Annex-5C
(Item No, 5.4.1)

Hydro Capacity addition Programme for 2019-20

Sl. No.	Particular	Unit Nos.	Cap. (MW)	Capacity addition as programmed	Capacity addition Actual(A)/ Anticipated	Remarks
A.	**Central Sector**					
1	**Kameng** NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit #1 Unit # 2 Unit # 3 Unit # 4	150 150 150 150	Aug,19 Aug,19 Nov,19 Nov,19	**10.02.2020** **03.02.2020** 2020-21 2020-21 (slipping)	-Seepage of water during welding affecting progress of works -Difficult approach & working conditions -Ventilation constraints -Works affected due to heavy rains during this monsoon.
	Sub- total (A):		**600 MW**		**300 MW**	
B.	**State Sector**					
2	**Uhl - III** BVPCL, H.P. 3x33.33=1004MW	Unit #1 Unit # 2 Unit # 3	33.33 33.33 33.33	Oct,19 Nov,19 Dec,19	2020-21 (slipping)	-Difficult approach -Delay in welding of liner in bend **(Critical)**
3	**Sawra Kuddu** HPPCL, H.P. 3x37=111 MW	Unit #1 Unit # 2 Unit # 3	37 37 37	Sep,19 Oct,19 Nov,19	2020-21 (slipping)	-Delay in completion of HRT works& associated transmission line.
	Sub- total (B):		**111**			
C.	**Private Sector**					
4	**Bajoli Holi** GMR, H.P. 3x60=180 MW	Unit #1 Unit # 2 Unit # 3	60 60 60	Jan.,20 Feb.,20 Mar.,20	2020-21 (slipping)	-Works affected due to heavy rainfall in Aug., 19 and inclement weather from early Dec., 19 to end of Jan., 20 -Poor financial health of civil contractor.
5	**Singoli Bhatwari** L&T, Uttarakhand 2x33=99 MW	Unit #1 Unit # 2 Unit # 3	33 33 33	Mar.,20 Mar.,20 Mar.,20	2020-21 (slipping)	-Delay in completion of HRT works
6	**Sorang** HSPCL Uttarakhand 2x50=100 MW	Unit #1 Unit # 2	50 50	Nov,19 Dec.,19	2020-21 (slipping)	-Poor planning of re-erection of penstock works -Weather constraints
	Sub- total (C):		**379**			
	Total (A+B+C)		**1190 MW**		**300 MW**	

Target (2019-20): 1190 MW
Capacity Addition (2019-20): 300 MW
Slipping to 2020-21: 890 MW

Annex-5D
(Item No. 5.4.2)

Hydro Capacity Addition Programme for 2020-21

Sl. No.	Name of Project	Unit No.	State/ Implem. Agency	Capacity (MW)	Remarks
	Central Sector				
1	**Kameng** 4x150= 600 MW	U-3 to U-4	Arunachal Pradesh/ NEEPCO	300	
			Sub- total (Central):	**300**	
	State Sector				
2	**Uhl-III** 3x33.33= 100 MW	U-1 to U-3	Himachal Pradesh/ HVPCL	100	
3	**Thottiyar** 1x30 + 1x10= 40 MW	U-1 to U-2	Kerala/ KSEB	40	
4	**Vyasi** 2x60=120 MW	U-1 to U-2	UJVNL/ Uttarakhand	120	
5	**Sawra Kuddu** 3x37= 111 MW	U-1 to U-3		111	
			Sub- total (State):	**371**	
	Private Sector				
6	**Bajoli Holi** 3x60= 180 MW	U-1 to U-3	Himachal Pradesh / GMR Bajoli Holi Hydro Power Pvt. Ltd.	180	
7	**Rongnichu** 2x48= 96 MW	U-1 to U-2	Sikkim/ Madhya Bharat Power Corporation Ltd.	96	
8	**Singoli Bhatwari** 3x33= 99 MW	U-1 to U-3	Uttarakhand/ L&T Uttaranchal Hydro power Limited	99	
9	**Sorang** 2x50= 100 MW	U-1 to U-2	Himachal Pradesh/ Himachal Sorang Power	100	
			Sub- total (Private):	**475**	
Total (C.S, +SS.+PS.)				**1146**	

Annex-5F
(Item No. 5.11.1)

State-wise List of Hydro RMU&LE schemes completed in the IX Plan

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Bhakra RB BBMB	CS	5x132	88.45	90.68	125.00 (U)	RM&U	2000-01
2	Dehra U-2 BBMB	CS	1x165	10.74	10.74	25.00 (Res.)	R&M+Res.	1998-99
3	Bairasiul, NHPC	CS	3x66	18.45	18.45	-	R&M	2000-01
4	Bassi, HPSEB	SS	4x15	5.35	4.34	-	R&M	2000-01
Jammu & Kashmir								
5	Salal St.I, NHPC	CS	3x115	51.50	51.50	-	R&M	2000-01
6	Chenani, J&KSPDC	SS	5x4.66	11.00	11.00	0.93 (Res)	R&M+Res.	2000-01
Punjab								
7	Ganguwal, U-2 BBMB	CS	1x24.2	18.90	15.00	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	1997-98
8	Kotla, U-3, BBMB	CS	1x24.2	18.90	16.90	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	1998-99
9	Ganguwal U-3, BBMB	CS	1x24.2	25.00	43.40	22.00 (LE)+ 2.20 (Res)	RM&LE+Res	2000-01
10	Kotla U-2, BBMB	CS	1x24.2	25.00		22.00 (LE)+ 2.20 (Res)	RM&LE+Res	2001-02
Uttarakhand								
11	Chilla U-1, 3& 4, UJVNL	SS	3x36	4.25	4.11	-	R&M	1998-99
12	Tiloth, UJVNL	SS	3x30	8.02	5.51	6.00 (U)	RM&U	1998-99
Andhra Pradesh								
13	Lower Sileru, APGENCO	SS	4x115	13.35	9.30	24.00 (Res)	R&M+Res.	2001-02

14	Srisailam RB, APGENCO	SS	7x110	16.32	11.40	-	R&M	2001-02
Karnataka								
15	Sharavathy, U-1 to 8, KPCL	SS	8x89.1	65.00	63.49	115.20 (U) +178.20 (Res)	RM&U+Res	1997-98
16	Sharavathy, U-9&10, KPCL	SS	2x89.1	17.96	14.68	28.80(U) +19.10 (Res)	RM&U+Res	1997-98
Orissa								
17	Hirakud-I, U1&2, OHPC	SS	2x37.5	95.10	95.10	24.00(U) +75.00(LE)	RMU&LE	1997-98
Gujarat								
18	Ukai,U-1&3, GSECL	SS	2x75	24.99	24.99	75.00 (Res.)	R&M+Res.	1997-98
Maharashtra								
19	Koyna I&II, MSPGCL	SS	4x65+ 4x75	74.91	74.91	40.00(U) + 260.00(LE)	RM&U of St-I & II & LE of St-I	1999-2000
20	Koyna III, U-10, 11 &12, MSPGCL	SS	3x80	4.65	4.65	-	R&M	1997-98
Total			**4892.10**	**597.84**	**570.16**	**1093.03 [339.0(U) + 331.03(Res.) + 423.0(LE)]**		

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector: SS- State Sector

Annex-5G
(Item No. 5.11.1)

State-wise List of Hydro RMU&LE schemes completed in the X Plan

Sl. No.	Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs. in Crs.)	Actual Exp. (Rs. in Crs.)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh								
1	Pong, BBMB	CS	6x60	17.70	17.79	36.00(U)	RM&U	2003-04
Punjab								
2	Ganguwal, U-1, BBMB	CS	1x29.25	51.28	81.99	25.89 (LE) +2.10	RM&LE+ Res.	2006-07
2	Kotla, U-1, BBMB	CS	1x29.25	51.28		2.33 (Res.)	RM&LE+ Res.	2006-07
4	Shanan Ph.A, PSPCL	SS	4x15+ 1x50	11.35	10.93	-	R&M	2003-04
5	Shanan, Ph.B, PSPCL	SS	4x15+ 1x50 $	35.95	13.34	60.00(LE)	RM&LE (LE for 15 MW units+R&M for 50 MW unit	2006-07
6	Anandpur Sahib, PSPCL	SS	4x33.5	3.68	1.04	-	R&M	2006-07
7	UBDC I&II, PSPCL	SS	3x15+ 3x15.45	7.89	2.44	45.00 (LE)	RM&LE (LE for 3x15MW &R&M for 3x15.45 MW	2006-07
8	Mukerian St.I, PSPCL	SS	3x15	6.04	4.38	-	R&M	2006-07
Uttarakhand								
9	Chibro, UJVNL	SS	4x60	10.45	10.52	-	R&M	2006-07
Karnataka								
10	Nagjhari, U-1&3,KPCL	SS	2x135	26.12	21.62	30 (U)	RM&U	2002-03

11	Supa PH, KPCL	SS	2x50	2.64	2.47	-	R&M	2002-03
12	Mahatma Gandhi, VVNL	SS	4x12+ 4x18	44.66	43.13	19.20 (U) +120.00 (LE)	RMU&LE	2002-03
13	Munirabad , VVNL	SS	2x9+ 1x10.3	3.64	3.53	28.30 (LE)	RM&LE	2002-03
14	Mani Dam, KPCL	SS	2x4.5	1.00	1.00	-	R&M	2002-03
15	Shivasamu dram, VVNL	SS	6x3+ 4x6	68.38	73.17	42.00 (LE)	RM&LE	2004-05
16	Bhadra, Ph.II, KPCL	SS	1x2	3.30	2.51	2.00 (LE)	RM&LE	2005-06
17	Varahi, KPCL	SS	2x115	2.57	2.66	-	R&M	2006-07
18	Sharavathy, Ph.A, KPCL	SS	10x103.5	5.22	3.52	-	R&M	2006-07
Kerala								
19	Neriamanga -lam KSEB	SS	3x15	58.00	53.05	9.00 (U) +45.00(LE)	RMU&LE	2006-07
20	Pallivasal, KSEB	SS	3x5+ 3x7.5	94.00	371.71	37.50 (LE)	RM&LE	2002-03
21	Sengulam, KSEB	SS	4x12	114.00		48.00 (LE)	RM&LE	2002-03
22	Panniar, KSEB	SS	2x15	62.00		30.00 (LE)	RM&LE	2002-03
Tamilnadu								
23	Pykara, TANGEDCO	SS	3x6.65+1x11+2 x14	26.06	20.147	58.95(LE)	RM&LE	2004-05
24	Papanasam, TANGEDCO	SS	4x7	27.05	22.61	4.00 (U) + 28.00 (LE)	RMU&LE	2005-06
Orissa								
25	Hirakud-I (Sw.yard), OHPC	SS		9.85	15.88	-	R&M	2006-07
26	Hirakud-I,U-3&4, OHPC	SS	2x24	126.14	108.86	16.00(U)+ 48.00(LE)	RMU&LE	2005-06
West Bengal								
27	Maithon, U-2, DVC	CS	1x20	42.08	36.94	3.20(U)+ 20.00(LE)	RMU&LE	2004-05
Maharastra								
28	Bhira Tail Race, MSPGCL	SS	2x40	1.60	0.70	-	R&M	2003-04

29	Tillari, MSPGCL	SS	1x60	4.50	4.24	6.0 (U)	RM&U	2004-05
30	Koyna Gen. Complex, MSPGCL	SS	4x70+4x 80+4x80	12.00	11.50	-	R&M	2004-05
Meghalaya								
31	Umium St.I, MePGCL	SS	4x9	81.88	84.21	36(LE)	RM&LE	2002-03
32	Khandong, NEEPCO	CS	2x25	4.00	3.35	-	R&M	2003-04
Total			**4446.60**	**1016.31**	**1029.24**	**829.08 [123.40 (U) +701.25 (LE) + 4.43 (Res.)]**		

Installed Capacity of Shanan, Ph.B, at Sl. No. 5 not included in the total, as the same has been accounted for at Sl.No. 4

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector: SS- State Sector

Annex-5H
(Item No. 5.11.1)

State-wise List of Hydro RMU&LE schemes completed in the XI Plan

Project, Agency	CS/ SS	Inst. Cap. (MW)	Est. Cost (Rs . in crs)	Actual Exp (Rs . in crs)	Benefits (MW)	Category	Year of Completion
Himachal Pradesh							
Dehar Ph. A BBMB	CS	6x165	11.00	6.94	-	R&M	2010-11
Dehar Ph. B BBMB	CS	6x165	49.00	24.45	330 (LE)	RM&LE	2009-10
Uttarakhand							
Tanakpur, NHPC	CS	3x31.4	10.77	11.95	-	R&M	2007-08
Khodri Ph.A, UJVNL	SS	4x30	5.25	6.39	-	R&M	2008-09
Chilla Ph.A, UJVNL	SS	4x36	23.55	21.24	-	R&M	2008-09
Andhra Pradesh							
Upper Sileru, APGENCO	SS	4x60	4.20	3.34	-	R&M	2009-10
Karnataka							
Nagjhari, U1 to 6, KPCL	SS	5x150 + 1x135	14.75	15.31	-	RM&U	2009-10
Sharavathy Ph.B, KPCL	SS	10x103.5	20.50	11.14	-	R&M	2009-10
Supa, KPCL	SS	2x50	3.45	4.90	-	R&M	2009-10
Bhadra, KPCL	SS	2x12	1.44	0.85	-	R&M	2009-10
Lingnamakki, KPCL	SS	2x27.5	3.81	2.62	-	R&M	2010-11
Tamil Nadu							
Mettur Dam, TANGEDCO	SS	4x10	30.17	24.16	10 (U) + 40 (LE)	RMU&LE	2007-08

Maharashtra							
Koyna St.I&II, MSPGCL	SS	4x70 + 4x80	87.50	81.82	-	R&M	2008-09
Vaitarna, MSPGCL	SS	1x60	16.00	0.14	-	R&M	2009-10
Koyna Dam PH, MSPGCL	SS	2x18	5.78	0.25	-	R&M	2009-10
Koyna St.III, MSPGCL	SS	4x80	16.65	5.79	320 (LE)	RM&LE	2011-12
Manipur							
Loktak, NHPC	CS	3x30 derated	18.55	17.88	15.00 (Res.)	R&M + Res.	2011-12
Meghalaya							
Umium St.II, MePGCL	SS	2x9	90.46	55.67	2(U) +1 8.0 0 (L E)	RMU&L E	2011-12
Total		**5841.2**	**412.83**	**294.84**	**735 [12.00 (U) +708.00 (LE)+1 5.00 (Res)]**		

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration; MW – Mega Watt; CS-Central Sector: SS- State Sector

Annex-5I
(Item No. 5.11.1)

State-wise list of Hydro RMU&LE schemes completed in the XII Plan

Sl. No	Project, Agency	CS/ SS	Inst. Cap. (No.x. MW)	Est. Cost (Rs . in Crs)	Actual Exp (Rs . in Crs)	Benefits (MW)	Capacity after RMU&LE (MW)	Cate-gory	Year of Compl-etion
Himachal Pradesh									
1	Bassi, HPSEB	SS	4x15	124.25	158.26	6.0(U)+ 60(LE)	66	RMU&LE	2013-14
Jammu & Kashmir									
2	Lower Jhelum, J&KSPDC	SS	3x35	101.3	96.10	15.00 (Res)	105	R&M+ Res.	2014-15
3	Sumbal Sindh, J&KSPDC	SS	2x11.3	25.00	24.59	-	22.6	R&M	2016-17
Uttarakhand									
4	Pathri, UJVNL	SS	3x6.8	113.25	108.3	20.40(LE)	20.4	RM& LE	2014-15
5	Khatima, UJVNL	SS	3x13.8	256.77	118.83	41.40 (LE)	41.4	RM& LE	2016-17
Uttar Pradesh									
6	Matatila, UPJVNL	SS	3x10.2	10.29	7.21	30.6 (LE)	30.6	RM& LE	2015-16
Andhra Pradesh									
7	Lower Sileru, APGENCO	SS	4x115	8.75	6.77	-	460	R&M	2013-14
8	Srisailam RB, APGENCO	SS	7x110	16.70	17.60	-	770	R&M	2015-16
Telangana									
9	Nagarjuna Sagar Ph-I works, TSGENCO	SS	1x110+ 7x100.8	33.35	13.90	-	815.6	R&M	2012-13
Karnataka									
10	Supa, KPCL	SS	2x50	3.45	3.88	-	100	R&M	2014-15
11	Nagjhari,U-1 to 6, KPCL (5x150+1x 135)	SS	1x135 (U-6)	69.21	64.49	15 (U)	150	RM&U	2015-16

12	Sharavathy Genarating Station (Ph B), KPCL	SS	10x103.5	20.00	29.27	-	1035	R&M	2016-17
Kerala									
13	Idamalayar, KSEB	SS	2x37.5	14.50	13.22	-	75	R&M	2012-13
14	Sabarigiri, U-4 KSEB	SS	1x55	52.20	50.41	5(U)	60	RM&U	2014-15
15	Poringalkuthu, KSEB	SS	4x8	88.63	51.90	4 (U)+ 32.00 (LE)	36	RMU&LE	2015-16
Tamil Nadu									
16	Periyar, TANGEDCO	SS	4x35	161.18	133.68	28.00(U)+ 140(LE)	168	RMU&LE	2015-16
Odisha									
17	Rengali Unit-1 OHPC	SS	1x50	47.50	36.76	50(LE)	50	RM& LE	2012-13
18	Rengali Unit-2 OHPC	SS	1x50	25.20	20.73	50(LE)	50	RM& LE	2013-14
West Bengal									
19	Jaldhaka St.I, WBSEDCL	SS	3x9	88.62	79.97	27 (LE)	27	RM& LE	2016-17
Assam									
20	Khandong NEEPCO	CS	1x25	25.05	29.18	25(LE)	25	RM& LE	2014-15
21	Kopili, NEEPCO	CS	2x50	50.22	50.92	-	100	R&M	2014-15
Total			**4149.60**	**1335.42**	**1115.97**	**549.40 [58(U)+ 476.40 (LE) + 15 (Res)]**	**4207.6**		

Annexure-5J
(Item No. 5.12)

State-wise list of Hydro RMU&LE schemes programmed for completion during 2017-22

S.l. No.	Name of Project, Agency, Inst. Cap. (No. X MW)	CS/ SS	Capacity covered Under UMU&LE (No. x MW)	Est. Cost (Rs. in Crores)	Actual Expense (Rs. in Crores)	Benefit (MW)	Capacity After RMU&LE	Cate-gory	Year of comp-letion
A. Completed Schemes									
Himachal Pradesh									
1	Pong Power House, BBMB (6x66)	CS	6x66	142.25	-	396 (LE)	396	RM&LE	2022-23
Madhya Pradesh									
2	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	34.27	1.067	-	115	R&M	2022-23
Sub Total(A)			**511.00**	**176.52**	**1.067**	**396 (LE)**	**511.00**		
B. Ongoing Schemes – Under Tendering									
Punjab									
3	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	82.16	1.60	-	600	R&M	2022-23
4	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	-	-	91.35	R&M	2022-23
5	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	31.65	0.17	-	134	R&M	2022-23
Uttarakhand									
6	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144 (LE)+ 12(U)	156	RMU &LE	2024-25
Tamil Nadu									
7	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	42	RMU &LE	2023-24
8	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	70	RMU &LE	2022-24
Sub Total(B)			**1065.35**	**783.45**	**1.77**	**268 [240 (LE)+28 (U)]**	**1093.35**		

C. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
Jammu & Kashmir									
9	Lower Jehlum HEP, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)+ 27 (U)	132	RMU &LE	2022-27
10	USHP-II Kangan, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)	105	RM& LE	2022-27
Uttarakhand									
11	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240 (LE)	240	RM& LE	2025-26
12	Khodri PH-II UJVNL (4x30)	SS	4x30	169.63	-	120 (LE)	120	RM& LE	2025-26
13	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	30	RM& LE	2023-24
Andhra Pradesh									
14	Machkund St.I & St.II, APGENCO (3x17+3x 23)	SS	3x17+ 3x23	508.00	-	120 (LE) +9 (U)	129	RMU &LE	2025-26
Tamil Nadu									
15	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0 (LE)+ 6(U)	46	RMU &LE	2025-26
West Bengal									
16	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	40	RM& LE	2022-23
Manipur									
17	Loktak, NHPC (3x35)	CS	3x35	236.07	-	105 (LE)	105	RM& LE	2022-23
Sub Total(C)			**905.00**	**1269.85**	**7.76**	**947.00 [905 (LE)+42 (U)]**	**947.00**		
D. Ongoing Schemes – Under RLA Studies									
Tamil Nadu									
18	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	60	RM& LE	2022-27
19	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	175	RM& LE	2022-27
20	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	180	RM& LE	2022-27
21	Kundah-IV, TANGEDCO (2x50)	SS	2x50	-	-	100 (LE)	100	RM& LE	2022-27
22	Kundah-V, TANGEDCO	SS	2x20	-	-	40 (LE)	40	RM& LE	2022-27

	(2x20)								
23	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	200	RM& LE	2022-27
24	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	30	RM& LE	2022-27
25	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	25	RM& LE	2022-27
26	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	35	RM& LE	2022-27
27	Kadamparai, PH TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	400	RM& LE	2022-27
28	Aliyar, TANGEDCO (1x60)	SS	1x60	-	-	60 (LE)	60	RM& LE	2022-27
Kerala									
29	Idukki 2nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	390	RM& LE	2022-27
Andhra Pradesh									
30	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM& LE	
31	Hampi Canal PH, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM& LE	
Assam									
32	Khandong Power Station, NEEPCO (2x25)	CS	2x25	220.21	12.71	50 (LE)	50	RM& LE	
Meghalaya									
33	Umiam-umtru Stage-IV, MePGCL (2x30)	SS	2x30	-	-	-	60	R&M	
Sub Total(D)			**1877.00**	**570.21**	**12.71**	**1817 (LE)**	**1877.00**		
Total (A+B+C+D)			**4358.35**	**2800.03**	**23.31**	**3428 [3358 (LE)+70 (U)]**	**4428.35**		

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension; Res – Restoration;
MW – Mega Watt; CS-Central Sector: SS- State Sector

Annexure-5K
(Item No. 5.12)

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 UMU&LE (No. x MW	Est. Cost (Rs. in Crores)	Actual Expense (Rs. in Crores)	Benefit (MW)	Capa-city After RMU&LE	Category	Year of comp-letion
A. Completed Schemes B.									
Himachal Pradesh									
1	Pong Power House, BBMB (6x66)	CS	6x66	142.25	-	396 (LE)	396	RM&LE	2022-23
Madhya Pradesh									
2	Gandhi Sagar, MPPGCL (5x23)	SS	5x23	34.27	1.067	-	115	R&M	2022-23
Sub Total(A)			**511.00**	**176.52**	**1.067**	**396(LE)**	**511.0**		
B. Ongoing Schemes – Under Tendering									
Punjab									
3	Ranjit Sagar Dam, PSPCL (4x150)	SS	4x150	82.16	1.60	-	600	R&M	2022-23
4	UBDC St.I & St.II, PSPCL (3x15+3x15.45)	SS	3x15+ 3x15.45	23.55	-	-	91.35	R&M	2022-23
5	Anandpur Sahib Hydel Project, PSPCL (4x33.5)	SS	4x33.5	31.65	0.17	-	134	R&M	2022-23
Uttarakhand									
6	Chilla Ph B UJVNL (4x36)	SS	4x36	490.56	-	144(LE) + 12(U)	156	RMU &LE	2024-25
Tamil Nadu									
7	Moyar PH, TANGEDCO (3x12)	SS	3x12	67.05	-	36(LE)+ 6(U)	42	RMU &LE	2023-24
8	Kodayar PH-I, TANGEDCO (1x60)	SS	1x60	88.48	-	60 (LE)+ 10 (U)	70	RMU &LE	2022-24
Sub Total(B)			**1065.35**	**783.45**	**1.77**	**268 [240(LE) +28(U)]**	**1093.35**		

A. Ongoing Schemes – Under DPR Preparation/ Finalisation/ Approval									
Jammu & Kashmir									
9	Lower Jehlum HEP, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)+ 27 (U)	132	RMU &LE	2022-27
10	USHP-II Kangan, J&KSPDC (3x35)	SS	3x35	-	-	105 (LE)	105	RM& LE	2022-27
Uttarakhand									
11	Chibro, UJVNL (4x60)	SS	4x60	184.88	-	240(LE)	240	RM& LE	2025-26
12	Khodri PH-II UJVNL (4x30)	SS	4x30	169.63	-	120(LE)	120	RM& LE	2025-26
13	Kulhal, UJVNL (3x10)	SS	3x10	115.24	-	30(LE)	30	RM& LE	2023-24
Andhra Pradesh									
14	Machkund St.I & St.II, APGENCO (3x17+3x 23)	SS	3x17+ 3x23	508.00	-	120 (LE) +9 (U)	129	RMU &LE	2025-26
Tamil Nadu									
15	Kodayar PH-II, TANGEDCO (1x40)	SS	1x40	-	-	40.0(LE) + 6(U)	46	RMU &LE	2025-26
West Bengal									
16	Maithon, DVC (2x20+1x23.2)	CS	2x20 (U-1&3)	56.03	7.76	40.00 (LE)	40	RM& LE	2022-23
Manipur									
17	Loktak, NHPC (3x35)	CS	3x35	236.07	-	105 (LE)	105	RM& LE	2022-23
Sub Total(C)			**905.00**	**1269.85**	**7.76**	**947.00 [905 (LE)+42 (U)]**	**947.00**		
B. Ongoing Schemes – Under RLA Studies									
Tamil Nadu									
18	Kundah-I, TANGEDCO (3x20)	SS	3x20	-	-	60 (LE)	60	RM& LE	2022-27
19	Kundah-II, TANGEDCO (5x35)	SS	5x35	-	-	175 (LE)	175	RM& LE	2022-27
20	Kundah-III, TANGEDCO (3x60)	SS	3x60	-	-	180 (LE)	180	RM& LE	2022-27
21	Kundah-IV,	SS	2x50	-	-	100 (LE)	100	RM&	2022-27

	TANGEDCO (2x50)							LE	
22	Kundah-V, TANGEDCO (2x20)	SS	2x20	-	-	40 (LE)	40	RM& LE	2022-27
23	Mettur Tunnel, TANGEDCO (4x50)	SS	4x50	-	-	200 (LE)	200	RM& LE	2022-27
24	Sarkarpathy, TANGEDCO (1x30)	SS	1x30	-	-	30 (LE)	30	RM& LE	2022-27
25	Sholayar-II, TANGEDCO (1x25)	SS	1x25	-	-	25 (LE)	25	RM& LE	2022-27
26	Suruliyar, TANGEDCO (1x35)	SS	1x35	-	-	35 (LE)	35	RM& LE	2022-27
27	Kadamparai, PH TANGEDCO (4x100)	SS	4x100	-	-	400 (LE)	400	RM& LE	2022-27
28	Aliyar, TANGEDCO (1x60)	SS	1x60	-	-	60 (LE)	60	RM& LE	2022-27
Kerala									
29	Idukki 2nd stage, KSEB (3x130)	SS	3x130	-	-	390 (LE)	390	RM& LE	2022-27
Andhra Pradesh									
30	Tungabhadra Dam, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM& LE	
31	Hampi Canal PH, APGENCO (4x9)	SS	4x9	175.00	-	36 (LE)	36	RM& LE	
Assam									
32	Khandong Power Station, NEEPCO (2x25)	CS	2x25	220.21	12.71	50 (LE)	50	RM& LE	
Meghalaya									
33	Umiam-umtru Stage-IV, MePGC	SS	2x30	-	-	-	60	R&M	

	L (2x30)								
Sub Total (D)			1877.00	570.21	12.71	**1817 (LE)**	1877.00		
Total (A+B+C+D)			4358.35	2800.03	23.31	**3428 [3358 (LE)+70 (U)]**	4428.35		

Abbreviations: R&M – Renovation & Modernisation;. U – Uprating; LE – Life Extension;
Res – Restoration;
MW – Mega Watt; CS-Central Sector: SS- State Sector

Abbreviations

1	APGENCO	Andhra Pradesh Generation Corporation
2	BBMB	Bhakra Beas Management Board
3	DVC	Damodar Valley Corporation
4	GSECL	Gujarat State Electricity Corporation Ltd.
5	HPSEB	Himachal Pradesh State Electricity Board
6	J&KSPDC	Jammu & Kashmir State Power Development Corpn.
7	JSEB	Jharkhand State Electricity Board.
8	KPCL	Karnataka Power Corporation Ltd.
9	KSEB	Kerala State Electricity Board
10	MSPGCL	Maharashtra State Power Generation Corporation Ltd.
11	MePGCL	Meghalaya Power Generation Corporation Ltd.
12	MPPGCL	Madhya Pradesh Power Generation Corporation Ltd.
13	NEEPCO	North-East Electric Power Corporation
14	OHPC	Odisha Hydro Power Corporation
15	PSPCL	Punjab State Power Corporation Ltd.
16	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
17	TANGEDCO	Tamil Nadu Generation and Distribution Corporation Ltd.
18	TSGENCO	Telangana State Power Generation Corporation
19	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Ltd.
20	UJVNL	Uttarakhand Jal Vidyut Nigam Ltd.
21	VVNL	Vishwesharayya Vidyut Nigam Ltd.
22	WBSEDCL	West Bengal State Electricity & Distribution Company Ltd.
23	AVR	Automatic Voltage Regulator
24	BOQ	Bill of Quantity
25	CERC	Central Electricity Regulatory Commission
26	CPRI	Central Power Research Institute
27	DPR	Detailed Project Report
28	DVR	Digital Voltage Regulator
29	JICA	Japan International Co-operation Agency
30	LOA	Letter of Award
31	RLA	Residual Life Assessment

Annexure-6A
(Item No. 6.12.1)

Thermal Capacity Addition Programme (RFD) for the year 2018-19

S. No.	State	Project Name	LOA Date	Unit No	Targeted Cap. (MW)	Ach. Cap. (MW)	Org. Comm. Sched.	Actual Date of Capacity Addition
		CENTRAL SECTOR						
1	Assam	Bongaigaon TPP	Feb-08	U-3	250	250	Sep-11	26.03.2019
2	Bihar	Nabi Nagar TPP	Jan-08	U-3	250	250	Aug-13	26.02.2019
3	Bihar	New Nabi Nagar TPP	Jan-13	U-1	660	-	Jan-17	Slipped
4	MP	Gadarwara TPP	Mar-13	U-1	800	800	Mar-17	29.03.2019
5	Odisha	Darlipalli STPP	Feb-14	U-1	800	-	Feb-18	Slipped
		Total Central Sector			**2760**	**1300**		
		STATE SECTOR						
1	Assam	Namrup CCGT	Feb-09	ST	36.15	-	Jan-12	Slipped
2	MP	Shri Singhaji TPP St-II	Sep-14	U-3	660	660	May-18	18.11.2018
3	MP	Shri Singhaji TPP St-II	Sep-14	U-4	660	660	Jul-18	27.03.2019
4	Odisha	Ib valley TPP	Mar-14	U-4	660	-	Sep-17	Slipped
5	Rajasthan	Chhabra TPP Extn	Mar-13	U-6	660	660	Jun-18	29.03.2019
6	Rajasthan	Suratgarh SCTPP	May-13	U-7	660	-	Sep-16	Slipped
7	Karnataka	Yelahanka CCPP BY KPCL	Nov-15	GT+ST	370	-	Mar-18	Slipped
8	Telangana	Kothagudem TPS St-VII	Jan-15	U-1	800	800	Nov-17	26.12.2018
		Total State Sector			**4506.15**	**2780**		
		PRIVATE SECTOR			**NIL**			
	TOTAL THERMAL CAPACITY ADDITION					**4080**		
	ADDITIONAL PROJECTS							
		CENTRAL SECTOR						
1	Maharashtra	Solapur STPP	Mar-12	U-2	-	660	-	29.03.2019
		Total Central Sector				**660**		
		STATE SECTOR						
1	Assam	Lakwa Replacement Power Project.	Dec-15	U-1,2,3,4,5, 6&7	-	69.755	-	26.04.2018
		Total State Sector				**69.755**		

		PRIVATE SECTOR						
1	MP	Mahan TPP	Aug-07	U-2	-	600	-	07.10.2018
2	Chhattisgarh	Uchpinda TPP	Jun-09	U-4	-	360	-	20.03.2019
3	WB	Dishergarh TPS	Oct-10			12		27.03.2019
		Total Private Sector				**972**		
		Total Additional Capacity				**1701.755**		
	TOTAL GRAND THERMAL CAPACITY ADDITION				**7266.15**	**5781.755**		

Annexure-6B
(Item No. 6.12.2)

Thermal Capacity Addition Programme (RFD) for the year 2019-20

S. No.	Project Name	LOA Date	Unit No	Fuel	Targe-ted Cap. (MW)	Org. Comm. Sched.	Ant. Trial Run/ COD at the Beginn-ing of the year	Achie-ved Cap. (MW)	Actual/ Ant. Date of Cap. Addition
	CENTRAL SECTOR								
1	Nabi Nagar STPP	Jan-13	U-1	Coal	660	Jan-17	May-19	660	12.07.19 (A)
2	Lara STPP	Dec-12	U-2	Coal	800	May-17	Dec-19	Slipped	Due to Lockdown
3	Gadarwara STPP	Mar-13	U-2	Coal	800	Sep-17	Dec-19	Slipped	Due to Lockdown
4	Khargone STPP St-I	Mar-15	U-1	Coal	660	Mar-19	Aug-19	660	29.09.19 (A)
		Mar-15	U-2	Coal	660	Sep-19	Feb-20	660	24.03.2020 (A)
5	Darlipalli STPP St-I	Feb-14	U-1	Coal	800	Feb-18	Aug-19	800	30.12.19 (A)
6	Tanda TPP St- II	Sep-14	U-5	Coal	660	Sep-17	Sep-19	660	28.09.19 (A)
7	Neyveli New TPP	Jun-11	U-1	Lignite	500	Mar-18	Apr-19	500	20.12.19 (A)
		Jun-11	U-2	Lignite	500	Sep-18	Oct-19	Slipped	Due to Lockdown
	Total Central Sector				**6040**			**3940**	
	STATE SECTOR								
1	Dr.Narla Tata Rao TPS Stage-V	Dec-15	U-8	Coal	800	Jun-19	Feb-20	Slipped	Due to Lockdown
2	Namrup CCGT	Feb-09	ST	Gas	36.15	Jan-12	Nov-19	Slipped	Due to Lockdown
3	Wanakbori TPS Extn.	Oct-14	U-8	Coal	800	Oct-18	Nov-19	800	12.10.19 (A)
4	Yelahanka CCPP	Nov-15	GT+ST	Gas	370	Mar-18	Nov-19	Slipped	Due to Lockdown
5	Ib valley TPP	Mar-14	U-3	Coal	660	Aug-17	Apr-19	660	01.07.19 (A)
		Mar-14	U-4	Coal	660		Jul-19	660	17.08.19 (A)

6	Suratgarh SCTPP	Mar-13	U-7	Coal	660	Jul-16	Nov-19	660	15.03.2020 (A)
7	Bhadradri TPP	Mar-15	U-1	Coal	270	Mar-17	Jan-20	Slipped	Due to Lockdown
	Total Sector Sector				**4256.15**			**2780**	
	TOTAL THERMAL CAPACITY ADDITION				**10296.15**			**6720**	
	ADDITIONAL PROJECTS								
	PRIVATE SECTOR								
1	BLA Power Pvt. Ltd (Niwari) TPP	Apr-11	U-2	Coal				45	06.06.19 (A)
	Total Private Sector							**45**	
	Total Additional Capacity							**45**	
	TOTAL GRAND THERMAL CAPACITY ADDITION (as on 31.03.2020)							**6765**	

Annexure-9A

Outstanding Dues (More than 45 days) Of Power Utilities (Principal and Surcharge) Payable to Central Public Sector Undertakings (CPSU) Based upon the information received from CPSUs upto 31st March, 2020

All Figures in Rs Crores

S. No	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	
1		3		4		5		6		7		8		9		10		11		12		13		14		15	
	NORTHERN REGION																									
	HARYANA																									
1	UHBVN																									**0.00**
2	DHBVN																									**0.00**
3	HPPC			0.00	2.95																					**2.95**
4	HPGCL									3.19	0.00	0.00	0.00													
	TOTAL (Haryana)	**0.00**	**0.00**	**0.00**	**2.95**	**0.00**	**0.00**	**0.00**	**0.00**	**3.19**	**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**		**6.14**
	HIMACHAL																									
5	HPSEB			3.28	0.13					0.00	2.52							0.44	0.35							**6.72**
6	Govt.of HP															13.97	315.03									**329.00**
	TOTAL (Himachal)	**0.00**	**0.00**	**3.28**	**0.13**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.52**			**0.00**	**0.00**	**13.97**	**315.03**	**0.44**	**0.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		**335.72**
	DELHI																									
6	DESU																									**0.00**
7	DTL																14.19									**14.19**
8	DPCL																									**0.00**
8	TPDDL									0.17	0.00	0.00	0.00													**0.17**
9	BYPL /BSES YAMUNA			0.00	70.49	59.20				149.89	205.1	402.49	85.14							97.24	160.3					**1229.87**
10	BRPL/BSES RAJDHANI									0.00	106.1	0.00	0.00							58.97	62.61					**227.71**
	TOTAL (Delhi)	**0.00**	**0.00**	**0.00**	**70.49**	**59.20**	**0.00**	**0.00**	**0.00**	**150.06**	**311.2**	**402.49**	**85.14**	**0.00**	**0.00**	**0.00**	**14.19**	**0.00**	**0.00**	**156.21**	**222.9**	**0.00**	**0.00**	**0.00**		**1471.94**
	JAMMU & KASHMIR										.															
11	J&K PDD	3646.0		881.18	206.79	449.00	7.60			546.14	109.0					401.41	49.61	6.57	0.23	181.62	41.96					**6527.17**
12	J&K PDCL/JKPCL			360.68	19.17															72.06	1.60					**453.51**
13	J&K SPTCL									44.01	0.01															**44.02**

	TOTAL (J&K)	**3646.0**	**0.00**	**1241.8**	**225.9**	**449.0**	**7.60**	**0.00**	**0.00**	**590.15**	**109.0**	**0.00**	**0.00**	**0.00**	**0.00**	**401.4**	**49.61**	**6.57**	**0.23**	**253.68**	**43.56**	**0.00**	**0.00**	**0.00**	**0.00**	**7024.7**
	PUNJAB																									
14	PSEB					5.70				52.18	3.31	0.03	4.35													**65.57**
15	PSPCL			92.83	12.40												1.27			14.83	0.81					**122.14**
	TOTAL (Punjab)	**0.00**	**0.00**	**92.83**	**12.40**	**5.70**	**0.00**	**0.00**	**0.00**	**52.18**	**3.31**	**0.03**	**4.35**	**0.00**	**0.00**	**0.00**	**1.27**	**0.00**	**0.00**	**14.83**	**0.81**	**0.00**	**0.00**	**0.00**		**187.71**
	RAJASTHAN																									
16	RRVUNL /RSEB					98.40	14.40											38.01	11.17							**161.98**
17	RRVPNL																									**0.00**
17	JVVNL			7.72	0.40					8.19	2.58						0.21									**118.58**
18	AVVNL			16.16	2.21					85.68	6.27			97.18	2.30		1.19			6.43	0.08					**118.02**
19	JDVVNL			37.06	6.19					140.52	11.59					13.19	2.70			13.39	0.71					**225.35**
	TOTAL (Rajasthan)	**0.00**	**0.00**	**60.94**	**8.80**	**98.40**	**14.40**	**0.00**	**0.00**	**234.39**	**20.44**			**97.18**	**2.30**	**13.19**	**4.10**	**38.01**	**11.17**	**19.82**	**0.79**	**0.00**	**0.00**	**0.00**		**623.93**
	OTHERS																									
20	HWB (KOTA)									34.32	0.00															**34.32**
	UTTAR PRADESH																									
21	UPPCL	1853.0		650.7	95.38	392.2	0.00			536.35	268.8					108.0	162.3			1307.9	238.0					**5612.9**
23	UPRVUNL																									**0.00**
24	UPJVNL																									**0.00**
	TOTAL (Uttar Pradesh)	**1853.0**	**0.00**	**650.7**	**95.38**	**392.2**	**0.00**	**0.00**	**0.00**	**536.35**	**268.8**			**0.00**	**0.00**	**108.0**	**162.3**	**0.00**	**0.00**	**1307.9**	**238.0**	**0.00**	**0.00**	**0.00**		**5612.9**
	UTTARAKHAND																									
22	UPCL	104.0		11.09	0.61	2.80	0.00			10.40	2.68					8.13	7.38			1.11	0.15					**148.35**
	CHANDIGARH																									
23	CPDD			0.00	0.01													126.0	8.85							**134.95**
	OTHERS																									
24	M/s N.F.L. Nangal																	0.06								**0.06**
25	B.S.L. Project S/Nagar																									**0.00**
26	Beas Project talwara																									**0.00**
27	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)	**5603.0**	**0.00**	**2060.7**	**416.7**	**1007.3**	**22.0**	**0.00**	**0.00**	**1611.04**	**718.1**	**402.52**	**89.49**	**97.18**	**2.30**	**544.7**	**553.9**	**171.1**	**20.6**	**1753.6**	**506.2**	**0.00**	**0.00**	**0.00**		**15580.7**

	WESTERN REGION																									
	GUJARAT																									
28	GUVNL									4.59	0.50															**5.09**
	GOA																									**0.00**
29	GOA ED									0.00	0.00															**0.00**
	MADHYA PRADESH																									**0.00**
30	MPPCL / MPPTCL									0.00	0.00															**8.00**
31	MPPMCL			0.87	0.07	8.00						0.00	0.00				0.00					0.00				**0.94**
	TOTAL (Madhya Pradesh)	**0.00**	**0.00**	**0.87**	**0.07**	**8.00**	**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**	**0.00**	**0.00**	**0.00**	**0.00**		**8.94**
	CHHATTISGARH																									
32	CSEB/CSPDCL			0.00	0.20					0.00	0.04															**0.24**
	TOTAL(CHHATTIS-GARH)	**0.00**	**0.00**	**0.00**	**0.20**	**0.00**				**0.00**	**0.04**													**0.00**		**0.24**
	MAHARASHTRA																									
33	MSEDCL									0.38	0.15															**0.53**
	DADRA NAGAR & SILVASA																									**0.00**
34	Electricity Department					0.80				0.00	0.11															**0.91**
	DAMAN & DIU																									**0.00**
35	Electricity Department																									**0.00**
36	**BARC**																									**0.00**
37	**IGCAR**									0.00	0.00															**0.00**
	TOTAL (Western Region)	**0.00**	**0.00**	**0.87**	**0.27**	**8.80**	**0.00**	**0.00**	**0.00**	**4.97**	**0.80**	**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**		**15.71**
	SOUTHERN REGION																									
	ANDHRA PRADESH																									
38	APEPDCL/APNPCL /APTRANSCO	47.00				0.40				164.81	46.45			201.03	5.11									185.14	2.49	**652.43**
	TOTAL (Andhra Pradesh)	**47.00**				**0.40**				**164.81**	**46.45**			**201.03**	**5.11**									**185.14**	**2.49**	**652.43**
	KARNATAKA																									**0.00**
39	BESCOM	61.00								2.87	0.01	3.52	0.00	70.59	1.00									3.10	0.00	**153.49**
40	MESCOM									0.07	0.00	0.37	0.00	10.04	0.14									0.00	0.00	**10.62**
41	CESCOM	146.00				11.40	0.00			111.44	21.22	29.69	6.81	87.16	2.01									37.00	0.42	**441.75**
42	HESCOM	836.00								300.01	170.52	27.74	9.08	258.42	3.99									131.31	0.00	**1737.07**

43	GESCOM	439.00								97.08	30.52	14.86	1.15	128.23	1.89								44.82	0.00	**757.55**
44	ESCOMS																								**0.00**
	TOTAL (Karnataka)	**1482.0**			**0.00**	**11.40**	**0.00**			**511.47**	**222.27**	**76.18**	**17.04**	**554.44**	**9.03**								**216.23**	**0.42**	**3100.48**
	TELANGANA																								
45	TSNPDCL/TSSPDCL	1428.0				82.40				203.81	54.29			449.50	6.53								378.05	5.09	**2607.67**
	Kerala																								
46	KSEB	253.00								14.62	1.86			-15.12	0.62								0.05		**255.03**
	TAMILNADU																								**0.00**
47	TNEB/TANGEDCO	71.00		24.74	4.54					1524.4	464.15			4119.51	49.77								768.69	16.86	**7043.72**
	Puducherry																								**0.00**
48	PED	34.00				3.10				81.45	6.70			173.01	4.23								5.04		**307.53**
	Others																								**0.00**
49	BHAVINI									26.91	2.96														**29.87**
50	AUGF																								**0.00**
	TOTAL (Southern Region)	**3315.0**	**0.00**	**24.74**	**4.54**	**97.30**	**0.00**	**0.00**	**0.00**	**2527.5**	**798.68**	**76.18**	**17.04**	**5482.37**	**75.29**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1553.2**	**24.86**	**13996.7**
	EASTERN REGION																								**0.00**
51	**DVC**			0.00	0.07																				**0.07**
	BIHAR																								**0.00**
52	BIHAR(NBPDCL/SBPCL/BSEB			0.13	0.25	81.80						11.53													**93.71**
	SIKKIM																								**0.00**
53	Electricity Department			3.79	0.32	8.40																			**12.51**
	WEST BENGAL																								**0.00**
54	WBSEB			77.05	13.29	42.90						19.95	0.00												**153.19**
	JHARKHAND																								
55	JBVNL/JUVNL											3877.93	1179.0												**5056.93**
	ORISSA																								**0.00**
56	GRIDCO	208.00		0.00	0.00	0.00	19.80																		**227.80**
	OTHERS																								**0.00**
57	MEA (Power to Nepal)			34.49	0.00																				**34.49**
58	PTC (Regulated Power)																								**0.00**

	TOTAL (Others)																								0.00
	TOTAL (Eastern Region)	**208.00**	**0.00**	**115.46**	**13.93**	**133.10**	**19.80**	**0.00**	**0.00**	**0.00**	**0.00**	**3909.41**	**1179.0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**5578.70**
	NORTH EASTERN REGION																								**0.00**
	ARUNACHAL PRADESH																								
59	Department of Power			0.00	0.00			8.06	0.82																**8.88**
	ASSAM																								
60	APDCL			0.00	0.00			0.80	0.15																**0.95**
	MANIPUR																								**0.00**
61	Electricity Department	19.00		3.15	0.14	9.20		23.21	6.65																**61.35**
	MEGHALAYA																								**0.00**
62	MeEcl/MeSEB	436.00		10.53	**17.87**	**18.40**		**352.70**	**292.02**																**1127.58**
	MIZORAM																								**0.00**
63	Electricity Department			0.00	0.00																				**0.00**
	NAGALAND																								**0.00**
64	Department of Power			0.00	0.00																				**0.00**
	TRIPURA																								**0.00**
65	TSECL			**0.00**	**0.00**			**134.13**	**10.81**																**144.94**
	TOTAL (NE Region)	**455.00**	**0.00**	**13.68**	**18.01**	**27.60**	**0.00**	**518.90**	**310.45**	**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**		**1343.70**
	Andaman&Nicobar																								
66	Electricity Deptt	2.00												0.84	0.00										**2.84**
	GRAND-TOTAL	**9583.00**	**0.00**	**2215.46**	**453.47**	**1274.10**	**41.80**	**518.90**	**310.45**	**4143.5**	**1517.60**	**4388.11**	**1285.5**	**5580.39**	**77.59**	**544.70**	**553.94**	**171.17**	**20.60**	**1753.63**	**506.28**	**0.00**	**0.00**	**1553.20**	**24.80**	**36518.4**

Utilities

1. APCPDCL Andhra Pradesh Central Power Distribution Company Ltd.
2. APEPDCL Andhra Pradesh Eastern Power Distribution Co. Ltd.
3. APGCL Assam Power Generation Corporation Ltd.
4. APNPDCL Andhra Pradesh Northern Power Distribution Co. Ltd.

5.	APSPDCL	Andhra Pradesh Southern Power Distribution Co. Ltd.
6.	APTRANSCO	Andhra Pradesh Transmission Corporation Ltd.
7.	AVVNL	Ajmer Vidyut Vitran Nigam Ltd.
8.	BBMB	Bhakra Beas Management Board
9.	BESCOM	Bangalore Electricity Supply Company Ltd.
10.	BRPL	BSES Rajdhani Power Ltd.
11.	BYPL	BSES Yamuna Power Ltd.
12.	CESCOM	Chamundeshwari Electricity Supply Company Ltd.
13.	CPDD	Chandigarh Power Development Department.
14.	DHBVN	Dakshin Haryana Bijli Vitran Nigam
15.	DPCL	Delhi Power Company Ltd.
16.	DTL	Delhi Transco Ltd.
17.	DESU	Delhi Electric Supply Undertaking
18.	DVC	Damodar Valley Corporation
19.	ESCOMS	Electricity Supply Company (Karnataka)
20.	GESCOM	Gulbarga Electricity Supply Company Ltd.
21.	GOAED	Goa Electricity Department
22.	GUVNL	Gujarat Urja Vikas Nigam Limited
23.	HESCOM	Hubli Electricity Supply Company Ltd.
24.	HPGCL	Haryana Power Generation Corporation Ltd.
25.	HVPNL	Haryana Vidyut Prasaran Nigam Ltd.
26.	UHBVN	Uttar haryana Bijli Vitran Niagam
27.	HPSEB	Himachal Pradesh State Electricity Board
28.	HPPC	Heavy Water Board
29.	HPPC	Haryana Power Purchase Centre
30.	HWB	Heavy Water Board(Kota)
31.	J&K PDCL	Jammu & Kashmir Power Development Corporation Lt
32.	J&K PDD	Jammu & Kashmir Power Development Department
33.	JDVVNL	Jodhpur Vidyut Vitran Nigam Ltd.
34.	JVVNL	Jaipur Vidyut Vitran Nigam Ltd.
35.	MEA	Ministry of External Affairs
36.	MESCOM	Mangalore Electricity Supply Company
37.	MPPGCL	Madya Pradesh Power Generation Co. Ltd.
38.	MPPTCL	Madya Pradesh Power Transmission company Ltd.
39.	MPPMCL	Madya Pradesh Power Management company Ltd.
40.	SEDCL	Maharashtra State Electricity Distribution Co. Ltd.
41.	TPDDL	Tata Power Delhi Distribution Limited
42.	NEEPCO	North Eastern Electric Power Corporation Ltd.
43.	NHDC	Narmada Hydro Development Corporation
44.	NHPC	National Hydro Power Corporation
45.	NLC	Nyveli Lignite Corporation
46.	NPCIL	Nuclear Power Corporation of India Ltd.
47.	NTPC	National Thermal Power Corporation
48.	PED	Power Grid Corporation of India Ltd.
49.	PSPCL	Punjab State Power Corporation Ltd.
50.	RRVPNL	Rajasthan Rajya Vidyut Prasaran Nigam Ltd.
51.	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
52.	SJVNL	Satluj Jal Vidyut Nigam Ltd.
53.	THDC	Tehri Hydro Development Corporation
54.	TSECL	Tripura State Electricity Corp. Ltd.
55.	UHBV	Uttar Haryana Bijli Vitran Nigam
56.	UPCL	Uttarakhand Power Corporation Ltd.
57.	UPJVNL	Uttar Pradesh Jal Vidyut Nigam Ltd.
58.	UPPCL	Uttar Pradesh Power Corporation Ltd.
59.	UPRVUNL	Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd.
60.	PTC	Power Trading Corporation
61.	NTPL	NLC Tamilnadu Power Ltd.

CENTRAL ELECTRICITY AUTHORITY

FINANCIAL STUDIES & ASSISTANCE DIVISION

Annex-9B

(Item No. 2)

STATEMENT SHOWING ESTIMATED AVERAGE RATES OF ELECTRICITY (upto 01.04.2019) (Provisional)

(Rates in Paise/KW

S. No.	Name of	Tariff effe	Domestic			Commercial				Agriculture			Small Industry 12500KW(25000000 KWh/Month)	Medium Indu	Large Industi	Heavy Indu	Heavy Indus	Railway Traction
			1KW (100	4KW (400 K	10KW	(100	2KW	(30(	10KW	(1	30KW	(4	50KW	(7	2HP	(4	5HP	(1	10HP	(2000 KWh/ Month)					
1	Andhra Pr	01.04.2018	208.5	491.63	679.5	903.17		1032.9		1060.97		1066.58		71.88 *		71.88 *		71.88 *		727	727	786.47	786.5	738.05	531.58
2	Assam	10.04.2018	595	722.5	781	800		800		913.73		913.73		489.92		489.92		651.33		587.33 U	765.96	737.73	737.6	737.59	-
																				555.67 R					
3	Bihar	01.04.2018	694.3 U	824.15	902.06	863.9 U		910.54		918.31		919.87		579		579		579		878.62	906.89	785.57	-	774.97 at :	885.69 at 25KV
			686.35 R			736.7 R																			885.69 at 132KV
4	Chhattish	01.04.2018	408.24	534.06	742.82	759.73		924		961.33		968.8		510		510		510		586.45	674.23	807.84	807.8	759.84	661.11 at 132KV
5	Gujarat	01.04.2018	393.88 U	506 U	566.38 U	585.42		585.42		642.36		700		190		190		190		579.33	588.46	550.68	626	629.53	600 at 132KV
			325.19 R	434.03 R	494.5 R																				
6	Haryana	01.11.2018	370	546.25	720	645		715		776.67		776.67		10		10		10		645	756.67	620.91	620.9	602.41	650.87 at 11KV
7	Himachal	01.04.2018	463.5	496.33	532.25	594		559.44		670		670		429		415.8		411.4		527.2	577.56	525.56	525.6	513.33	818.89 at 66KV
8	Jammu &	01.10.2016	191.4	293.98	353.21	401.5		627.73		627.73		627.73		80.85		80.85		80.85		399.67	397.47	422.1	422.1	410.45	-
9	Jharkhand	01.05.2018	645 U	590.25 U	580.5 U	700 U		644 U		634.67 U		632.8 U		512		512		512		797.98	797.98	539.3	539.3	523.27	680.88 at 25 kV
			530 R	505.25 R	501.5 R	570 R		558 R		556 R		555.6 R													
10	Karnataka	01.04.2018	531.59 D	754.32 D	826.43 D	959.3 D		973.43 D		975.79 D		976.26 D		0		0		0		718.7 D	877.18 D	812.41 D	818.9 D	819.31 D	780.87
			490.25 F	701.59 F	764 F	899.23 F		913.37 F		915.72 F		916.19 F								668.03 F	781.47 F	790.94 F	795.3 F	795.54 F	
11	Kerala	01.04.2017	376.5	745	855	854		1063		1103		1103		222.98		222.98		222.98		671.67	705	636.1	636.1	636.1	618.89 at 110KV
12	Madhya P	11.05.2018	564.08 U	676.82 U	723.54 U	794.2 U		799.77 U		938.62 U		938.84 U		462.5		501.5		523.25		893.8 U	893.8 U	843.77	843.8	781.28	762.22 at 132/220
			536.83 R	674.59 R	721.3 R	771.4 R		776.81 R		927.13 R		927.34 R								817.5 R	791.34 R				
13	Maharash	01.09.2018	591.6	934.09	1186.22	1162.57		1256.15		1605.34		1605.34		340.5		340.5		340.5		696.9	993.19	898.51 B	898.5 B	923.65	894.44
																						931.3 C	931.3 C		
14	Meghalay	01.04.2018	425	537.5	590	769.33		801.33		806.67		807.73		343.3		343.3		343.3		678.33	678.33	713.89	713.8	673.74	-
15	Odisha	01.04.2018	374.4	496.6	566.8	637.87		718.29		731.7		734.38		153		153		153		598.5	615.6	669.21	669.2	644.81	665.88 at 25/33KV
16	Punjab	01.04.2018	583.08	747.21	822.87	824.9		849.31		878.39		878.39		583.08 W		583.08 W		583.08 W		698.34	814.44	793.26	809.6	809.58	984.36 at 132KV
17	Rajasthan	01.06.2018	737.5	729.38	751.25	953.33		992.33		1078.19		1081.21		486.5		486.5		486.5		768.09	832.02	841.93	-	818.62	832.78
18	Tamil Nad	11.08.2017	85	470	584	840.88		883.58		890.69		892.12		0		0		0		685.13	685.13	759.98	760	759.98	801.67
B : (	Telangana	01.04.2018	238.5	668.5	821	911		1011		1034.33		1039		257.5 #		253 #		251.5 #		721	731	800.11	799.8	747.12	631.65 at 33 kV
19	Uttar Prad	02.02.2019	619.5 U	673.31 U	738.68 U	967.5 U		1157.42 U		1186.08 U		1191.82 U		655.75 U		655.75 U		655.75 U		987.21 U	1014.08 U	913.22 U	913.2 U	872.39	1150 Below 132
			367.5 R	517.13 R	598.5 R	605.58 R		605.58 R		605.58 R		605.58 R		220.38 R		220.38 R		220.38 R		913.17 R	938.03 R	844.72 R	844.7 R		1114.7 132KV & a
20	Uttarakha	01.04.2018	335	436.25	516	596.67		596.67		687.55		687.55		199		199		199		541.67	592.55	639.47	639.5	639.47	655.88

Annex - 10A
(Item 10.2)

All India Sector wise/Organisation wise Target, Actual Generation & PLF (%) for the year 2019-20

Fuel, Sector/Organisation	Target (MU)	Actual (MU)	PLF (%)
THERMAL			
CENTRAL SECTOR			
APCPL	7500	3842.82	29.17
BRBCL	3600	4887.16	74.18
DVC	37476	36997.84	59.41
K.B.U.N.L	3025	2904.66	54.21
MUNPL	3000	1050.67	17.80
NEEPCO.	2828	3224.46	**
NLC	20030	20086.09	70.84
NPGCL	3000	2616.7	77.56
NSPCL	3600	2745.97	62.52
NTECL	8000	5674.72	43.07
NTPC Ltd.	267928	254142.34	67.30
NTPL	6200	4844.41	55.15
ONGC	4759	3884.98	**
RGPPL	4505	4263.72	**
TOTAL CENTRAL SECTOR	**375451**	**351166.54**	**64.21**
STATE SECTOR			
HPGCL	10600	7030.16	29.42
IPGCL	630	501.54	**
PPCL	5650	5513.57	**
PSPCL	6200	1967.61	12.73
RRVUNL	41890	31178.64	53.16
UPRVUNL	31550	27852.94	57.98
BECL	1000	596.27	13.58
CSPGCL	20650	18212.53	65.54
GMDCL	1540	740.25	33.71
GPPCL	600	539.94	**
GSECL	27228	18251.75	43.12
GSEGL	460	624.81	**
MAHAGENCO	53536	48239.21	51.44
MPPGCL	29875	22219.2	46.84
APEPDCL	798	656.16	**
APGENCO	20000	17470.83	58.33
APPDCL	9000	7127.55	50.71
KPCL	15900	12583.04	41.89
KSEB	0	12.04	#
P&ED, Pudu.	225	255.79	#
RPCL	4000	376.78	2.68
SCCL	9000	9226.98	87.54
TANGEDCO	27194	23334.18	56.83
TSGENCO	22140	20994.75	70.66

A&N ADM	150	96.19	#
DPL	2800	2233.33	39.60
OPGC	6000	6495.79	56.57
TVNL	2000	2420.62	65.61
WBPDC	22950	21123.53	50.73
APGCL	850	1104.61	**
TSECL	570	687.62	**
TOTAL STATE SECTOR	**374986**	**309668.21**	**50.24**
PVT. SEC. UTILITY			
CESC	6159	6137.4	62.11
AEML	3800	3347.43	76.22
TATA PCL	5672	5895.13	54.17
TOR. POW. (UNOSUGEN)	2600	2317.99	67.32
TOTAL PVT. UTILITY SECTOR	**18231**	**17697.95**	**62.49**
PVT. SEC. IPP			
ABAN POWR	550	795.28	**
ACB	2035	1931.2	67.65
ADHUNIK	3400	3029.42	63.87
APGPCL	765	1014.31	**
APL	59000	61079.7	75.25
BALCO	3000	3497.96	66.37
BEPL	1250	517.81	13.10
BLAPPL	0	243.25	33.57
CEPL	4000	3559.82	33.77
CGPL	26700	26495.39	75.41
DBPCL	7000	6439.02	61.09
DIPL	2200	3378.1	64.10
EPGL	0	4589.86	43.54
ESSARPMPL	4000	3281.04	31.13
GCEL	2000	5831.21	48.46
GIPCL	3450	3372.39	76.50
GIPL	350	628.85	**
GMR ENERG	11500	10004.27	69.03
GPGSL (GVK)	2600	1312.74	27.68
HEL	4400	4430.09	84.06
HMEL	0	10.02	0.38
HNPC	2500	2961.32	32.42
ITPCL	6000	7235.28	68.64
JHAPL	3000	2901.09	55.05
JhPL(HR)	7000	5888.87	50.79
JITPL	4000	5199.79	49.33
JPL	10600	9461.41	31.68
JPPVL	8900	8870.37	55.49
JSWEL	11670	10863.07	60.03
KONDAPALI	1914	776.25	**
KWPCL	0	483.99	9.18
LANCO	3800	3480.5	66.04
LAPPL	8600	7539.56	71.53
LPGCL	10500	7174.91	41.25

MBPMPL	7000	6267.72	59.46
MCCPL	2200	2062.18	78.26
MPL	7400	6488.2	70.35
NPL	8900	8757.21	71.21
PENNA	340	307.13	**
PPGCL (Jaypee)	9000	9120.88	52.44
RATTANINDIA	5500	3196.28	26.95
RKMPPL	3000	2822.97	22.32
RPSCL	7000	6039.7	57.30
RWPL (JSW)	7200	5875.54	61.93
SCPL	700	714.2	81.31
SEIL	18500	18706.66	80.67
SEL	500	585.71	5.56
SKS	2000	2683.49	50.92
SPGL	1178	566.9	**
SPL	31000	33340.92	95.85
SrEPL	700	1357.94	**
ST-CMSECP	1330	1437.55	65.46
SVPPL	0	313.1	56.58
TATA PCL	1700	1464.39	69.46
TOR. POW. (SUGEN)	6000	6003.35	**
TOR. POW. (UNOSUGEN)	0	2727.06	**
TRNE	3400	1926.84	36.56
TSPL	12000	8864.11	50.97
UPCL	6800	3277.94	31.10
VIP	3000	0	0.00
WPCL	10000	10508.16	51.12
Total PVT. SEC. IPP	**373032**	**363694.27**	**54.32**
PVT. SEC. IMP			
GIPCL	180	203	
ICCL	150	271.59	
NALCO	100	46.3	
Total PVT. SEC. IMP	**430**	**520.89**	
Total IPP & Import	**373462**	**364215.16**	**54.32**
Total PVT. Sector	**391693**	**381913.11**	**54.64**
THERMAL Total	**1142130**	**1042747.86**	**55.99**
NUCLEAR			
CENTRAL			
DAE	0	0	0.00
NPCIL	44720	46472.45	79.20
CENTRAL Total	**44720**	**46472.45**	**78.03**
NUCLEAR Total	**44720**	**46472.45**	**78.03**
HYDRO			
CENTRAL			
BBMB	9470	12167.23	
DVC	210	198.47	
NEEPCO.	4877	3051.71	
NHDC	2300	4165.6	
NHPC	24050	25779.75	

NTPC Ltd.	3000	3449.67	
SJVNL	8550	9571.53	
THDC	4160	4244.93	
CENTRAL Total	**56617**	**62628.89**	
STATE			
HPPCL	716	527.42	
HPSEBL	1760	1812.13	
JKSPDC	4815	5321.2	
PSPCL	3765	4452.2	
RRVUNL	610	606.18	
UJVNL	4196	4887.52	
UPJVNL	1100	1073.48	
CSPGCL	250	236.79	
GSECL	677	1237.67	
MAHAGENCO	3881	4157.94	
MPPGCL	2315	2333.42	
SSNNL	1300	4177.01	
APGENCO	3162	3908.14	
KPCL	11497	13789.13	
KSEB	6034	5454.04	
TANGEDCO	3890	4765.24	
TSGENCO	3041	4507.04	
JUUNL	110	36.12	
OHPC	5570	6059.2	
TUL	5213	6041.55	
WBSEDCL	1528	1511.75	
APGCL	390	384.3	
MeECL	985	1018.29	
STATE Total	**66805**	**78297.76**	
PVT SEC. UTL			
BHIRA HPS	445	351.5	
BHIRA PSS HPS	441	489.85	
BHIVPURI HPS	270	336.54	
KHOPOLI HPS	285	310.38	
TOTAL PVT SEC. UTL	**1441**	**1488.27**	
PVT SEC. IPP			
ALLAIN DUHANGAN	692	758.71	
BASPA HPS	1250	1353.33	
BHANDARDHARA HPS	36	17.09	
BUDHIL HPS	250	283.58	
CHANJU-I HPS	157	169.75	
CHUZACHEN HPS	500	472.06	
DIKCHU HPS	450	485.19	
JORETHANG LOOP	437	406.9	
KARCHAM WANGTOO	4131	4646.53	
MALANA HPS	337	369.34	
MALANA-II HPS	350	418.09	
SHRINAGAR HPS	1294	1540.01	

TASHIDING HPS	435	434.91	
VISHNU PRAYAG HPS	1750	1998.71	
TOTAL PVT SEC. IPP	**12069**	**13354.2**	
TOTAL PVT. SEC.	**13510**	**14842.47**	
HYDRO Total	**136932**	**155769.12**	

- **PLF is calculated for Coal & Lignite based power station only.**
- **** Gas Based Station**
- **# diesel Based Station**

Annex-10B
(Item - 10.4)

ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS LOCATED IN THE REGIONS OF MAIN LAND AND ISLANDS

As on 31.03.2020)
(UTILITIES)

Region	Owner-ship/ Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES * (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Northern Region	State	16659.00	250.00	2879.20	0.00	19788.20	0.00	5777.25	701.01	26266.46
	Private	22425.83	1080.00	558.00	0.00	24063.83	0.00	2817.00	15788.13	42668.96
	Central	14354.96	250.00	2344.06	0.00	16949.02	1620.00	11491.52	379.00	30439.54
	Sub Total	**53439.79**	**1580.00**	**5781.26**	**0.00**	**60801.05**	**1620.00**	**20085.77**	**16868.14**	**99374.96**
Western Region	State	21740.00	1040.00	2849.82	0.00	25629.82	0.00	5446.50	555.54	31631.86
	Private	32847.17	500.00	4676.00	0.00	38023.17	0.00	481.00	24652.05	63156.22
	Central	18347.95	0.00	3280.67	0.00	21628.62	1840.00	1695.00	666.30	25829.92
	Sub Total	**72935.12**	**1540.00**	**10806.49**	**0.00**	**85281.61**	**1840.00**	**7622.50**	**25873.89**	**120618.00**
Southern Region	State	19512.50	0.00	791.98	159.96	20464.44	0.00	11774.83	586.88	32826.15
	Private	12747.00	250.00	5340.24	273.70	18610.95	0.00	0.00	41277.52	59888.47
	Central	11835.02	3240.00	359.58	0.00	15434.60	3320.00	0.00	541.90	19296.50
	Sub Total	**44094.52**	**3490.00**	**6491.80**	**433.66**	**54509.99**	**3320.00**	**11774.83**	**42406.30**	**112011.12**
Eastern Region	State	7450.00	0.00	100.00	0.00	7550.00	0.00	3537.92	275.11	11363.03
	Private	6153.00	0.00	0.00	0.00	6153.00	0.00	96.00	1211.86	7460.86
	Central	13682.05	0.00	0.00	0.00	13682.05	0.00	1005.20	10.00	14697.25
	Sub Total	**27285.05**	**0.00**	**100.00**	**0.00**	**27385.05**	**0.00**	**4639.12**	**1496.97**	**33521.13**
North Eastern Region	State	0.00	0.00	497.71	36.00	533.71	0.00	422.00	233.25	1188.95
	Private	0.00	0.00	24.50	0.00	24.50	0.00	0.00	100.95	125.45
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1155.00	30.00	3208.62
	Sub Total	**770.02**	**0.00**	**1775.81**	**36.00**	**2581.83**	**0.00**	**1577.00**	**364.20**	**4523.02**
Islands	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.84	7.84
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Sub Total	**0.00**	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**18.19**	**58.24**
ALL INDIA	State	65361.50	1290.00	7118.71	236.01	74006.21	0.00	26958.50	2357.03	103321.74
	Private	74173.00	1830.00	10598.74	273.70	86875.45	0.00	3394.00	83038.35	173307.79
	Central	58990.00	3490.00	7237.91	0.00	69717.91	6780.00	15346.72	1632.30	93476.93
	Total	**198524.50**	**6610.00**	**24955.36**	**509.71**	**230599.57**	**6780.00**	**45699.22**	**87027.68**	**370106.46**

Figures at decimal may not tally due to rounding off

Abbrevation:

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 31.03.2020

(As per latest information available with MNRE)

***Break up of RES all India as on 31.03.2020 is given below (in MW) :**

Small Hydro Power	Wind Power	Bio-Power		Solar Power	Total Capacity
		BM Power/Cogen.	Waste to Energy		
4683.16	37693.75	9875.31	147.64	34627.82	87027.68

* Sector wise breakup of RES capacity as shown is provisional.

Allocation from central sector stations has been updated till 29.02.2020.

Share of Railway (675 MW) from NABI NAGAR TPP (750 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 31.03.2020)

State	Owner-ship/ Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Delhi	State	0.00	0.00	1800.40	0.00	1800.40	0.00	0.00	0.00	1800.40
	Private	878.22	0.00	108.00	0.00	986.22	0.00	0.00	217.16	1203.38
	Central	3528.13	0.00	207.01	0.00	3735.14	102.83	740.09	0.00	4578.07
	Sub-Total	**4406.35**	**0.00**	**2115.41**	**0.00**	**6521.76**	**102.83**	**740.09**	**217.16**	**7581.85**
Haryana	State	2510.00	0.00	150.00	0.00	2660.00	0.00	200.00	69.30	2929.30
	Private	4561.78	0.00	0.00	0.00	4561.78	0.00	539.00	457.00	5557.78
	Central	1588.79	0.00	535.61	0.00	2124.40	100.94	1573.02	5.00	3803.36
	Sub-Total	**8660.57**	**0.00**	**685.61**	**0.00**	**9346.18**	**100.94**	**2312.02**	**531.30**	**12290.44**
Himachal Pradesh	State	0.00	0.00	0.00	0.00	0.00	0.00	694.60	256.61	951.21
	Private	0.00	0.00	0.00	0.00	0.00	0.00	894.40	695.03	1589.43
	Central	151.69	0.00	62.01	0.00	213.70	28.95	1223.88	0.00	1466.53
	Sub-Total	**151.69**	**0.00**	**62.01**	**0.00**	**213.70**	**28.95**	**2812.88**	**951.64**	**4007.17**
Jammu & Kashmir and Ladakh	State	0.00	0.00	175.00	0.00	175.00	0.00	1230.00	130.48	1535.48
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.30	69.30
	Central	523.42	0.00	129.07	0.00	652.49	67.98	1091.88	0.00	1812.35
	Sub-Total	**523.42**	**0.00**	**304.07**	**0.00**	**827.49**	**67.98**	**2321.88**	**199.78**	**3417.13**

Punjab	State	1760.00	0.00	150.00	0.00	1910.00	0.00	1243.40	127.80	3281.20
	Private	5115.50	0.00	0.00	0.00	5115.50	0.00	288.00	1320.70	6724.20
	Central	1451.97	0.00	264.01	0.00	1715.98	196.81	2287.22	0.00	4200.02
	Sub-Total	**8327.47**	**0.00**	**414.01**	**0.00**	**8741.48**	**196.81**	**3818.62**	**1448.50**	**14205.42**
Rajasthan	State	6920.00	250.00	603.80	0.00	7773.80	0.00	433.00	23.85	8230.65
	Private	2957.00	1080.00	0.00	0.00	4037.00	0.00	104.00	9214.93	13355.93
	Central	985.57	250.00	221.10	0.00	1456.67	556.74	1416.19	344.00	3773.60
	Sub-Total	**10862.57**	**1580.00**	**824.90**	**0.00**	**13267.47**	**556.74**	**1953.19**	**9582.78**	**25360.18**
Uttar Pradesh	State	5469.00	0.00	0.00	0.00	5469.00	0.00	724.10	25.10	6218.20
	Private	8814.33	0.00	0.00	0.00	8814.33	0.00	842.40	3180.61	12837.34
	Central	4406.96	0.00	549.49	0.00	4956.45	289.48	1830.03	30.00	7105.96
	Sub-Total	**18690.29**	**0.00**	**549.49**	**0.00**	**19239.78**	**289.48**	**3396.53**	**3235.71**	**26161.50**
Uttara-khand	State	0.00	0.00	0.00	0.00	0.00	0.00	1252.15	67.87	1320.02
	Private	99.00	0.00	450.00	0.00	549.00	0.00	149.20	592.85	1291.05
	Central	362.17	0.00	69.66	0.00	431.83	31.24	475.54	0.00	938.61
	Sub-Total	**461.17**	**0.00**	**519.66**	**0.00**	**980.83**	**31.24**	**1876.89**	**660.72**	**3549.68**
Chandigarh	State	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	40.55	40.55
	Central	40.74	0.00	15.03	0.00	55.76	8.01	102.21	0.00	165.98
	Sub-Total	**40.74**	**0.00**	**15.03**	**0.00**	**55.76**	**8.01**	**102.21**	**40.55**	**206.53**
Central - Unallocated		1315.53	0.00	291.05	0.00	1606.58	237.03	751.45	0.00	2595.07
Total (Northern Region)	State	16659.00	250.00	2879.20	0.00	19788.20	0.00	5777.25	701.01	26266.46
	Private	22425.83	1080.00	558.00	0.00	24063.83	0.00	2817.00	15788.13	42668.96
	Central	14354.96	250.00	2344.06	0.00	16949.02	1620.00	11491.52	379.00	30439.54
	Grand Total	**53439.79**	**1580.00**	**5781.26**	**0.00**	**60801.05**	**1620.00**	**20085.77**	**16868.14**	**99374.96**

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 31.03.2020)

State	Ownership / Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Goa	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
	Private	0.00	0.00	48.00	0.00	48.00	0.00	0.00	5.12	53.12
	Central	481.33	0.00	19.67	0.00	501.00	26.00	1.00	0.00	528.00
	Sub-Total	**481.33**	**0.00**	**67.67**	**0.00**	**549.00**	**26.00**	**1.00**	**5.17**	**581.17**
Daman & Diu	State	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	19.86	19.86
	Central	153.55	0.00	43.34	0.00	196.89	7.00	0.00	0.00	203.89
	Sub-Total	**153.55**	**0.00**	**43.34**	**0.00**	**196.89**	**7.00**	**0.00**	**19.86**	**223.75**
Gujarat	State	4510.00	1040.00	2177.82	0.00	7727.82	0.00	772.00	72.35	8572.17
	Private	7144.67	500.00	3985.00	0.00	11629.67	0.00	0.00	10270.49	21900.16

	Central	3487.95	0.00	424.00	0.00	3911.95	559.00	24.00	243.30	4738.25
	Sub-Total	**15142.62**	**1540.00**	**6586.82**	**0.00**	**23269.44**	**559.00**	**796.00**	**10586.14**	**35210.58**
Madhya Pradesh	State	5400.00	0.00	0.00	0.00	5400.00	0.00	1703.66	83.96	7187.62
	Private	6079.00	0.00	75.00	0.00	6154.00	0.00	0.00	4611.05	10765.05
	Central	4502.38	0.00	257.00	0.00	4759.38	273.00	1536.00	300.00	6868.38
	Sub-Total	**15981.38**	**0.00**	**332.00**	**0.00**	**16313.38**	**273.00**	**3239.66**	**4995.01**	**24821.05**
Chhattis-garh	State	2080.00	0.00	0.00	0.00	2080.00	0.00	120.00	11.05	2211.05
	Private	7667.50	0.00	0.00	0.00	7667.50	0.00	0.00	540.80	8208.30
	Central	2261.55	0.00	0.00	0.00	2261.55	48.00	106.50	0.00	2416.05
	Sub-Total	**12009.05**	**0.00**	**0.00**	**0.00**	**12009.05**	**48.00**	**226.50**	**551.85**	**12835.40**
Mahara-shtra	State	9750.00	0.00	672.00	0.00	10422.00	0.00	2850.84	388.13	13660.97
	Private	11756.00	0.00	568.00	0.00	12324.00	0.00	481.00	9199.27	22004.27
	Central	4717.82	0.00	2272.73	0.00	6990.55	690.00	27.50	123.00	7831.05
	Sub-Total	**26223.82**	**0.00**	**3512.73**	**0.00**	**29736.55**	**690.00**	**3359.34**	**9710.40**	**43496.29**
Dadra & Nagar Naveli	State	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	205.46
	Central	212.36	0.00	66.34	0.00	278.70	9.00	0.00	0.00	287.70
	Sub-Total	**412.36**	**0.00**	**66.34**	**0.00**	**478.70**	**9.00**	**0.00**	**5.46**	**493.16**
Central - Unallocated		2531.00	0.00	197.59	0.00	2728.59	228.00	0.00	0.00	2956.59
Total (Western Region)	State	21740.00	1040.00	2849.82	0.00	25629.82	0.00	5446.50	555.54	31631.86
	Private	32847.17	500.00	4676.00	0.00	38023.17	0.00	481.00	24652.05	63156.22
	Central	18347.95	0.00	3280.67	0.00	21628.62	1840.00	1695.00	666.30	25829.92
	Grand Total	**72935.12**	**1540.00**	**10806.49**	**0.00**	**85281.61**	**1840.00**	**7622.50**	**25873.89**	**120618.00**

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 31.03.2020)

State	Ownership / Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Andhra Pradesh	State	5010.00	0.00	235.40	0.00	5245.40	0.00	1673.60	56.18	6975.18
	Private	3873.88	0.00	3831.32	36.80	7742.00	0.00	0.00	8058.74	15800.75
	Central	1546.83	153.98	0.00	0.00	1700.81	127.27	0.00	250.00	2078.08
	Sub-Total	**10430.71**	**153.98**	**4066.72**	**36.80**	**14688.21**	**127.27**	**1673.60**	**8364.92**	**24854.00**
Telangana	State	5162.50	0.00	0.00	0.00	5162.50	0.00	2479.93	41.22	7683.65
	Private	1389.45	0.00	831.82	0.00	2221.27	0.00	0.00	3973.60	6194.87

	Central	1806.85	179.92	0.00	0.00	1986.77	148.73	0.00	10.00	2145.50
	Sub-Total	**8358.80**	**179.92**	**831.82**	**0.00**	**9370.54**	**148.73**	**2479.93**	**4024.82**	**16024.02**
Karnataka	State	5020.00	0.00	0.00	0.00	5020.00	0.00	3586.60	193.89	8800.49
	Private	1948.50	0.00	0.00	25.20	1973.70	0.00	0.00	15038.18	17011.88
	Central	2877.80	436.65	0.00	0.00	3314.45	698.00	0.00	0.00	4012.45
	Sub-Total	**9846.30**	**436.65**	**0.00**	**25.20**	**10308.15**	**698.00**	**3586.60**	**15232.06**	**29824.81**
Kerala	State	0.00	0.00	0.00	159.96	159.96	0.00	1856.50	172.90	2189.36
	Private	1047.50	0.00	174.00	0.00	1221.50	0.00	0.00	204.57	1426.07
	Central	1011.42	298.00	359.58	0.00	1669.00	362.00	0.00	50.00	2081.00
	Sub-Total	**2058.92**	**298.00**	**533.58**	**159.96**	**3050.46**	**362.00**	**1856.50**	**427.47**	**5696.43**
Tamil Nadu	State	4320.00	0.00	524.08	0.00	4844.08	0.00	2178.20	122.70	7144.98
	Private	4487.67	250.00	503.10	211.70	5452.47	0.00	0.00	13996.92	19449.39
	Central	3025.32	1540.75	0.00	0.00	4566.07	1448.00	0.00	231.90	6245.97
	Sub-Total	**11832.99**	**1790.75**	**1027.18**	**211.70**	**14862.62**	**1448.00**	**2178.20**	**14351.52**	**32840.34**
NLC	State	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
	Central	0.00	133.00	0.00	0.00	133.00	0.00	0.00	0.00	133.00
	Sub-Total	**0.00**	**133.00**	**0.00**	**0.00**	**133.00**	**0.00**	**0.00**	**0.00**	**133.00**
Puducherry	State	0.00	0.00	32.50	0.00	32.50	0.00	0.00	0.00	32.50
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.51	5.51
	Central	140.80	109.70	0.00	0.00	250.50	86.00	0.00	0.00	336.50
	Sub-Total	**140.80**	**109.70**	**32.50**	**0.00**	**283.00**	**86.00**	**0.00**	**5.51**	**374.51**
Central - Unallocated		1426.00	388.00	0.00	0.00	1814.00	450.00	0.00	0.00	2264.00
Total (Southern Region)	State	19512.50	0.00	791.98	159.96	20464.44	0.00	11774.83	586.88	32826.15
	Private	12747.00	250.00	5340.24	273.70	18610.95	0.00	0.00	41277.52	59888.47
	Central	11835.02	3240.00	359.58	0.00	15434.60	3320.00	0.00	541.90	19296.50
	Grand Total	**44094.52**	**3490.00**	**6491.80**	**433.66**	**54509.99**	**3320.00**	**11774.83**	**42406.30**	**112011.12**

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 31.03.2020)

State	Ownership / Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Bihar	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.70	70.70
	Private	700.00	0.00	0.00	0.00	700.00	0.00	0.00	272.77	972.77

	Central	4638.39	0.00	0.00	0.00	4638.39	0.00	110.00	0.00	4748.39
	Sub-Total	**5338.39**	**0.00**	**0.00**	**0.00**	**5338.39**	**0.00**	**110.00**	**343.47**	**5791.86**
Jharkhand	State	420.00	0.00	0.00	0.00	420.00	0.00	130.00	4.05	554.05
	Private	580.00	0.00	0.00	0.00	580.00	0.00	0.00	42.70	622.70
	Central	1276.46	0.00	0.00	0.00	1276.46	0.00	61.00	0.00	1337.46
	Sub-Total	**2276.46**	**0.00**	**0.00**	**0.00**	**2276.46**	**0.00**	**191.00**	**46.75**	**2514.21**
West Bengal	State	5290.00	0.00	100.00	0.00	5390.00	0.00	986.00	121.95	6497.95
	Private	2437.00	0.00	0.00	0.00	2437.00	0.00	0.00	410.93	2847.93
	Central	1270.62	0.00	0.00	0.00	1270.62	0.00	410.00	0.00	1680.62
	Sub-Total	**8997.62**	**0.00**	**100.00**	**0.00**	**9097.62**	**0.00**	**1396.00**	**532.88**	**11026.50**
DVC	State	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	150.00
	Central	3305.02	0.00	0.00	0.00	3305.02	0.00	186.20	0.00	3491.21
	Sub-Total	**3455.02**	**0.00**	**0.00**	**0.00**	**3455.02**	**0.00**	**186.20**	**0.00**	**3641.21**
Odisha	State	1740.00	0.00	0.00	0.00	1740.00	0.00	2061.92	26.30	3828.22
	Private	2286.00	0.00	0.00	0.00	2286.00	0.00	0.00	485.39	2771.39
	Central	1867.98	0.00	0.00	0.00	1867.98	0.00	89.00	10.00	1966.98
	Sub-Total	**5893.98**	**0.00**	**0.00**	**0.00**	**5893.98**	**0.00**	**2150.92**	**521.69**	**8566.59**
Sikkim	State	0.00	0.00	0.00	0.00	0.00	0.00	360.00	52.11	412.11
	Private	0.00	0.00	0.00	0.00	0.00	0.00	96.00	0.07	96.07
	Central	102.25	0.00	0.00	0.00	102.25	0.00	64.00	0.00	166.25
	Sub-Total	**102.25**	**0.00**	**0.00**	**0.00**	**102.25**	**0.00**	**520.00**	**52.18**	**674.43**
Central - Unallocated		1221.33	0.00	0.00	0.00	1221.33	0.00	85.01	0.00	1306.34
Total (Eastern Region)	State	7450.00	0.00	100.00	0.00	7550.00	0.00	3537.92	275.11	11363.03
	Private	6153.00	0.00	0.00	0.00	6153.00	0.00	96.00	1211.86	7460.86
	Central	13682.05	0.00	0.00	0.00	13682.05	0.00	1005.20	10.00	14697.25
	Grand Total	**27285.05**	**0.00**	**100.00**	**0.00**	**27385.05**	**0.00**	**4639.12**	**1496.97**	**33521.13**

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 31.03.2020)

State	Ownership / Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Assam	State	0.00	0.00	328.21	0.00	328.21	0.00	100.00	5.01	433.22
	Private	0.00	0.00	24.50	0.00	24.50	0.00	0.00	45.33	69.83
	Central	403.50	0.00	435.56	0.00	839.06	0.00	389.58	25.00	1253.64

	Sub-Total	**403.50**	**0.00**	**788.27**	**0.00**	**1191.77**	**0.00**	**489.58**	**75.34**	**1756.69**
Arunachal Pradesh	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	107.11	107.11
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.61	29.61
	Central	37.05	0.00	46.82	0.00	83.87	0.00	158.05	0.00	241.92
	Sub-Total	**37.05**	**0.00**	**46.82**	**0.00**	**83.87**	**0.00**	**158.05**	**136.72**	**378.64**
Meghalaya	State	0.00	0.00	0.00	0.00	0.00	0.00	322.00	32.53	354.53
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.92	13.92
	Central	50.62	0.00	109.69	0.00	160.31	0.00	79.77	0.00	240.08
	Sub-Total	**50.62**	**0.00**	**109.69**	**0.00**	**160.31**	**0.00**	**401.77**	**46.45**	**608.53**
Tripura	State	0.00	0.00	169.50	0.00	169.50	0.00	0.00	16.01	185.51
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.41	4.41
	Central	56.10	0.00	436.95	0.00	493.05	0.00	75.99	5.00	574.04
	Sub-Total	**56.10**	**0.00**	**606.45**	**0.00**	**662.55**	**0.00**	**75.99**	**25.42**	**763.96**
Manipur	State	0.00	0.00	0.00	36.00	36.00	0.00	0.00	5.45	41.45
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.16	5.16
	Central	47.10	0.00	71.57	0.00	118.67	0.00	102.34	0.00	221.01
	Sub-Total	**47.10**	**0.00**	**71.57**	**36.00**	**154.67**	**0.00**	**102.34**	**10.61**	**267.62**
Nagaland	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.67	30.67
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00
	Central	32.10	0.00	48.93	0.00	81.03	0.00	61.83	0.00	142.86
	Sub-Total	**32.10**	**0.00**	**48.93**	**0.00**	**81.03**	**0.00**	**61.83**	**31.67**	**174.53**
Mizoram	State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.47	36.47
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52	1.52
	Central	31.05	0.00	40.46	0.00	71.51	0.00	102.44	0.00	173.95
	Sub-Total	**31.05**	**0.00**	**40.46**	**0.00**	**71.51**	**0.00**	**102.44**	**37.99**	**211.94**
Central - Unallocated		112.50	0.00	63.62	0.00	176.12	0.00	185.00	0.00	361.12
Total (North-Eastern Region)	State	0.00	0.00	497.71	36.00	533.71	0.00	422.00	233.25	1188.95
	Private	0.00	0.00	24.50	0.00	24.50	0.00	0.00	100.95	125.45
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1155.00	30.00	3208.62
	Grand Total	**770.02**	**0.00**	**1775.81**	**36.00**	**2581.83**	**0.00**	**1577.00**	**364.20**	**4523.02**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTs LOCATED IN ISLANDS

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.03.2020)

State	Ownership / Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Andaman & Nicobar	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.09	7.09
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Sub-Total	**0.00**	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**17.44**	**57.49**
Laksha-dweep	State	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	0.75	0.75
	Central	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**	**0.75**	**0.75**
Total (Islands)	State	0.00	0.00	0.00	40.05	40.05	0.00	0.00	5.25	45.30
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.84	7.84
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Grand Total	**0.00**	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**18.19**	**58.24**

Annex – 11A
(Item No. 11.6.4)

1st meeting of North Eastern Regional Power Committee (Transmission Planning) [NERPC(TP)]

1. Installation of 420 kV, 80 MVAr bus reactor at Ranganadi HEP.
2. Interconnection of 132 kV substations in upper Assam (below Brahmaputra) with neighbouring substations in Arunachal Pradesh
3. Scheme for relieving congestion in Agia substation of Assam
4. Reconductoring of Dimapur-Imphal and Leimatak (Loktak)-Jiribam 132kV lines
5. Re-conductoring of the 132 kV line from Khliehriat to Panchgram by HTLS conductor
6. Re-conductoring and strengthening of the 132 kV D/C line from Umiam Stage-I to Umiam Stage-III by HTLS conductor
7. Modifications in enhancement of Intra-state Transmission system of Assam
8. New Proposals of Assam considering load forecast for the year 2030
9. Establishment of 7x167 MVA, 400/220 kV GIS substation at New Kohima in place of conventional substation under NERSS-VI
10. Modifications in NERSS-V scheme and Surajmaninagar- Comilla (North) 400 kV link
11. Utilisation of spare 132kV ISTS bays at Silchar (POWERGRID), P.K.Bari (TSECL), Palatana (OTPC), and Surajmaninagar (TSECL)
12. Reconductoring of Siliguri-Bongaigaon 400kV D/c Twin Moose line with Twin HTLS conductor, reconductoring of Alipurduar – Salakati (Bongaigaon) 220kV D/c line with Single HTLS, and establishment of Bornagar S/s
13. Conversion of 2 nos. 63 MVAR Line Reactors at BishwanathChariali end of BiswanathChariali – Lower Subansiri 400kV (2nd) D/c line to Bus Reactors
14. Conversion of 132kV Khliehriat and 132/33kV Nirjuli substations from single main transfer scheme to double main transfer scheme on completion of 25 years age
15. Charging of 400 kV Silchar (PG) - Melriat (PG) I (Future) Main Bay for completing GIS Dia of 420 kV, 125 MVAR Bus Reactor at 400/132 kV Silchar Substation

Annex- 12A
(Item No. 12.6)

Details of Foreign Tours performed during 2019-20:

S. No	Purpose of the Visit	Name & Designation of the Officer	Country	Duration of Visit
1.	Workshop on "Role on Coal Power Generation and its Sustainable Development	1. Shri Rajeev Kumar Director	Indonesia	11 April, 2019
2.	Visit to Bhutan for the purpose of attending various meetings with the officials of Royal Government of Bhutan including finalizing the tariff protocol of Mangdechhu HEP and for the site visit, physical monitoring of Mangdechhu HEP	1. Shri Ajay Talegoankar Chief Engineer	Bhutan	23 April 2019 to 26 April 2019
3.	Punatsanchu-I HEP (6x200 MW), Bhutan – Inspection of 06 nos. RIP Condenser Bushings (Oil to SF6 Bushing) at the works of M/s HSP Hochspannungsgeraete GmbH	1. Shri Asif Iqbal Assistant Director-I	USA	07 May, 2019 to 09 May, 2019
4.	Fourth meeting of SAARC Energy Council of Experts of Energy Regulator (Electricityin Maldives	1. Shri B S Bairwa Director	Maldives	10 June, 2019 to 11 June, 2019
5.	Nomination of CEA Officers for Renewable Energy Courses at Denmark Technical University (DTU), Denmark as a part of Strategic Sector Co-operation (SSC) of India with Danish Energy Agency	1. Shri Pardeep Jindal Chief Engineer 2. Shri Ravinder Gupta Chief Engineer	Denmark	17 June 2019 to 28 June, 2019 26 August, 2019 to 06 September, 2019
6.	1st Batch of the Study Programme on Power Trading at Nord Pool Academy, Norway for Power System engineers of Eastern Region funded through PSDF	1. Shri JoydebBandyopadhyay Member Secretary 2. Shri Hemant Jain Chief Engineer 3. Shri Shri Dinesh Kumar Bauri Executive Engineer 4. Shri Ganeswara Rao Jada Executive Engineer 5. Shri Ghanshyam Prasad Chief Engineer	Norway	17 June, 2019 to 21 June, 2019

7.	Renewable Energy Courses at Denmark Technical University (DTU), Denmark as a part of Strategic Sector Co-operation (SSC) of India with Danish Energy Agency	1. Shri ApoorvaAnand Deputy Director	Denmark	17 June 2019 to 12 July, 2019
8.	SAARC Energy Centre (SEC) Dissemination Workshop on "Development of Roadmap for Implementation of Smart Grid: Concept, Practices and Technologies in SAARC"	1. Smt Manjari Chaturvedi Director	Bhutan	23 July, 2019 to 24 July, 2019
9.	Punatsangchhu-I HE Project (6x200 MW), Bhutan – Deputation of CEA officers to attend the discussion on techno-commercial bid of Contract Package MEM#7B	1. Shri Sandeep Malik, Director 2. Shri Deepak Sharma Deputy Director 3. MsSonam Srivastava Assistant Director-II	Bhutan	6 August, 2019 to 8 August, 2019
10.	2nd Batch of the Study Programme on Power Trading at Nord Pool Academy, Norway for Power System engineers of Eastern Region funded through PSDF	1. Shri ShyamKejriwal Superintending Engineer, ERPC 2. Shri Premananda Sarkar Executive Engineer, ERPC	Norway	19 August 2019 to 23 August, 2019
11.	Visit of Indian Delegation to Dhaka, Bangladesh for 17th meetings of Indo-Bangladesh JSC/JWG on co-operation in power sector	1. Shri P. S. Mhaske Chairperson 2. Shri Goutam Roy Chief Engineer 3. ShriDhiraj Srivastava Director	Bangladesh	25 August, 2019 to 26 August, 2019
12.	Punatsangchhu-II HE Project (6x170 MW), Bhutan – Deputation of CEA officers to attend the pre bid meeting of Contract Package EM#8A "Illumination for Dam, Surge, BVC & Power House Complex" of the project	1. Shri Pankaj Kumar Gupta Director 2. Shri Reetesh Tiwari Assistant Director-I	Bhutan	4 September, 2019 to 6 September, 2019
13.	Technical Assistance (TA) Programme for the development of Solar Parks and Ultra Mega Solar Power projects (UMSPP)	1. Shri Sumit Kumar Sinha, Assistant Director - I	European Union	22 September, 2019 to 28 September, 2019

14.	Punatsangchhu-II HE Project (6x170 MW), Bhutan Contract Package #EM-6 – Computerized Control System and Protection System along with Associated Equipment –to witness the routine tests of HIPASE-P Product	1. Shri Shri Reetesh Tiwari Assistant Director-I	Austria	7 October, 2019 to 13 October, 2019
15.	Third Learning Program on Smart Grid Technologies and Implications for inclusive development	1. Vivek Goel Chief Engineer	Australia	14October, 2019 to 17October, 2019
16.	Joint Inspection for carrying out detailed assessment of the losses and damages caused due to flash floods at PHPA-II	1. Shri Asif Iqbal, Assistant Director-I	Bhutan	14October, 2019 to 25 October, 2019
17.	Clean Coal Technology (CCT) Training Program for the Project on Efficiency and Environmental Improvement of Coal fired Power Stations under CEA-JCOAL MoU	1. Shri Annepu Suresh Director 2. Shri Bitan Sekhar Ray Assistant Director-I 3. Shri Rohit Yadav Assistant Director-I 4. Shri Manoj Kumar Assistant Director-I	Japan	15October, 2019 to 22October, 2019
18.	Site visit of CEA Officers to Mangdechhu HE Project in Bhutan	1. Shri Shravan Kumar Director 2. Shri PrateekJaitwal Assistant Director-I	Bhutan	21 October, 2019 to 23 October, 2019
19.	Third round of discussions with Royal Government of Bhutan (RGoB) for Sankosh Hydro Electric Project (HEP)	1. Shri Praveen Kumar Sahukari Assistant Director-I	Bhutan	21 October, 2019
20.	Joint Inspection for carrying out detailed assessment of the losses and damages caused due to flash floods at PHPA-II	1. Shri ManojTripati Director	Bhutan	23 October, 2019 to 25 October, 2019
21.	Finalisation of the completion cost of ATS of Mangdechhu HEP and other works executed by BPC	1. Shri B S Bairwa Director 2. Shri S K Dotan Deputy Director	Bhutan	29 October, 2019 to 31 October, 2019
22.	Knowledge Co-Creation Program for Young Leaders (For FY 2019) on “Renewable Energy” being organised by JICA	1. Shri Deepak Choudhary Assistant Director-I	Japan	17 November, 2019 to 3 December, 2019
23.	Visit of a team to USA and Europe to study on the subject “Road map for power sector in India by 2030”	1. Shri Ghanshyam Prasad Chief Engineer 2. Shri Ajay Talegaonkar Chief Engineer	USA	21November, 2019 to 25November, 2019

24.	7th Meeting of Monitoring Committee for timely implementation of Maitree Super Thermal power Project of 1320 (2x660 MW) at Rampal, Bagarhat in Bangladesh	1. Shri PurushotamDassSiwal Member (Thermal)	Bangladesh	27 November, 2019 to 29 November, 2019
25.	Project site meeting of contract package# EM-4 (400kV XLPE Power Cable & Accessories) to discuss pending issues related to XLPE Cable Termination Towers etc. at Pothead Yard Punatsangchhu-II H.E. Project (6x170 MW)	1. Shri Saumen Biswas, Chief Engineer 2. V. Sita Rama Raju, Deputy Director 3. Raj Kumar Jayaswal, Deputy Director	Bhutan	8 January, 2020 to 10 January, 2020
26.	Visit of team to Europe to study power markets in UK and Europe to understand the positive impact of the transparent energy markets can have on attracting additional investment and meeting energy needs	1. Pardeep Jindal, Chief Engineer 2. Ajay Talegaonkar, Chief Engineer 3. Ghanshyam Prasad, Chief Engineer	UK and Europe	13 January, 2020 to 17 January, 2020
27.	World Bank invitation to attend an International Regional Inter-connector Project Workshop organized by the World Bank	1. Pardeep Jindal, Chief Engineer 2. Ishan Sharan, Director	Srilanka	06 February, 2020
28.	Study Tour with regard to Coal Mining, Coal Exploration Technology Production, Optimisation through new technologies	1. NityaSaronMondal, Chief Engineer	Australia	17 February, 2020 to 21 February, 2020
29.	Participation in the BRICS Senior Officials meeting to be held at Moscow, Russia	1. Vijay Menghani, Chief Engineer	Russia	20 February, 2020 to 21 February, 2020

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