



**CENTRAL ELECTRICITY AUTHORITY**  
Sewa Bhawan, R.K. Puram,  
New Delhi - 110 066

**CEA ANNUAL REPORT - 2018-19**



**CEA  
ANNUAL REPORT  
2018-19**



**CENTRAL ELECTRICITY AUTHORITY  
MINISTRY OF POWER  
GOVERNMENT OF INDIA**





# **CEA**

# **ANNUAL REPORT**

# **2018 - 19**

**CENTRAL ELECTRICITY AUTHORITY**  
**MINISTRY OF POWER**  
**GOVERNMENT OF INDIA**

## THE AUTHORITY

(As on 31.03.2019)



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



**Dr. Somit Dasgupta**  
Member (E&C)



**Sh. P.D. Siwal**  
Member (Thermal)



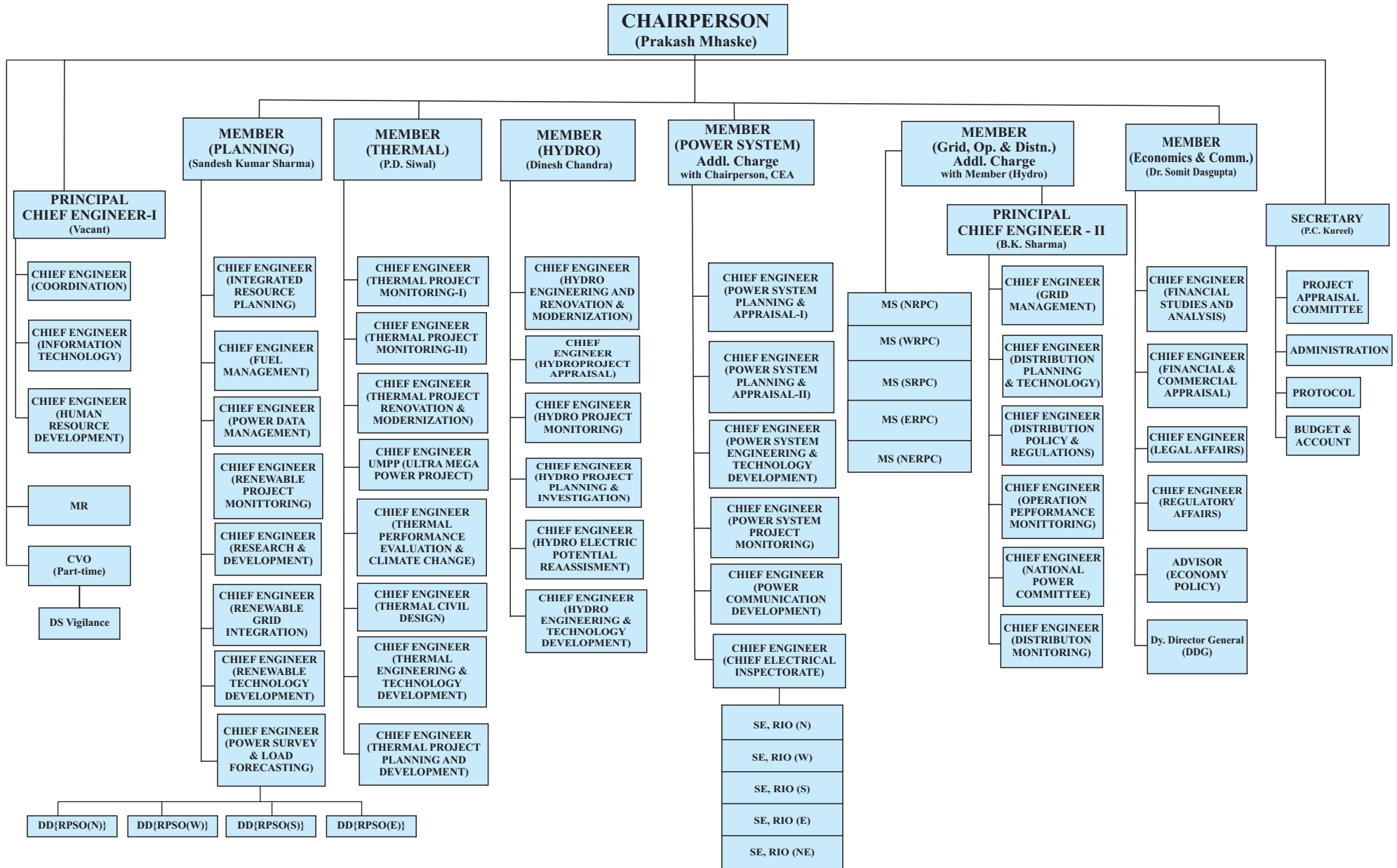
**Sh. Sandesh Kumar Sharma**  
Member (Planning)



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

# ORGANIZATION CHART OF CEA

(As on 31.03.2019)



**CENTRAL ELECTRICITY AUTHORITY**  
**Sewa Bhawan, R.K. Puram New Delhi – 110066**  
**CEA Website: [www.cea.nic.in](http://www.cea.nic.in)**

**Sub ordinate Offices:**

**REGIONAL POWER COMMITTEES (RPCs)**

1. **Member Secretary, [Eastern Regional Power Committee](#)**, 14, Golf Club Road Tollygunje, Kolkata 700033
2. **Member Secretary, [Northern Regional Power Committee](#)** 18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016
3. **Member Secretary, [North Eastern Regional Power Committee](#)**, NERPC Complex, Dong Parmaw, Lapalang, Shillong-793006
4. **Member Secretary, [Southern Regional Power Committee](#)** No. 29, Race Course Cross Road, Bengaluru-560009
5. **Member Secretary, [Western Regional Power Committee](#)** F-3, MIDC Area, Marol, Opposite SEEPZ, Central Road, Andheri (East), Mumbai-400093

**REGIONAL POWER SURVEY OFFICES (RPSOs)**

1. **Dy. Director, Regional Power Survey Office (East)**, 201, C.G.O. Complex, DF-Block, Salt Lake City, Kolkata-700064
2. **Dy. Director, Regional Power Survey Office (North)**, Room No. 224, 2<sup>nd</sup> Floor, Sewa Bhawan, R.K. Puram, New Delhi-110066
3. **Dy. Director, Regional Power Survey Office (South)**, Letter Box No. 38, 6<sup>th</sup> Floor, 'F' Wing, Kendriya Sadan, Koramangala, Bengaluru-560034
4. **Dy. Director, Regional Power Survey Office (West)**, F-3, 5<sup>th</sup> Floor, MIDC Area, Marol, Opposite SEEPZ, Central Road, Andheri (East), Mumbai-400093

**REGIONAL INSPECTORATE OFFICES (RIOs)**

1. **Superintending Engineer, Regional Inspectorate Office (East)** ERPC Building, 14 Golf Club Road, Tollygunje, Kolkata-700033
2. **Superintending Engineer, Regional Inspectorate Office (North)** 18-A, Qutab Institutional Area, Shaheed Jeet Singh Marg, Katwaria Sarai, New Delhi-110016
3. **Superintending Engineer, Regional Inspectorate Office (North East)** NERPC Complex, 3<sup>rd</sup> Floor, Dong Parmaw, Lapalang, Shillong-793006
4. **Superintending Engineer, Regional Inspectorate Office (South)** Shastri Bhawan, Chennai-600006.
5. **Superintending Engineer, Regional Inspectorate Office (West)**, F-3, MIDC Area, Marol, Opposite SEEPZ, Central Road, Andheri (East), Mumbai-400093

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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 2018-19 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 2018-19. 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 2018-19.

As per mandate of Electricity Act, 2003, CEA has notified the National Electricity Plan (Vol-I Generation) and (Vol-II Transmission), which covers review of the capacity addition in generation and transmission in 12<sup>th</sup> Plan (2012-2017) and perspective planning for the 2017-22 & 2022-27 periods. During the year 2018-19, various Hydro Electric Schemes aggregating to installed capacity of 2746 MW have been accorded concurrence/ appraisal by CEA. CEA rendered Consultancy Services for hydro projects in Bhutan and Nepal. In order to help the DISCOMs to evolve integrated approach for strengthening of Distribution sector in the country, the Distribution Perspective Plan 2022 (DPP-2022) for distribution sector was prepared by CEA. CEA has also carried out various activities of planning, monitoring, technical advice etc., which are described in detail in this report.

In the end, I take this opportunity to express my deep appreciation for the committed efforts put in by one and all in the power sector especially the officers and staff of CEA in accomplishment of the above tasks. 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 Organization (RIO)

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

#### B) Regional Power Survey Offices (RPSO)

Four (4) Regional Power Survey Offices (RPSO), 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**

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 Agreements, 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 31.03.2019 was 743 as against the sanctioned strength of 1458 leaving 715 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
<b>Chairperson/Members</b>	07	-	07	06	-	06
<b>CPES GROUP-A</b>	348	84	432	250	73	323
<b>CPES GROUP-B</b>	90	19	109	30	03	33
<b>Non CPES Group</b>						
<b>Group-A</b>	94	-	94	41	-	41
<b>Group-B</b>	351	10	361	101	06	107
<b>Group-C</b>	135	103	238	57	51	108
<b>Group-C(MTS)</b>	145	72	217	81	44	125
<b>Total</b>	<b>1170</b>	<b>288</b>	<b>1458</b>	<b>566</b>	<b>177</b>	<b>743</b>

### **1.4.2 No. of Women Employees in CEA (as on 31.03.2019)**

Category	No. of Govt. Employees		No. of Women employees In position	% age
	Sanctioned	Filled		
<b>Chairperson/ Members</b>	07	06	-	-
<b>CPES GROUP-A</b>	432	323	37	11.45%
<b>CPES GROUP-B</b>	109	33	05	15.15%
<b>Non CPES Group</b>				
<b>Group-A</b>	94	41	15	36.58%
<b>Group-B</b>	361	107	35	32.71%
<b>Group-C</b>	238	108	17	15.74%
<b>Group-C(MTS)</b>	217	125	10	8.00%
<b>Total</b>	<b>1458</b>	<b>743</b>	<b>119</b>	<b>16.01%</b>

### 1.4.3 Representation of Scheduled Castes, Scheduled Tribes, OBC & Physically Handicapped Employees (as on 31.03.2019)

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	06	02	-	-	-
CPES GROUP-A	432	323	51	16	33	05
CPES GROUP-B	109	33	11	06	18	02
Non CPES Group						
Group-A	94	41	07	06	01	01
Group-B	361	107	19	05	08	04
Group-C	138	108	19	05	28	02
Group-C(MTS)	217	125	41	04	10	02
Total	1458	743	150	42	98	16

### 1.4.4 Representation of Physically Challenged employees (as on 31.03.2019)

Group	Total employees as on 31.03.2019	Physically Challenged Employees				Percentage of Physically Challenged
		VH	HH	OH	Total	
Group A (CPES+NON-CPES)	364	-	01	05	06	1.64%
Group B	140	-	01	05	06	4.28%
Group C	108	02	-	-	02	1.85%
Group -C(MTS)	125	01	-	01	02	1.60%
Total	743	03	02	11	16	2.15%

## 1.5 Annual Budget

**1.5.1** During the year 2018-19, budgetary allocation of Rs.118.22 Crores (Revised Estimates) was made for CEA. Out of this, Rs.90.68 Crores was allocated under Salary Head and Rs.27.54 Crores under Non Salary Head. Against this, during the FY 2018-19 an expenditure of Rs.89.60 Crores was booked under Salary Head and expenditure of Rs.26.52 Crores was booked under Non Salary Head upto 31.3.2019. The total expenditure incurred in respect of RE during the year was 98.22%.

### 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 2018-19 is Rs.3.91 Crores.

Payments received by the Department/ Organisations towards the consultancy services rendered by CEA for the Financial Year 2018-19 is Rs.1.98 Crores.

## 1.6 Progressive use of Hindi in Official Work of CEA

### 1. Official Language Policy And Achievements

Erstwhile CEA was notified in the official Gazette of the Govt. of India in pursuance of sub-rule 4 of rule 10 of the Official Language Rules 1976 and work to be done in Hindi by the officials having proficiency in Hindi under the sub rule 4 of 8.

The targets assigned by the Rajbhasha cell of Ministry of Home Affairs for the year 2018-19 for implementation of the official language policy were achieved.

Following activities were carried out during the year.

During the year all the work in 33 specified divisions/sections with Administration and Accounts Sections such as noting, drafting, issue of office orders, letters etc were carried out in accordance with Section 3(3) of the Official Language Act.

Efforts were also made to carry out maximum work of left all divisions/sections in Hindi.

All the letters received in Hindi were replied in Hindi only. Thus the Rule 5 of Official Language Act was implemented.

During the financial year 2018-19 average Hindi correspondences was 95% approximately. Quarterly percentage of Hindi correspondence during the year was as follows-

	Letters sent in Hindi	% of Hindi letters
1st Quarter	19845	94%
2nd Quarter	20923	93%
3rd Quarter	17563	96.3%
4th Quarter	17860	94.8%

### 2. Quarterly Meetings of Official Language Implementation Committee

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

- 1st meeting - 04 May, 2018
- 2nd meeting - 09 Aug, 2018
- 3rd meeting - 26 Nov, 2018
- 4th meeting - 19 Feb, 2019

During these meetings action were taken for strict implementation of official language policy.

During the year, following reports were issued in bilingual form.

1. Out come.
2. Annual Report
3. Implementation of Hindi promotion Schemes

In accordance with the Home Ministry / Official Language Department Office Memorandum No. – 11/12013/3/87-o.l. (K-2) dated-16.12.1988 and 06.03.1998, the incentive scheme for doing work in Hindi was implemented.

In accordance with the recommendation of Selection committee following officers /employees were awarded:

1. Sh. R.P Singh, DD, PCD, (Hindi Dictation)
2. Sh. Digambar Singh, SSA, Adm.-II
3. Sh. Pankaj Kumar, steno, Adm-II
4. Sh. Lokesh Kumar Meena, AD
5. Sh. Ram Babu, SSA, FM
6. Sh. Ram Avtar, Sr. Sec. Assist,
7. Sh. Prateek Srivastav, AD, PCD
8. Sh. Rajeev Kumar Mittal, DD, TPPD
9. Sh. Satyandra Kumar Dottan, DD, PSPA-II
10. Smt. Suman Bala, DD, TPM-I
11. Smt. Poonam Kumari, ASO, Vigilance



### 3. Hindi Week Celebrations

Hindi Fortnight was organized in the Central Electricity Authority from 4.9.2018 to 18.9.2018. On 4.9.2018, Hindi Fortnight was inaugurated by lightening the lamp and Ganapati Vandana under the Chairmanship of Chairman, Central Electricity Authority. There were many officers / employees present in the Authority including all the Members, Secretary and Chief Engineers. On this occasion, a cultural programme including poetry and workshop on 'Hindi Literature and Indian Nationalism' was also organized in which, Lectures and poems were read by a guest lecturer, Dr. Anand Bardhan, Associate Professor, Delhi Research and Management Institute, 18- A, Satsanga Vihar Marg, Qutub Institutional Area, New Delhi-67.

During the Hindi fortnight, 4 competitions in the Authority were organized successfully respectively, the Hindi essay writing, Hindi notation and drafting, Hindi Article writing and general language competition of Official Language Rules / Act and Hindi Language / Literature.

Many officers and employees took part enthusiastically in this occasion. All the results should be fair, for this, the eleven member's Evaluation Committee was constituted under the chairmanship of the Chief Engineer, E.I. with the approval of Chairperson, CEA.

Award distribution ceremony was celebrated on 18.09.2018. In this ceremony, cash prizes and citations were given to participants of various events after lightening the lamp, Saraswati Vandana. During the year 2017-18, 10 personnel who wrote more than 20,000 words were rewarded under the Annual Hindi Annotation and Draft Writing Incentive Scheme. Under the Dictation scheme given by the officers, an officer was awarded cash prize and a citation. After this, the Chairperson first congratulated the officers/ employees who did more work in Hindi and appealed to other employees to do more and more work in Hindi. Due to this, 9% increase in Hindi correspondence was also recorded during this period.

Apart from this, P.D. Division and HPPI divisions were provided Chal Vaeiayant Sheilds.

During the closing ceremony, after various cultural presentations, Shri Naresh Bhandari, CE, PCD & OL Incharge said in his speech about the functions and achievements of Hindi section during the year in front of senior officers. He further said that in the concluding quarter Hindi correspondence of CEA was 95 percent and in spite of the motivation and encouragement of the Chairperson, success has been achieved in the correspondence with the support of the Official Language Sections and the cooperation of Headholding of it's Divisions. On this, Mr. Naresh Bhandari, Chief Engineer (PCD) and OL Incharge All personnel of the official language section including Assistant Director (Rajbhasha) were appreciated and congratulated all sections/divisions by chairperson, CEA for working more and more in Hindi.

It was informed by the Incharge of the Official Language that during the year, various work challenges were faced as well as by the Parliamentary Official Language Committee inspection of this office, compiling and reviewing of the consolidated six monthly progress report of 67 offices of the town Official Language Implementation Committee (TOLIC), organizing its meetings and preparing agenda & minutes and sending/ uploading on TOLIC'S website, Organizing poetic seminar along with workshop, organizing quarterly meetings after requesting for Hindi Quarterly Progress Report on time from all divisions /sections and consolidating it. Translation of rules and regulations, participation in Hindi Advisory Committee and other types of activities that encourage Hindi language. He also highlighted the progress made by Ravinder Kumar Verma, the then Chairperson, in keeping the special interest in the field of Official Language Hindi and its progress.

The Chairperson has motivated the people to do more and more work in Hindi with his motivated words. Thus a successful Hindi fortnight was organized and personnel were encouraged to do more and more work in Hindi at all levels.

#### 4. Conducting Hindi Workshop

This office is regularly conducting workshops for propagation of Official Language Policy. In order to minimize the difficulties faced by CEA officers working in CEA complex and to increase use of Hindi in the office, a series of workshops on regular basis were held during the year and a total of four such workshops were held.

All the officers and officials actively participated in the workshops.

1. In the first workshop of the year 2018-19 held on dated 05.06.2018, a lecture was given by Sh. Gopal Krishna Farlia, Member, Hindi Salahakar Samiti and Ex. Member (Hydro), CEA on the subject of "Rajbhasha Hindi va Sarkari Mansikta tatha Samsamyik Vishayo par Kavyapath"& Poetry was recited by the famous comedian poet Shambhu Shikhar in Hindi.
2. In the second workshop of the year 2018-19 held on dated 04.11.2018, a lecture was given by Dr. Anand Bardhan, Associate Professor, Delhi Research and Management Institute, New Delhi on the subject of "Hindi Sahitya avm Bhartiya Rashtravad."
3. In the third workshop of the year 2018-19 held on dated 21.12.2018, a lecture was given by Sh. Amit Prakash, JD, MoP, New Delhi on the subject of "Hindi Tippan avm Alekhan tatha rajbhasha Niti."

In the fourth workshop of the year 2018-19 held on dated 25.03.2019, two lectures were given by Sh. Omkant Shukla, DD (IT) and Dr. Om Prakash Dwedi, Sr. Anuvad Adhikari on the subject of "Hindi Sahitya avm Bhartiya Rashtravad."

#### 5. Purchase of Hindi Books/publication

This office has a library. Hindi Books are procured regularly in the library during each financial year. Hindi News papers & Hindi magazines too are regularly purchased in the library.

During the year technical and non-technical books were purchased in the library and an expenditure of Rs.2,20,911/- was incurred for procurement of Hindi Books, which is included the expenditure of Rs. 1.95 lakh on the publication of two parts of National Electricity Plan.

#### 6. Facility to work in bilingual on PC

This office is regularly procuring/ updating PC software so that the officers/officials could work in Hindi/ bilingual form. At present this office has facility to work in Bilingual Microsoft office software.

7. Publication of in-house magazine in the Hindi Advisory Committee held on 11.04.2018, 'Sanjivani', a social novel of Ms. Usha Verma, Assist. Director (OL), CEA was released by Hon'ble Shri R.K. Singh, Minister of State (IC, Power and New & Renewable Energy).

#### 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 16 Consultants were hired in CEA during the year 2018-19.

#### 1.8 Welfare Activities in CEA

##### 1.8.1 Welfare of SC/ST/OBC/PwD employees.

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

### 1.8.2 Activities related to Women employees

Women employees of CEA have been participating in various activities viz. sports, recreation & cultural activities. They have also been co-opted as members of CEA Departmental Canteen Management Committee.

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. Asha Sharma, All India Democratic Women's Association as the independent member.

### 1.8.3 Recreation and Sports:

During 2018-19, CEA employees actively participated in the recreation activities of sports, music and dance and took part in the All India Civil Services, Inter-ministry, Inter-CPSU Tournaments etc. The achievements have been as under:

1. CEA Carom team for men participated in the Inter-CPSU Carom Tournament organized by NEEPCO from 4.12.2018 to 09.12.2018 at Shillong. The team won the Runners-up Trophy in Doubles event and 1<sup>st</sup> position in Singles event.
2. CEA Volley Ball team for men participated in the Inter-ministry Volley Ball Tournament 2018-19 organized by CCSCSB at Vinay Marg Sports Complex, New Delhi held in January, 2019. The team won 3<sup>rd</sup> position in team championship.

CEA represented the Central Secretariat Volley Ball Team in the All India Civil Services Volley Ball Tournament 2018-19 (**A National Status**) held at Chandigarh from 25.02.2019 to 01.03.2019.

3. CEA Women Athletics Team won the

Bronze Medal in the 4x100 mtr. Relay Race in the CPSU Athletics Tournament 2019 held at BBMB, Nangal (Punjab).

4. Shri Gurujit Medhi, Deputy Director, NERPC, Shillong won the Bronze Medal in the CPSU Chess Tournament 2019 at Nathpa Jhakri (HP).
5. CEA has represented the Central Secretariat Badminton Team in the All India Civil Services Badminton Tournament 2018-19 (**A National Status**) held at Pune from 14-20 February, 2019.

### 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

37 Superannuation cases, one death and one compulsory retirement cases have been settled for pension during the year 2018-19. In addition, nearly 1000 revision of pension cases were dealt in the section. In addition, 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 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.

2. 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 - 2018 was observed in Central Electricity Authority and

and its Subordinate Offices from 29.10.2018 to 03.11.2018. The Vigilance Awareness Week was celebrated to highlight the theme “Eradicate Corruption – Build a New India”.

3. Complaints other than anonymous/pseudonymous were taken up for investigation promptly and after completion of investigations, reports submitted to the prescribed competent authority. As on 31.03.2019, one disciplinary case against Shri Hira Lal, Data Entry Operator (retired), CEA is under process and is to be forwarded to Ministry of Power shortly for onward transmission to the Union Public Service Commission for seeking advice of the Commission as per Rule 9 of the Central Civil Services (Pension) Rules, 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 Hemant Jain, Chief Engineer (Regulatory Affairs), is functioning 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 2018-19, 154 Nos. of Grievances were received and 22 Nos. were pending as on 01.04.2018. A total of 164 Nos. Grievances were settled/disposed off during the period 01.04.2018 to 31.03.2019 with

average disposal time of 24 days.

### 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. 576 applications were received during the year 2018-19 (upto 31.03.2019), under the Act and were disposed off by various CPIOs in CEA. Further, 67 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.

### 1.13 Parliament Questions/ Assurances, VIP references

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

1. Parliament Questions ii) Parliamentary Assurances
2. Oral evidence
3. MO/VIP/MOP references
4. Consultative Committees
5. Standing Committee on Energy
6. Material for Calling Attention Motion
7. Material for Economic Survey 2018-19
8. Major Achievements in Power Sector
9. Annual Report of the MOP for 2018-19
10. Material for interview of Power Minister and Secretary(power) to various press media
11. Monitorable targets for the year 2018-19 and Achievements
12. Power Ministers' Conference
13. Material for various speeches.
14. International Cooperation with various countries
15. Inputs for regional meeting relating to power matters of the regions
16. Action taken reports were prepared based on the inputs received from various divisions.



17. NitiAayog Dashboard
18. Examination of DPRs
19. Material for President's Address to both the Houses of Parliament and Finance Minister's Budget Speech.
20. Compilation and processing of material for matters such as:-

- Power sector reform,
- Private Sector participation including action taken report,

(B) During the year 2018 & 2019 (till 31.03.2019) there were four Parliament Sessions and the Admitted version of Questions were dealt with as follows:

Sr. No	Session	Starred	Un-starred
1.	Budget Session- 2018 & Budget Session- 2019	23	171
2.	Monsoon Session	8	137
3.	Winter Session	12	137

### 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.

The Executive Summary is an important reference document containing information regarding installed capacity, power supply position, actual generation vis-à-vis the programme, details of the thermal and hydro generating units commissioned during the month, major transmission lines & sub-stations commissioned, status of the coal position, etc. pertaining to the month in the reference.

### 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 network. The important statistics/data/information of CEA is uploaded on the bilingual (English & Hindi) website of Central Electricity Authority ([www.cea.nic.in](http://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 online 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 Multifunctional Printers, Plotters, Workstations, etc. All officials of CEA have been provided with latest desktop computers/laptops with internet facility and associated peripherals 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 Software like Red Hat Linux, Oracle, Windows Server, WebSphere are being used for maintaining the Data-Center and Internet connectivity in CEA.

Application Software like MS Office, Information Management System (IMS), Comp DDO are available to facilitate daily official works in CEA. Apart from these, there are a few scientific Application Software like AutoCAD, 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 Other works

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

Hon'ble Minister of State (IC) for Power and New & Renewable Energy launched the National Power Portal (NPP) on 14.11.2017. The portal is accessible at <https://npp.gov.in>.

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

#### 1.15.3.2 E-Office in CEA:

For conducting file and letter handling processes in more efficient and transparent manner, eOffice (e-File) application has been launched in CEA on 1st January 2018. 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 workflow, tracking and searching facility, etc. Progress report of eOffice in CEA during the period from 01.04.2018 to 31.03.2019 is as under:

- Report of e-Office Application for year 2018-19 (from 01.04.2018 to 31.03.2019)
- No. of e-Receipts 19240
- No. of e-Dispatches 2993
- No. of e-Files Created 1776

### 1.15.3.3 VPN connectivity:

VPN connectivity has been provided to senior officers of CEA and officers of Divisions/Sections of CEA, located in NRPC Building, Katwaria Sarai for implementation and smooth functioning of e-Office application, outside the NIC network.

### 1.15.3.4 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 working on setting up of Information Sharing and Analysis Centre (ISAC) for Power Sector. Regular workshops on cyber security in Power Sector are conducted for power utilities

### 1.15.3.5 Digitization of Approvals/Clearances given by CEA:

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

- (a) Online Application for Inspection of Electrical Installations
- (b) DPR Approval Process Monitoring System for Hydro Projects
- (c) Online Application for prior approval of Government Under Section 68 of Electricity Act, 2003.

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

### 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.

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## CHAPTER – 2

### PLANNING FOR POWER DEVELOPMENT

#### 2.1 Power Planning

##### 2.1.1 Generation Planning Studies

Generation capacity addition is required to meet the ever increasing demand of electricity in the country. To optimize all the resources for power generation, Expansion Planning Studies are undertaken by CEA using sophisticated software modeling tool namely "ORDENA". The software model is capable of carrying out planning studies for long term/medium term and short term (hourly dispatch) scenario..

##### 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, Volume I (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:

- i) The actual capacity addition during 12th Plan period 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 achievement is about 112% of the target.
- ii) 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.
- iii) By 2021-22, the Renewable Energy capacity target has been set to 175 GW.
- iv) To meet the demand projected as per the 19th EPS for the Year 2021-22, a

coal based capacity addition of 6,445 MW is required during the period 2017-22 considering the committed 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 and 16,789 MW-completing 25 years by 2022 & without FGD space) of coal based capacity during 2017-22. However, coal based capacity totaling to 47,855 MW is currently under different stages of construction and are likely to yield benefits during the period 2017-22.

- v) The Renewable Energy Generation will contribute about 20.1 % of the total energy requirement in 2021-22.
- vi) The total coal requirement in the year 2021-22 has been estimated as 735 MT.
- vii) The average CO<sub>2</sub> emission factor is estimated to be 0.721 kg CO<sub>2</sub>/kWh during 2015-16 (including renewables). It is expected that this average CO<sub>2</sub> emission factor may reduce to 0.604 kg CO<sub>2</sub>/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 modeling 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 prepared and is under finalization. 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 2017-18 and 2018-19

- i) Against a capacity addition target of 13,171.15 MW, Capacity addition of



9505 MW was achieved during 2017-18 comprising of 795 MW Hydro, 8710 of MW Thermal.

- ii) For the Year 2018-19, against a capacity addition target of 8106.15MW, Capacity addition of 5921.755 MW was achieved as on 31.03.2019 comprising of 140 MW Hydro, 5781.755 MW of Thermal.

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

- i) Chief Engineer (IRP), CEA was a Member of the committee for “Increasing Peaking Mode Operation of Hydro Power Project.
- ii) Chief Engineer (IRP) was a Member of the committee on the assessment of Long Term Power Demand in the State of Madhya Pradesh and to prepare a capacity addition programme for Madhya Pradesh GENCO (MPGENCO) upto FY 2026.

## 2.2 National Level Data Registry System

Section 74 of Electricity Act, 2003 & 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 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 developed by CEA and NTPC and was inaugurated by Hon'ble Minister of Power,

Govt. of India on 27<sup>th</sup> September 2018. The process of operationalization of the portal for effective utilization 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 Electric Power Survey (EPS) have been published and the 19th edition is in progress. The 19th EPS Committee, constituted by the CEA in June 2015, decided that its 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 (Volume- II of EPS) is under progress.

The Volume–III of 19th EPS Report covering 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, Thiruvananthapuram, has been completed. The electricity demand forecast for 7 other Mega cities namely Ahmedabad, Hyderabad, Imphal, Jodhpur, Kanpur, Kolkata and Surat is under preparation.

The Report titled “Report on Nineteenth Electric Power Survey of India (Econometric Method)”, i.e. Volume - IV of EPS Report, covering electricity demand projection upto the year 2036-37 is under finalization. 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 variables used for carrying out the electricity demand projections comprises of gross domestic product (GDP), electricity pricing, population, temperature and rainfall data etc.

## **2.4 Publications on All India Electricity Statistics – General Review & Growth Electricity Sector in India**

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

### **2.4.1 All India Electricity Statistics – General Review**

In General Review-2018, 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.

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-2018 also contains the information about the installed capacity and generation of captive power plants of about 4470 Nos.

General Review-2018 containing the data for the year 2016-17 was published in June, 2018.

General Review-2019 containing data for the year 2017-18 is under finalization.

### **2.4.2 Growth of Electricity Sector in India**

Publication titled "Growth of Electricity Sector in India from 1947-2018" was published in June, 2018 containing data for 2016-17 and provisional /estimated data for 2017-18 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 Implementation of initiative of Working Group III on National Mission on Enhance Energy Efficiency (NMEE) 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, Up-rating and Retirement of Installed Capacity of Stations

A Standing Committee is constituted under the chairmanship of Member (Planning) for considering the proposals of de-rating, up-rating & retirement of electricity generating units. The Committee considers the performance of the units for de-rating & up-rating, 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 611.5 MW during 10<sup>th</sup> Plan, 2398 MW during 11<sup>th</sup> Plan, 5082.44 MW during 12<sup>th</sup> plan and 2550.38 MW during the year 2017-18 was retired.

During the year 2018-19, various proposals of de-rating, up-rating and retirement of the generating units were received, out of which 24 Nos. of thermal generating units with aggregate capacity of 2409 MW were retired and 3 units of Bhakra HPS was up-rated by 54 MW.

The list of all the generating units retired during 2018-19 is given below:-

Sl. No.	Name of Station/Plant	Unit No.	Installed Capacity (MW)	Utility/ Agency
1	OBRA TPS	8	94.00	UPRVUNL
2	BANDEL TPS	3,4	120.00	WBPDC
3	LAKWA GT	2,3	30.00	APGCL
4	GND TPS(BHATINDA)	1,2,3,4	440.00	PSPCL
5	ROPAR TPS	1,2	420.00	PSPCL
6	BADARPUR TPS	1,2,3,4,5	705.00	NTPC
7	B. BRIDGE D.G	1,2,3,4	200.00	GMR PCL
8	NLC TPS	7	100.00	NLC
9.	KOTHAGUDEM TPS	3,6,8	300.00	TSGENCO
	<b>Total</b>		<b>2409.00</b>	

## 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 multi-pronged challenges with the increasing number of Distributed Generation Resources, integration of renewable energy projects like wind and solar with the national grid due to shift of generation mix from conventional sources based on fossil fuel to renewable resource based projects concerning the environmental aspects, replacement of conventional fuel based transport system by pollution free electric vehicles etc.

To meet all these challenges, in house R&D is required to develop new technologies and find out solutions.

For the above purpose, CEA oversees and promotes the activities of research and development in the Power Sector. Currently, following are the research schemes for the power sector facilitated by CEA:

- National Perspective Plan (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 & instrumentation, data acquisition system, 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 Ministry of Power, Government of India and the research conducted in-house by CPRI.

- (iv) **Uchhatar Avishkar Yojana:**

Based on the application of the research projects to the power sector, CEA supports Uchhatar Avishkar Yojana, 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)**

In respect of Energy Domain, CEA

facilitates, through its representation on Project Advisory Committees(PAC), the implementation of 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. 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, totaling to Rs. 80 crores was approved under 12th Plan (2012-17).

Total 90 projects with an outlay of Rs. 60.3719 crore were approved during 12th Five Year Plan. However, R&D schemes under the 12th Five Year Plan were extended for another 3-year period entailing budgetary support of Rs. 10.8284 Crore, Rs. 40 Crore and Rs. 40 Crore for the years 2017-18, 2018-19 and 2019-20 respectively.

A total of One hundred and two (102) R&D projects has been taken up during the 12th Plan period and the three-year action plan (2017-18 to 2019-20) period. The Summary of the projects completed and those going on as on 31.3.2019 is as under:

Scheme component	Completed (no.)	On-going	Total
NPP	2	17	19
RSoP	17	31	48
IHRD	19	16	35
Total	38	64	102



Out of these, 1 no. project is running under UAY and 8 nos. under IMPRINT scheme.

The thrust areas for R&D in power sector were updated and high priority areas were identified for dissemination to the power sector organisations under the Government.

### 2.7.3 Works related to Electric Vehicles

In line with the recommendations of the Committee on Technical Aspects of Charging Infrastructure for Electric Vehicles following action has been taken by CEA:

- a) Amendments to the Central Electricity Authority (Technical Standards for connectivity below 33 KV) Regulations, 2013 have been notified after incorporating the provisions related to charging stations for Evs.
- b) Draft Amendments to Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 for inclusion of provisions related to charging of Electric Vehicles are under notification.
- c) A Working Group-3 of Technical Committee (ETD 51) on Electric Vehicles headed by CEA has recommended the International standard for high level communication between Electric Vehicle and Charging Station, viz. ISO 15118 (Parts 1-5 and 8) and all these parts have been approved.

### 2.7.4 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 prepared the standards on Electrical Energy Storage (EES) Systems.

### 2.7.5 Other R&D initiatives in CEA (MoU with IIT, Delhi)

CEA, being an apex technical organization for the development of power sector, its human

resources need to be developed through enhancing their technical knowledge and R&D exposure.

An MoU was signed between MoP / CEA & IIT Delhi to develop R&D Project in Power Sector and for development of Human Resource relevant to the need of Power Sector to further strengthen R&D initiative in CEA.

Under the MoU, three officers for M.Tech and one for MBA are currently pursuing their course.

## 2.8 Fuel Management and Analysis

Central Electricity Authority (CEA) plays a pivotal role in optimal utilization of coal by the power sector. It monitors coal supply to the power plants so that the plants have coal stock as per norms. CEA in association with MoP, MoC, Railways and others stakeholders closely monitors the coal supply to power plants and take necessary steps to improve the coal supply. With the concerted efforts of all stakeholders, the coal supply to power utilities has improved.

### 2.8.1 Monitoring Mechanism

The coal stock position of all the power plants in the country having coal linkages are being monitored by CEA on a daily basis and daily report is published on CEA website. Moreover, the power plants including plants designed on imported coal, plants having dedicated coal block and plants getting coal through e-auctions apart from the plants having coal linkages are monitored on monthly basis and monthly report is published on CEA website. As on 31<sup>st</sup> March 2019, the total coal stock available with the 165 no. of plants was 34.55 Million Tonnes (MT).

CEA is a member of Inter-ministerial subgroup constituted by the Infrastructure Constraints Review Committee under the aegis of Joint Secretary, Ministry of Coal comprising representatives from Ministry of Railways, Ministry of Power, CEA and Coal India Limited

## 2.8.2 Coal Supply Position for the year 2018-19

For the year 2018-19, the total receipt of coal (domestic + imported) was about 644 MT against the estimated coal requirement of about 656 MT. However, the coal consumption was about 629 MT during the same period.

Coal receipt and consumption for the year 2018-19 is given as under:

(Figures in MT)

Estimated Requirement (Domestic + Imported)	655.6 (609.4 + 46.2)
Receipt- Domestic coal (Actual)	582.1
Receipt- Imported coal for blending (Actual)	21.4
Receipt- Imported coal for plants designed on imported coal (Actual)	40.3
Receipt-Total Imported coal (Actual)	61.7 (21.4+40.3)
Receipt-Total (Domestic + Imported)	643.8 (582.1+61.7)
Consumption (Actual) (includes Imported coal)	628.9

During the year 2018-19, the receipt of coal by the power plants from domestic sources was 582.1 MT as against 538.6 MT during last year 2017-18. Total coal consumption for the year 2018-19 was 628.9 MT as against 608.0 MT during last year 2017-18.

Plant-wise details of the coal receipt and coal consumption during 2018-19 is at Annexure 2A.

### 2.8.2.1 Receipt of Coal during the year 2018-19

During the year 2018-19, source wise break up of coal receipt at the power stations is given below:

Source	Actual Receipts (MT)
CIL	457.4
SCCL	55.9
Captive Mines	40.1
E- auction	28.7
<b>Total Domestic</b>	<b>582.1</b>
<b>Total Import</b>	<b>61.7</b>
<b>Total Receipt</b>	<b>643.8</b>

### 2.8.2.2 Import of the coal during the year 2018-19

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 devised customized strategy as per suitability of each power station and has already started the process of substitution of imported coal with domestic coal for many power plants.

During 2018-19, the coal imported for blending purpose by the power plants designed on domestic coal was 21.4 MT vis-à-vis 17.0 MT during the last year resulting in an increase of 4.4 MT (25%). In addition to above, power plants designed on imported coal have imported 40.3 MT coal during 2018-19 vis-à-vis 39.4 MT during last year resulting in an increase of 0.9 MT (2.3%).

### 2.8.2.3 Specific Coal Consumption (kg/kWh)

During the year 2018-19, the Specific Coal Consumption of the power plants designed on domestic coal was 0.654 kg/kWh and that for the plants designed on imported coal was 0.480 kg/kWh.

### 2.8.2.4 Coal Quality Issues

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 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, has resulted into lowering of ECR, thus benefiting the end consumers of electricity.

#### 2.8.2.5 Estimation of coal requirement for the year 2019-20

As per the coal based generation target of 1059 BU, the estimated total coal requirement for the year 2019-20 is about 698 MT, which includes coal required to meet the generating target and to build coal stock up to normative level. Out of this, the estimated coal of about 651 MT is for plants designed on domestic coal and about 47 MT for the plants designed on imported coal. The likely total coal availability from domestic sources (from CIL, SCCL, Captive Coal Blocks, E-Auction) is around 631 MT, resulting in a shortfall of about 20 MT in domestic coal. The details are as given below:-

S.No	Description		
<b>1.</b>	<b>Coal based generation</b>		
1.1	Coal based generation programme for 2019-20	BU	1058.9
<b>2.</b>	<b>Estimated Coal Requirement</b>		
2.1	Coal requirement including stock buildup for plants designed on domestic coal	MT	651.1

2.2	Coal requirement including stock buildup for plants designed on imported coal	MT	47.2
2.3	Total Coal Requirement	MT	698.3
<b>3.</b>	<b>Likely coal availability from indigenous sources</b>		
3.1	From CIL	MT	530
3.2	From SCCL	MT	54
3.3	From Captive Mines	MT	47
3.4	From e-auction (included in CIL)	MT	-
3.5	Total domestic coal availability	MT	631
4.1	Shortfall in domestic coal availability	MT	20
4.2	Requirement of imported coal for blending after GCV normalization	MT	13

**BU: Billion Units MT: Million Tonnes**

Some power utilities / power plants designed on domestic coal may plan for import of coal for blending purpose for their coastal power plants considering cost-economics in import of coal vis-à-vis domestic coal and Railway logistic constraints etc. to build coal stock. Power plants designed on imported coal would continue to import coal to meet their coal requirement.

#### 2.8.2.6 New initiatives for addressing issues related to coal supply to Power Plants

##### A. Flexibility in Utilization of Domestic Coal

A proposal was approved on 04.05.2016, for allowing flexibility in utilization of domestic coal amongst power generating stations to reduce the cost of power generation. Under the scheme, the Annual Contracted Quantity (ACQ) of each individual coal linkage as per Fuel Supply Agreement is to be aggregated as consolidated ACQ for each State and Company owning Central Generating Stations instead of

individual generating station. The State/Central Gencos would have flexibility to utilize their coal in most efficient and cost effective manner in their own power plants as well as by transferring coal to other State/Central Gencos Power plants for generation of cheaper power. The methodology for utilizing coal amongst State/Central Generating Stations has been issued on 08.06.2016 by CEA.

Further, the methodology for use of coal transferred by a State to Independent Power Producer (IPP) generating stations has been issued vide MoP order dated 20.02.2017. As per the methodology, the State can divert their coal and take equivalent power from IPP generating stations selected from the competing IPPs 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.

All the power utilities have signed supplementary agreement with CIL/Subsidiaries for aggregation of their Annual Contracted Quantity (ACQ) and they are now giving coal program as per their aggregate requirement.

#### Further Developments in the Scheme:

- MoP clauses related to bid security, performance security coal transportation mode in the methodology for Case-4 were amended. Subsequently, Ministry of power vide letter dated 25.10.2018 has issued 2<sup>nd</sup> amendment in the methodology to take care of moisture correction while reconciliation of coal were issued.
- Gujarat Urja Vidyut Nigam Limited (GUVNL) had selected M/s GMR Chhattisgarh Energy Limited (GCEL), having coal based power plant at Raikheda, Raipur, Chhattisgarh, for taking 500 MW

power for a period of 8 months starting from November 2017, which was extended upto November 2018. Subsequently, GUVNL floated fresh tender and has again selected M/s GCEL. GUVNL, in December 2018, has issued Letter of Award to M/s GCEL, for 1000 MW power to be supplied under Case-4 to GUVNL upto June 2019 by transferring their coal from SECL.

#### B. National Power Portal

National Power Portal (NPP) has been developed in CEA for collection of various power sector data and generation of reports. Through this portal, the power plants are furnishing their coal related data and reports are being generated and published. Daily Coal Report, Monthly Coal Report and Monthly Gas Report are being generated through this portal.

#### C. New Daily Coal Monitoring Methodology

CEA in consultation with all stake holders has issued a new methodology in November 2017 to monitor coal stock position of the power plants on daily basis. New methodology was necessitated as the States/Central power utilities started implementing the Flexibility in Utilization of Domestic Coal by allocating their aggregated coal to power plants, irrespective of plant specific ACQ.

#### D. Rationalization of Coal Linkages for IPPs

Ministry of Coal has issued a policy for linkage rationalization for IPPs on 15.05.2018 to reduce the landed cost of coal due to reduction in transportation cost and/ or cost of coal. The reduced landed cost of coal shall lead to saving, to be reflected in cost of power generated, and these savings shall be passed on to the DISCOM. CEA formulated methodology for the calculation of indicative saving in cost on account of linkage rationalization. Based on data received from CIL, the indicative saving is calculated.



### 2.8.2.7 Gas/ Liquid supply to Gas based Power Stations

Out of total 24937.22 MW Gas/Liquid fuel based installed generating capacity in the country as on 31<sup>st</sup> March 2019, CEA monitors the supply of gas to 63 gas based power stations, using gas as the primary fuel, totaling to a capacity of 23882.68 MW (excluding liquid fuel based power plants).

### 2.8.2.8 Gas Requirement and Supply Position

The production and supply of gas have 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 position for gas based power plants during 2018-19 is as under:

Category	Domestic			RLNG (Imported) (Regasified Liquefied Natural Gas)		Total	PLF (%)
	APM / Non - APM/ PMT	KGD-6	Total	LT * (Long Term)	SPOT		
<b>Gas Allotted</b>	54.48	32.37	86.86	7.48	-	94.34	<b>23.7</b>
<b>Gas Consumed/supplied</b>	22.42	0.00	22.42	4.04	4.53	30.99	
<b>% Gas Supplied w.r.t Gas Allotted</b>	41%	0%	26%	54%		33%	

\*contracted quantity

MMSCMD: Million Metric Standard Cubic Meter per Day.

Supply of gas to gas based power plants since 2013-14 is as under:

Sl. No.	Years	Capacity at the end of year (MW)	Domestic Gas Allocation	Gas Required* (MMSCMD)	Average Gas Supplied (MMSCMD)	Shortfall (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)=(5)-(6)
1.	2013-14	20385.27	84.31	97.9	27.13	72.3%
2.	2014-15	21665.57	84.31	104.0	25.2	75.8%
3.	2015-16	23075.57	87.09	113.6	28.26	75.1%
4.	2016-17	24037.17	87.05	118.2	30.32	74.3%
5.	2017-18	23842.17	87.12	116.0	30.72	73.5%
6.	2018-19	23882.68	86.86	115.0	30.99	73.1%

\*Normative gas requirement at 90% PLF taking GCV of gas= 9000 kCal/SCM (except for Ramgarh CCGT for which GCV is 4150 K Cal/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

## 2.9 Renewable Energy:

The erstwhile Renewable Energy Source Development Division (RESDD) is restructured into three new Divisions during 2018 namely; Renewable Technology Development (RTD) Division, Renewable Project Monitoring (RPM) Division and Renewable Grid Integration (RGI) Division.

A target has been set to commission 175 GW of Renewable Energy Capacity by the year 2022 which includes 100 GW of Solar (utility-scale, distributed, off-grid/mini-grid), 60 GW of Wind (utility scale), 10 GW of Bioenergy (Biomass & Bagasse) and 5 GW of Small Hydro. As on 31.03.2019, the total grid connected installed capacity from renewable energy sources is 77.64GW.

The earlier target of 20 GW capacity through installation of Solar Parks in the country with a capacity of 500 MW or more concentrated at a single location has been enhanced to 40 GW.

### 2.9.1 Issues pertaining to Grid integration of Renewable Energy Sources:

As per Regulation 5.2 (u) of the Indian Electricity Grid Code (IEGC) power from the wind or solar power projects enjoys must run status. As renewable generation from solar and wind plants is variable in nature, a suitable balancing mechanism is essential to ensure grid security and to tackle the variability/intermittency of generation from such sources. Grid integration therefore is the priority item for expanding Renewable Energy generation in India.

### 2.9.2 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 and the percentage of RE to total generation for the above period is given below:

Years	Non RES Generation (MU)	RES Generation (MU)	Total Generation (MU)	% of RE w.r.t. total generation
2014-15	1048673	61719	1110392	5.56
2015-16	1107822	65781	1173603	5.61
2016-17	1160141	81548	1241689	6.57
2017-18	1206306	101839	1308145	7.78
2018-19	1249337	126759	1376096	9.21

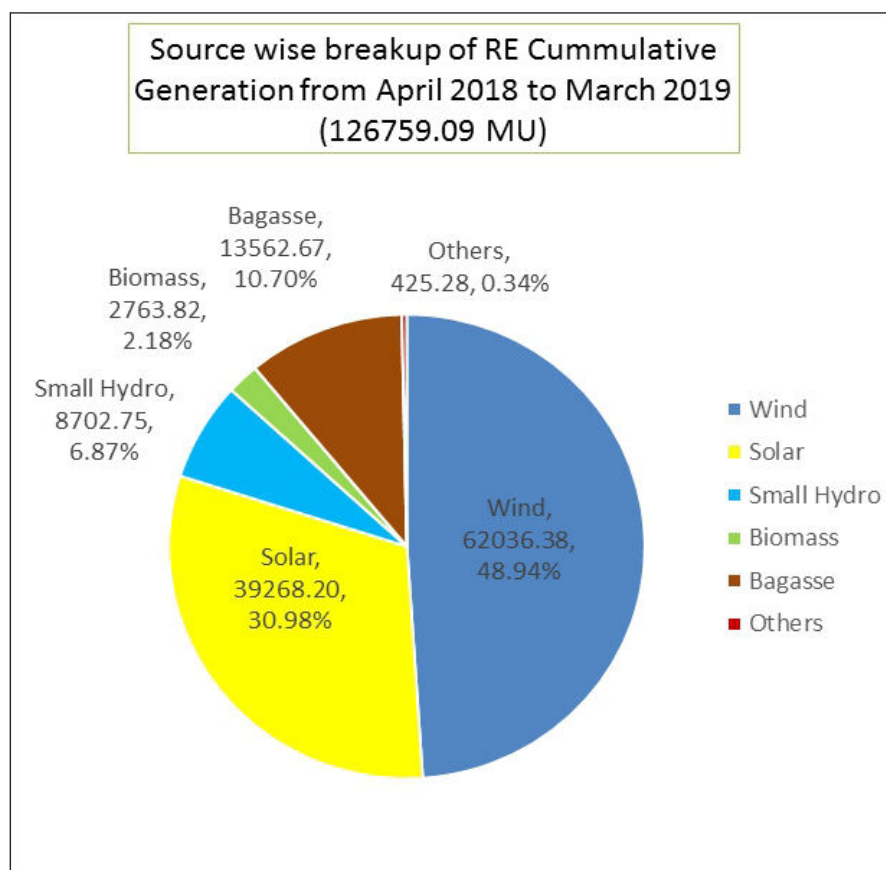
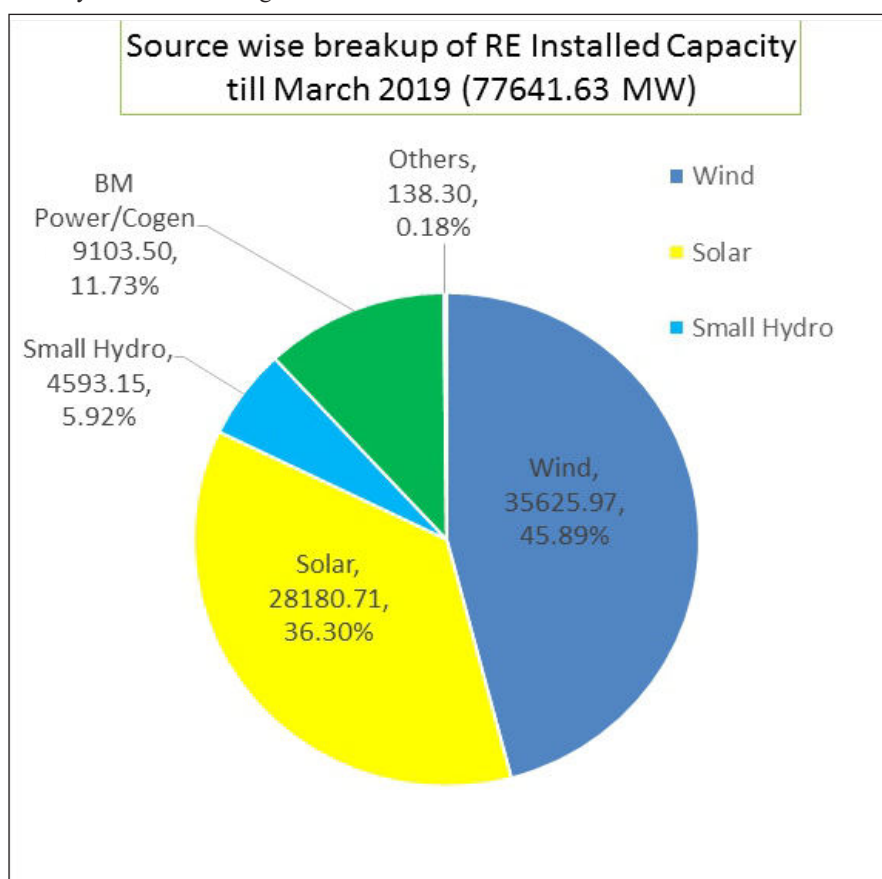
Renewable energy generation was about 9.21% of total energy generation in the country during 2018-19. Year wise generation from

renewable energy sources (RES) indicating the growth rates is given below.

Year wise generation from renewable energy sources (RES) in BU

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

The graphs indicating source-wise generation from RE sources and source wise breakup of RE installed Capacity for the years 2018-19 are given below:



## CHAPTER – 3

# POWER SYSTEMS PLANNING AND DEVELOPMENT

### 3.1 Transmission Planning

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

### 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 9<sup>th</sup> Plan was 5750 MW, which increased to 14,050 MW by the end of 10<sup>th</sup> Plan, and to 27,750 MW and 75,050 MW by end of 11<sup>th</sup> Plan and 12<sup>th</sup> Plan respectively.

As on 31.03.2019, inter-regional transmission capacity in the country is 99,050 MW. Details of inter-regional transmission lines are given at **Annexure – 3A**.

### 3.3 Regional Standing Committees on Power System Planning/ Regional Standing Committee on Transmission

#### 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 13<sup>th</sup> April, 2018, has constituted Regional Standing Committees on Transmission for NR, WR, SR, ER and NER 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 as members and Chief Engineer (Power System Wing), CEA as Member Secretary. Terms of Reference (ToR) of the Committee are:

- i. Evolve and finalize system strengthening Schemes for removal of operational constraints and transfer of surplus power through inter-regional corridors.
- ii. Examine the proposals for transmission system for Access / connectivity Applications.
- iii. Examine the Associated Transmission system with Electricity Generators.
- iv. Review the up-stream and down-stream network associated with transmission schemes.
- v. Examine and evaluate the intra-state transmission proposals

#### 3.3.2 Following Standing Committee Meetings were held during 2018-19:

##### Northern Region:

- 40<sup>th</sup> meeting of the Standing Committee on Power System Planning of Northern Region held on 22.06.2018 at NRPC, Katwaria Sarai, New Delhi.



- 1<sup>st</sup> meeting of Northern Region Standing Committee on Transmission held on 11.09.2018 at NRPC, Katwaria Sarai, New Delhi.
- 2<sup>nd</sup> meeting of Northern Region Standing Committee on Transmission held on 13.11.2018 at NRPC, Katwaria Sarai, New Delhi.

#### Western Region:

- 43<sup>rd</sup> Meeting of the Standing Committee on Power System Planning in Western Region held on 11.05.2018 at Baroda, Gujarat.
- 1<sup>st</sup> Meeting of Western Region Standing Committee on Transmission held on 05.09.2018 at NRPC, Katwaria Sarai, New Delhi.

#### Eastern Region:

- 1<sup>st</sup> meeting of Eastern Region Standing Committee on Transmission (ERSCT) was held on 16<sup>th</sup> July 2018.

#### Southern Region:

- 42<sup>nd</sup> meeting of the Standing Committee on Power System Planning of Southern Region was held on 27<sup>th</sup> April, 2018.
- 1<sup>st</sup> meeting of Southern Region Standing Committee on Transmission (SRST) was held on 7<sup>th</sup> September, 2018.

#### North Eastern Region:

- Meeting of 7<sup>th</sup> Standing Committee on Power System Planning (SCPSP) of North Eastern Region held on 17.05.2018
- Meeting of 1<sup>st</sup> North Eastern Region Standing Committee on Transmission (NERST) for planning of Transmission held on 29.11.2018.

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

### 3.4 Private Sector Participation 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 6<sup>th</sup> 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.

As provided in the Guidelines, Ministry of Power has appointed PFC Consulting Limited (PFCL) 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 6<sup>th</sup> January, 2006 issued an O.M on 9<sup>th</sup> December, 2010 which provides that since 6<sup>th</sup> 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 28<sup>th</sup> 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 6<sup>th</sup> 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*

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 has reconstituted the Empowered Committee on Transmission (ECT) and has also constituted the National Committee on Transmission (NCT) vide office order no. 15/3/2017-Trans dated 13.04.2018. The NCT recommends the mode of implementation {Tariff Based Competitive Bidding (TBCB) / Regulated Tariff Mechanism (RTM)} of transmission schemes agreed in Regional Standing Committee on Transmission (RSCTs). Based on the recommendations of NCT, ECT allocates the transmission projects to BPCs.

### 3.4.2 Status of the schemes notified through TBCB.

As far as Inter-State transmission system is concerned, till date forty-one projects have been awarded through Tariff Based Competitive Bidding out of which twenty-two projects have already been commissioned/ready for commissioning and fifteen projects are under implementation by various Transmission Service Providers. Out of balance four projects, one project has been cancelled by CERC, in one project the TSP has requested for closure and construction of two projects could not start due to litigation. Apart from this, there are twelve projects which are presently under bidding process out of which one project is currently on hold. These schemes are given at **Annexure – 3C** notified through Tariff Based Competitive Bidding (TBCB).

### 3.4.3 Following meetings of the National Committee on Transmission (NCT) were held during 2018-19:

MoP vide their office order no. 15/3/2017– Trans dated 13.04.2018 has constituted the "National Committee on Transmission" (NCT). The ToR of NCT are as follows:

- i. Formulate the transmission schemes based on transmission projects agreed in the Regional Standing Committee on Transmission (RSCTs).

- ii. Examine the cost of the Schemes.
- iii. Recommend the mode of implementation of transmission schemes i.e. Tariff Based Competitive Bidding (TBCB) / Regulated Tariff Mechanism (RTM), as per the existing Tariff Policy.
- iv. Form the Bid Evaluation Committee (BEC) for a TBCB Project.
- v. Recommend the urgency of project for RTM.

In the year 2018-19, total 3 nos. of meetings of National Committee on Transmission has been held which are given below:

- 1<sup>st</sup> Meeting of the National Committee on Transmission (NCT) was held on 27<sup>th</sup> July, 2018, in CEA.
- 2<sup>nd</sup> Meeting of the National Committee on Transmission (NCT) was held on 4<sup>th</sup> Dec, 2018, in CEA.
- 3<sup>rd</sup> Meeting of the National Committee on Transmission (NCT) was held on 01<sup>st</sup> March, 2019, in CEA.

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

### 3.4.4 Cost Committee:

In the 3<sup>rd</sup> meeting of NCT held on 1<sup>st</sup> March, 2019, a cost committee was reconstituted with the representatives from CEA, Powergrid/ CTU and BPCs to work out a cost matrix for different transmission schemes based on survey report of BPCs.

The cost committee met on 14.03.2019 and worked out the cost of the transmission schemes based on the preliminary route survey carried out by the BPCs, details of which are attached at **Annexure-3E**.

### 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

**Northern Region:**

- (i) DPR examination Bowala Nand Prayag (300 MW) by M/s UJVNL.
- (ii) DPR examination Goriganga – III A (150 MW) by M/s NHPC Ltd.
- (iii) DPR examination of Kirthai I (390 MW) HEP by M/s JKSPDC.
- (iv) DPR examination of Thana Plaun (191 MW) by M/s HPPCL.
- (v) DPR examination of WAH-Umiam stage-III (85 MW) by M/s NEEPCO.

**Western Region: NIL****Southern Region: NIL****Eastern Region: NIL****North Eastern Region**

- i) Wah Umiam Stage-III HEP (Erstwhile Mawphu HEP, Stage-II (85 MW) in Meghalaya by NEEPCO Ltd.

**3.6 Examination of DPR/FR of Transmission Works for processing of clearance by CEA****Northern Region:**

- i) DPR for revised schemes for intrastate transmission system under Green Energy Corridor (GEC) in Himachal Pradesh (Part-B) with estimated cost of 193.56 crores
- ii) DPR for transmission schemes under GEC in Rajasthan for KfW funding in place of deferred schemes with estimated cost of 218.8 crores

**Western Region:**

- I) Transmission scheme proposed under Green Energy Corridor for RES generation projects in Maharashtra as Green Energy Corridor – II (Part-B).

**Eastern Region**

- I) DPR for evacuation of solar power in the state of Odisha under Green Energy Corridor -II, Phase-II.

**Southern Region**

- I) DPR for power evacuation of 160 MW Solar-Wind Hybrid Park with storage of 40 MWh near Ramagiri in Anantapuram district of Andhra

Pradesh.

- ii) DPR for Intra State scheme of KPTCL under Green Energy Corridor –I, Package –II, V & VI

**North Eastern Region**

- i) Detailed Project Report (DPR) of “Enhancement of Intra State Transmission System of Assam”

**3.7 Grant of prior approval of Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2018-19.**

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

**Northern Region :**

- M/S ACME Solar Holding Ltd. for 250MW for Solar Power Plant in Jodhpur (Raj.).
- M/S Tata Power Renewable Energy Ltd. for its proposed TPREL 500MW Solar Power Project Chayan in Jaisalmer (Raj.).
- M/S ReNew Solar Power Pvt. Ltd. for its 250MW Solar Plant in Bikaner (Raj.).
- M/S Mahoba Solar (UP) Pvt. Ltd. for 250MW Solar Power Plant in Jodhpur (Raj.).

**Western Region :**

- M/S Alfano Energy Pvt. Ltd. for the Tr. Scheme connectivity system for 300MW wind farm in Kutch (Guj.).
- M/S Green Infra Wind Energy Ltd. for Tr. Scheme-Connectivity system for 250MW wind farm in Kutch (Guj.).
- M/S ReNew Energy Ltd. for 300MW Wind farm at Kutch, Guj.
- Adani Green Energy (MP) Ltd. for Wind Power in Kutch (Guj.).
- M/S Green Infra Wind Energy Ltd. for 300 MW wind farms in Kutch, Guj.
- (WRSS-XIX) and (NERSS-IX) Vapi-II- North Lakhimpur Transmission Ltd.

- M/S ReNew Wind Energy Pvt. Ltd. for its 300MW Power Project in Kutch (Guj.).
- M/S Avikiran Solar India Pvt. Ltd. for its 285MW wind farm in Kutch (Guj.).
- M/s Toramba Renewable Energy Private Limited for its proposed 300 MW wind farms in Horti, Osmanabad, Maharashtra”
- M/S Alfnar Energy Pvt. Ltd for its proposed 300 MW wind farm in Kotda Madh, Kutch (Guj.)
- Connectivity system of M/S TPL for 300MW Lakhpat wind farm in Kutch.
- Connectivity system of M/S TPL for 199.50MW Junachay and 115MW Nakhtazana wind farm in Kutch.
- Scheme to control Fault Level at Wardha S/S.

#### Eastern Region:

- NIL

#### Southern Region:

- To M/s Betam Wind Energy Private Limited for the construction of “230 kV Single Circuit Transmission line from Betam Wind Farms (Savarimangalam) to Tuticorin –II GIS Pooling Station”
- To M/s. Green Infra Renewable Energy Limited (GIREL) for laying of 230 kV S/c Transmission line from “Green Infra Renewable Project at Ottapidaram, Tuticorin to Tuticorin-II GIS Pooling Station”
- To M/s Mytrah Energy (India) Private Limited for the construction of 20 km of “220 kV Single Circuit Transmission line from Mytrah Wind Farms (Sokkanur) to Palakkad Sub Station”
- To M/s Sprng Renewable Energy Private Limited for the construction of 30 km of “230 kV Single Circuit Transmission line from 230/33 kV Mulanur Pooling Sub Station (Tirupur) to 400/230 kV Pugalur Sub Station”
- To M/s Udupi Kasargode Transmission Limited for laying of “Udupi (UPCL)-

Kasargode 400 kV Quad D/C transmission line”.

#### North Eastern Region:

- To M/s POWERGRID for Construction of “400kV D/C line section from Surjamaninagar (ISTS) S/s to a suitable point on the existing Surjamaninagar(TSECL)-North Comilla line near Surjamaninagar (TSECL) 132kV S/s”.

### 3.8 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2018-19.

#### Northern Region :

- Tr. System for Ultra Mega Solar Park in Fatehgarh, Dt: Jaisalmer (Raj.).

#### Western Region :

- ReNew ventura Pvt Ltd. for its 400MW wind farm in Kutch (Guj.).
- Goa Tamnar Tr. Project Ltd. by M/S Sterlite.
- 300MW Wind farm in Kotda Madh, Kutch (Guj.) to M/S Alfnar Energy Pvt. Ltd.
- New WR-NR Inter Regional Corridor.

#### Eastern Region:

- To M/s Adani Power (Jharkhand) Limited (APJL) for Laying of “400 kV D/C Transmission line from Godda Thermal Power project, Jharkhand to Mahabbatpur Dist. Maldah (Indo-Bangladesh Border)”.

#### Southern Region:

- To M/s Mytrah Energy (India) Private Limited (MEIPL) for construction of “230 kV Double Circuit Transmission line from Mytrah Wind Farms (Ottudampatti) to Tuticorin-II GIS Pooling Station”.
- To M/s Orange Sironj Wind Power Private Limited for construction of “230 kV Single Circuit Transmission line from Orange Sironj Wind Generation Switchyard (Pudiyamputtur) to Tuticorin-II GIS Pooling Station”



**North Eastern Region:**

- To M/s NER-II Transmission Ltd., for “Transmission System for North Eastern Region Strengthening Scheme (NERSS-II & V)”.

**3.9 Cross-Border power exchange****3.9.1 India-Bangladesh Cross Border Interconnection & Power Trade**

India is currently supplying power up to 1,160 MW 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:

- 2<sup>nd</sup> Baharampur - Bheramara 400 kV D/c line.
- 400 kV operation of Surajmaninagar - North Comilla link along with 500 MW HVDC Back-to-Back station at North Comilla (Bangladesh).

With commissioning of the above lines, supply of power from India to Bangladesh would increase to 1500 MW.

**3.9.2 India-Bhutan Cross Border Interconnections & Power Trade**

India and Bhutan have terms of cooperation for exchange of power between the two countries. Bulk of power generated at Hydro Electric Projects at Chukha (336MW), Kurichu (60MW) Tala (1020MW) and Dagachhu HEP (126 MW) in Bhutan, is exported to India after meeting the internal demand of Bhutan. In addition to above LILO of  $\pm 800$ kV, 6000MW Bishwanath Chariyali – Agra HVDC Bi-pole line at Alipurduar with 3000MW HVDC terminal and 400/220kV EHVAC station at

Alipurduar have also been commissioned for import of power from Bhutan.

Presently, about 1500 MW power from the existing hydro projects in Bhutan is being imported to India from Bhutan. The associated cross-border transmission system for evacuation and transfer of power from these HEPs is being operated in synchronism with the Indian Grid

RGoB is in the various phases of developing the hydro potential by 2021-22, of which Punatsangchhu-I (1200MW), Punatsangchhu-II (1020MW) and Mangdechhu (720 MW) HEPs are ongoing Projects and Associated Transmission Schemes (ATS) of these HEPs are at various stages of implementation as per the NTGMP Plan.

The work of transmission links under implementation Stage for import of power from Bhutan (Indian Portion - By POWERGRID) in Indian Territory is likely to be completed in matching time frame of the generation projects.

**3.9.3 India-Nepal Cross Border interconnection and Power Trade**

India is currently supplying power up to 570 MW to Nepal through following links:

- There are 13 cross border interconnections at 11kV, 33kV and 132 kV between Nepal and India, through which bilateral power exchange between NEA and utilities on the Indian side namely BSPTCL, UPPCL and UPCL has since been taking place on the principle of catering to the power needs of isolated local areas of both of the sides of the border.
- 240MW of power through 400kV D/c Dhalkebar (Nepal) - Muzaffarpur (India) line (charged at 220kV).

With the upgradation of 400kV D/C Dhalkebar-Muzaffarpur line to its rated voltage (presently it is charged at 220kV), which is expected to be completed in December 2019, the export of power to Nepal may increase by about 200-300MW.

### 3.9.4 India-Myanmar Cross Border Interconnections & Power Trade

- India is providing about 2-3 MW of power (Since 5<sup>th</sup> 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.

### 3.10 National Electricity Plan (Transmission)

As per Section 3 of the Electricity Act 2003, CEA, has been entrusted with the responsibility of preparing the National Electricity Plan (Generation & Transmission) in accordance with the National Electricity Policy. PSPA-II Division prepares National Electricity Plan (Transmission) for the country in consultation with CTU, STUs, generating companies and RPCs. The National Electricity Plan (Transmission) is based on studies carried out for various Load-generation scenarios considering seasonal variations of Load & generations.

National Electricity Plan (Vol-II Transmission) for the period ending 2021-22 has been notified in the Gazette of India on 7<sup>th</sup> February, 2019. The National Electricity Plan (Vol-II Transmission) covers the transmission system (transmission lines and associated substations) planning including the inter-regional transmission links for the period 2017-22 to meet the projected peak electricity demand of 226 GW in the year 2021-22.

As per the NEP, about 110,000 ckm of transmission lines and about 383,000 MVA of transformation capacity in the substations at 220 kV and above voltage levels are required to be added during the period 2017-22.

### 3.11 Miscellaneous works

#### 3.11.1 Green Energy Corridor:

The report on Green Energy Corridor has been prepared by PGCIL for transmission plan for evacuation 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.

The current estimated cost of the above scheme involving intra State and inter State transmission systems required to evacuate RE power is Rs. 10140.55 Crore and Rs. 15455 Crore (revised figures), respectively. Intra State transmission schemes are to be funded as 20% equity of the State Govt., 40% grant from National Clean Energy Fund (NCEF) and 40% soft loan, whereas, the inter State transmission schemes are to be funded as 30% equity by PGCIL and 70% soft loan.

For the funding of green energy corridors in both intra and inter State transmission projects, under the framework of cooperation between Govt. of India and Govt. of Germany, KfW Germany is providing soft loan to the tune of Euro 1 Billion. For Inter-state transmission projects pertaining to Part A, B and C of Green Energy Corridor, Loan agreement for financial assistance of Euro 500 million from KfW, Germany has been signed by PGCIL and the projects are likely to be completed by 2018. Further, for implementation of transmission schemes under Green Energy Corridor-Part D, Powergrid has taken loan from ADB.

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.

The intra state transmission schemes by the States are at various stages of tendering and award process and are likely to be implemented by 2018-19 progressively. Work is under progress for the awarded schemes.

The status of award of inter-State and intra-State transmission works during the financial year 2018-19 is attached at **Annexure-3F**.

### 3.11.2 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 in and beyond 13<sup>th</sup> plan. 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:

- System studies for evacuation of 412.9 MW power from small HEPs in Himachal Pradesh proposed under GEC-II.
- System studies for development of infrastructure at EHV level in Jammu and Kashmir during 12th and 13th Five Year Plans.
- System studies for evacuation of 4000 MW power from Renewable Energy (Solar) plants proposed under Green Energy Corridor-II in Bundelkhand region of Uttar Pradesh.
- 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.
- Evolution of transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones and Transmission Schemes for Solar Energy Zones (SEZs) in Rajasthan.
- Transmission system studies of Mumbai Transmission System.

### 3.12 Consultancy services and assistance to various utilities

#### (a) Power Development Department, Govt. of J&K:

220kV and 132kV Transmission System covered under Hon'ble Prime Minister's Reconstruction Plan (PMRP-2004) which includes number of Transmission Lines and Substations of 220kV and 132kV voltage levels.

#### (b) Technical Advice to MoP/CPSUs /State Utilities /CPRI/BIS etc.

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

### 3.13 Research & Development Works:

- (a) Committees report on investigation of frequent failures of EHV transmission towers and substation equipment in and around Agra region was prepared and submitted.
- (b) Pilot Audit of transmission towers of 400kV Jalandher - Sambha D/C Transmission line of M/s Sterlite Power Transmission Ltd. and 400 kV D/C Malerkotla - Amritsar transmission line of ESSEL Infra Projects Ltd.
- (c) Guidelines prepared for use of new generation HPC/HTLS conductors in Indian Transmission & Distribution sector.
- (d) Stakeholders meeting was conducted to discuss the issues related to Transformer Fire prevention/ protection Technology.
- (e) Meeting with stakeholders was conducted to discuss the issues related to validity period of Type Test on electrical products.

- (f) Stakeholders meeting was held to discuss the issues related with Porcelain, Glass and Composite Insulators used in EHV Transmission Lines.

- (g) Draft Power Transformer standardization manual is under preparation.

### 3.14 Representation/ Nomination in the Committees

- (a) PSETD officers are represented in:
  - (i). Various Committees constituted for transmission lines & substations by MoP/CEA/CPSUs/CERC etc.
  - (ii). Technical committees of BIS pertaining to EHV transmission lines (Conductor, Earth-wire, insulator & hardware and transmission line towers) and substations (surge arrestor, switchgear, transformer, HVDC, power electronics, high voltage engineering, battery etc.)
  - (iii). 7 Nos. of meetings of Sub group for techno-economic appraisal of DPRs for PSDF funding.
  - (iv). 8 Nos. of meetings of Cost Committee and Bid Evaluation Committee for projects to be awarded through Tariff Based Competitive Bidding (TBCB).
- (b) PSPA-II officers are represented in the following:
  - (i) Joint Steering Committee (JSC) for cooperation in power sector with Nepal, Bangladesh and Myanmar.
  - (ii) India Working Group (JWG) for cooperation in power sector with Nepal, Bangladesh, Sri Lanka and Myanmar.
  - (iii) Joint Technical Team- Transmission (JTT-T) with Nepal, Bangladesh, Sri Lanka and Myanmar
  - (iv) Committee on Large Scale Integration of Renewable Energy and other associated issues, constituted by Ministry of Power.
  - (v) Committee to study the system of Transmission Charges, constituted by Ministry of Power.
  - (vi) 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 and investigation was carried out.
- (ii) Meeting of Standing Committee was held to discuss various failures of transmission line towers reported to CEA. The details of failed transmission lines reported to CEA (Oct, 2016 to March, 2018) is enclosed at **Annexure-3G**.
- (iii) A sub group was constituted to prepare guidelines for tower material grades, construction methodology, site testing and O&M of EHV transmission lines, methodology for audit of transmission tower, to standardize protocol for investigation of towers and to review BIS codal provisions pertaining to EHV transmission lines.
- (b) Substation equipment failures:
  - (i) As a part of activity of Standing Committee to assess the causes of various failure of Substation Equipment of 220kV and above voltage levels, CEA officer visited Jhansi works of BHEL for internal inspection of failed power transformer of DTL.
  - (ii) Meeting of Standing Committee was held to discuss failures of various Substation Equipment reported to CEA during January, 2017 to March, 2018. The details of failure of transformers and reactors reported to CEA during month January, 2017 to March, 2018 is enclosed at **Annexure-3H**.



### 3.16 Amendment of CEA Regulations / Miscellaneous Works

1. 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 finalized after scrutinizing public comments.
2. VIP reference from Dr. Harsh Vardhan, Hon'ble Minister of Environment, Forest and Climate Change regarding electrocution of animal and from Hon'ble MP Shri Chandra Kant Khaire regarding damage of crops due to fire caused by snapping of conductor.
3. Examination of various DPRs for proposals submitted for grant under PSDF Funding.
4. Inputs on RFP documents in respect of the projects to be awarded through TBCB.
5. DPR for Transmission work in Electricity Department of Govt. of Puducherry under JKA Loan.
6. DPR for Evacuation of Power through Intra-State Transmission Schemes under Green Energy corridor-II in Tamil Nadu through NCEF Grant.
7. The training on CYMCAP software for Calculation of ampacity and temperature related to Power Cables was conducted.
8. Enquiry in allegations of M/s NAMPA Steel against PGCIL.
9. Examination of Revised Cost Estimate (RCE) of PGCIL for transmission progress in North Eastern States and Sikkim.
10. CEA officer visited to Dharmatari district of Chhattisgarh for field inspection of work carried out under DDUGJY.
11. Input for public procurement (preference) to make in India to provide for purchase preference (united with local content) in respect transmission power sector.

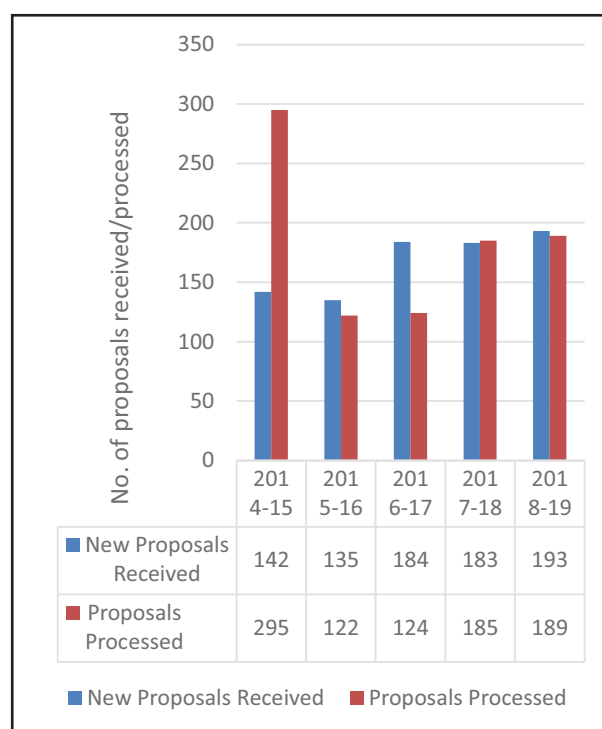
### 3.17 Power & Telecommunication Co-ordination Committee (PTCC)

PCD Division, CEA continued to follow up

cases to expedite PTCC clearance of EHV transmission lines of voltages 220 kV and above through discussions/follow-up with Bharat Sanchar Nigam Ltd. (BSNL), Railways, Defense and SEBs/Power Utilities. The division also rendered assistance to the State Power Utilities in resolving complex PTCC cases of voltage level of 132 kV and below.

To achieve the objectives of PTCC, two Central PTCC meetings were held viz. 106th Central PTCC meeting at Mahabaleshwar on 25th May, 2018 chaired by Chief Engineer (PCD), CEA and 107th Central PTCC meeting on 14th December, 2018 at Hyderabad chaired by CGM, BSNL (Jabalpur). 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.

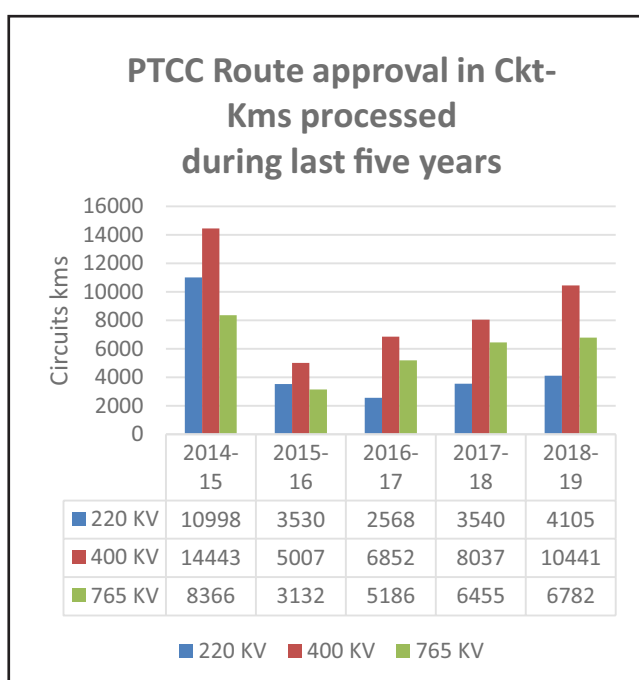
During the year 2018-19, 193 nos. new cases of EHV power lines (220 kV and above) were received for processing of PTCC route approval. A bar chart indicating the number of cases received for PTCC route approval during the last five financial years is given below:



It may be seen that during 2018-19, despite extreme staff crunch, computation of Induced Voltage (IV) likely to be developed on the communication / railway circuits in proximity of EHV lines under single line to earth fault current conditions in respect of 189nos. PTCC proposals were forwarded to BSNL, Defense & Railways for issuing the PTCC route approval. It included about 4105 Circuit kilometers of 220 kV lines, about 10441 Circuit kilometers of 400 kV lines and about 6782 Circuit kilometers of 765 kV lines. It is pertinent to mention that during 2018-19, 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.

It was a challenging task to process PTCC cases of 220kV transmission lines associated with SLTS (Srinagar Leh Transmission System), as there is no topomap issued by SoI (Survey of India) for Srinagar due to security considerations. CEA took extra ordinary efforts and computed induced voltage with the help of Google earth maps, and cleared PTCC cases without any delay in charging of lines.

A bar chart indicating the Circuit kilometers of 220kV, 400kV and 765kV transmission lines, for which PTCC route approval was accorded during the last five years is given below:



### 3.18 Reliable Telecommunication & Data Acquisition System for Power Sector at 66kV & 33kV level

Ministry of Power has entrusted to CEA the work of coordination with States/UTs in preparation of a Report for ensuring reliable telecommunication and data acquisition system at 66kV and 33kV substations located in disaster prone areas across the country. Accordingly, PCD Division had prepared and submitted the Report to Ministry of Power.

### 3.19 Frequency Allocation Co-ordination for 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 Telecommunication Consultancy Technical Support

HE&RM Division, CEA is carrying out the consultancy assignment for Jigmeling 400kV GIS Substation, Bhutan. PCD division is also rendering assistance in regard to communication of data, voice and protection; as and when required. Similar assistance was provided to HE&TD Division, CEA in regard to telecommunication consultancy assignment for Punatsangchhu-I Hydroelectric Project (6X200 MW), Bhutan.

### 3.21 Framing of Regulation for Communication Standards for power system operations

It was noted that in the absence of standards for communication systems, adequate planning of communication systems commensurate with transmission system planning was not being done. The transmission utilities tend to provide need based communication facilities in a non-systematic manner. Therefore, provision of communication standards was considered to be vital. To prepare the Communication

Standards, a Committee under the chairmanship of Member (Power System), CEA was constituted. The Committee comprises representation from NTPC, NHPC, PGCIL, KPTCL (Karnataka), MSETCL (Maharashtra), OPTCL (Orissa), APTRANSCO (Andhra Pradesh), NLDC (POSOCO), Wind Power Association and CEA. The Committee finalized the Draft Standards. The objectives of the Communication Standards were to ensure seamless integration, reliable, redundant and secure communication. These standards are applicable to all Users and control centres connected to the grid. The performance and reliability requirements of communication system have also been specified, so that these aspects are taken care while designing the communication systems. The security requirements to manage cyber security risks have also been addressed. The Standards of different technological options available for power system communication have also been included. To make standards more inclusive, public comments are also being sought.

### 3.22 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, TSTransco, Bihar SLDC and MPPTCL. The draft Manual has been prepared and is being proposed for inviting public comments.

### 3.23 Inspection of Electrical Installation

The Indian Electricity Act, 2003 stipulates the statutory inspection of electrical installations by Central and State Electrical Inspectors in respect of installations within their respective jurisdictions. The Chief Electrical Inspector and Electrical Inspectors appointed by the Central Government under section 162 of EA 2003 discharge the functions described in 'The Qualifications, Powers and Functions of Chief Electrical Inspector and Electrical Inspectors Rules, 2006' as per the provision of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended). The Chief Engineer of Chief Electrical Inspectorate Division is appointed as Chief Electrical Inspector to the Government of India and is assisted by the officers of Chief Electrical Inspectorate Division and Electrical Inspectors and the officers from five Regional Inspectorial Organizations (RIOs) with Headquarters at New Delhi, Chennai, Shillong, Mumbai, Kolkata in discharging the various responsibilities, briefly described as under:

- (a) Periodic inspection of electrical installations for compliance under Regulation 30 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (as amended).
- (b) Inspection of new electrical installations under Regulations 43 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010 (As amended) for according approval for energization of electrical installation of voltage exceeding 650 Volts.
- (c) Amendment of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010
- (d) Inquiry of fatal and non-fatal electrical accidents and remedial measures to be taken to avoid recurrence of such accidents in future.
- (e) Collection of Statistics, Return & information relating to electrical accidents in Format-19 & 20 under furnishing of Statistics, Returns & Information regulations 2007.

- (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.

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

- (a) The 2nd amendment of the above mentioned regulations was notified in Gazette on 1st March, 2018.
- (b) The 3rd amendment of the above mentioned regulations regarding Safety Provisions of Electric Vehicle charging stations is under approval for Gazette Notification.
- (c) Periodic Comprehensive review of the above mentioned regulations is in public domain for seeking comments.

### 3.24 Major achievement in terms of inspections during the year 2018-19 (Important installations inspected)

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

##### A) Substations:

- (i) **765 kV Substations:** Dharamjaygarh, Kotra, Champa, Jabalpur, Vindhyachal, Khandwa, Dhule, Bilaspur, Narsinghpur (NTPC), Palanpur, Durg, Kadapa, Vemagiri, Raichur, Nellore, Kurnool, Angul (PGCIL), Ranchi, Gaya, Darlipalli (NTPC), Chittorgarh (PGCIL).
- (ii) **400 kV Substations:** Dharamjaygarh, Kotra, Champa, Jabalpur, Vindhyachal, Khandwa, Dhule, Palanpur, Durg, Anumala, Boisar, Indore, Dehgam, Shajapur, singrauli (Essar), khargone (NTPC), Vadodara, Mapusa, Gwalior, Bhachau, Kala, Betul, Banaskantha,

Somanahalli, Chilakaluripeta, Sattena palli, Hirayur, Hindurpur, Srikakulam, Tuticorin, Dharwad, Srikona (PGCIL), Bongaigaon (PGCIL), Biswanath Chariali (PGCIL), Balipara (PGCIL), Imphal (PGCIL), Palatana (OTPC), Srikona, (PGCIL), Substation at Ranchi, Farrakka, Baripada, Durgapur, Daltonganj, Banka, Bolangir, Koenjhar, Biharsharif, Gaya, Patna, Murshidabad, Kishanganj, Chaibasa, Jharsuguda (OPGC), TPTL, Kahalgaon (NTPC), Nabhinagar (BRBCL), Chamera-I Hydro-electric Project, GIS at Tughlakabad (PGCIL), Mandola (PGCIL), Ballabgarh (PGCIL), Kala (PGCIL).

- (iii) **220kV Substations:** Navsari, Bhilosa industries (DNH), Naranpur (Ostro), Khandwa, Kakrapar (NPCIL), Karaikal, Challakere, Gaya (PGCIL), Bhadla, Jodhpur (Saurya Urja Co.).

- (iv) **132kV Substations:** Narsinghpur (NTPC), Mokochung (PGCIL), Nabhinagar (NTPC), Darlipalli, Durgapur (DVC), Bokaro (SAIL), GIS at Haldia (IOCL), Rourkela (NTPC-SAIL).

- (v) **HVDC Substations:** Champa, Bhadrawati, Kurukshetra (PGCIL terminal).

The details of electrical apparatus inspected at different voltage levels during the year 2018-19 is as follow:

Apparatus Voltage level	Transformers / ICT (MVA)	Reactors (MVar)	Capacitors (MVar)	Bays (no.)	Bus (no.)	Statecom (no.)
765 kV	6833	2420	Nil	50	2	Nil
400 kV	10617	3455	Nil	140	4	4
220 kV	1167	Nil	Nil	65	7	Nil
132 kV	232	Nil	Nil	27	1	Nil
33 kV	497.15	Nil	Nil	64	6	Nil
HVDC 800 kV	1776	Nil	Nil	Nil	Nil	Nil

Above data are based on the cumulative inspections carried out by all RIOs.



- B) Generating Units:** Thermal units of Neyveli (NLC), NMDC, OPGC Jharsuguda, NPGC Nabhinagar, BRBCL Nabhinagar, Hydro units of Gati Infra Chuzachen.

The region wise summary of generating units inspected during the year 2018-19 is as given below: -

RIOs	NR	SR	WR	ER	NER
No. of Inspections	Nil	1	1	4	1
Gen. Capacity (MW)	Nil	1000	80	2340	250

#### Transmission Lines:

- (i) **765 kV Lines:** Warora - Parli, Gadawara Warora, Vempally -Kadapa GIS (LILO), Dharmapuri - Tumkur (PGCIL), Dharmapuri - Tumkur (PNMTL), Sundargarh - Angul (PGCIL), Jharsuguda - Raipur (OGTL), Jharsuguda - Raipur (OGTL), Vindhyachal-Jabalpur (PJTL).
- (ii) **400 kV Lines:** Hindupur - NP Kunta, Srikakulam - Garividi, Tumkur - Hiriyur, Chilakaluripeta - Narasaraopeta, Neyveli - Pondicherry, Silchar - Melriat, Farakka-Jeerat (LILO) (PGCIL), Farakka-Behrapore, Kahalgaon-Banka, Rangpo-Kishanganj (TPTL), Samba - Amargarh, Neemrana-Dhanonda, Samaypur-Bamnauli (LILO), Mahan-Sipat (Essar).
- (iii) **220 kV Lines:** Naranpar - Bhachau, Mariachi - Tuticorin, LILO GIREL - Tuticorin PS, Neyveli - Bahoor (LILO), 220kV Agra - Bharatpur (LILO).
- (iv) **132 KV Lines:** Tezu - Namsai, Dhampur - Kalagarh (LILO).

Summary of transmission lines inspected at different voltage levels during the year 2018-19 is given below:

(Data in Circuit Km)

RIOs kV	NR	SR	WR	ER	NER
765 kV	Nil	659	1231	1200	Nil
400 kV	697	807.8	Nil	637	288
220 kV	129	230	139.5	Nil	Nil
132kV	9	Nil	Nil	Nil	190
110 kV	Nil	16.7	Nil	Nil	Nil
66 kV	Nil	36	20.27	Nil	Nil
33 kV	Nil	299	38.8	8	Nil
11kV	Nil	Nil	20.15	Nil	Nil
800 kV HVDC	Nil	Nil	Nil	Nil	Nil

- C) Electrical installations of the following organizations were inspected during the year 2018-19:**

PGCIL, SAIL, GAIL, IOCL, HPCL, BPCL, ONGC, AAI, NALCO, BALCO, NMDC, CGPL, Sasan, AIR, CPWD, Port Trust-JNPT, Kandla, Mumbai Airport, RCFL, Mazagon Dock, BMCTPL, BARC, NBCC, Balmer Lawrie, DVC, NHPC, SBI, LIC, Kolkata Port Trust, ESIC, CRPF, AIIMS, IIT, Paradip Port Trust, Meja Urja Nigam Ltd., NPCIL, etc.

#### 3.24.2 Inspections done for Renewables:

Solar power plants at following locations: NLC Neyveli, IOCL Kadapa, BDL Hyderabad, SIPCOT Chennai, NLC Andaman, Arinsun Clean Energy Private Limited, Devi Ahilya Bai Holkar Airport, Indian Institute of Forest Management, ACME Jaipur Solar Power, Dockyard, Mahindra Renewables Pvt Ltd, Rewa Ultra Mega Solar project, HPCL, IOCL Haldia, DHNPDCL Athal, Khemani Distilleries Private Limited, Daman, IOCL Jharsuguda, IOCL Balasore, IOCL Bhubaneswar, IOCL Paradip, IOCL Malda, IOCL Raninagar, IOCL Petrochemical Marketing Complex, Panipat, ONGC Buildings Dehradun, AIIMS Delhi, HPCL oil terminal Jodhpur, NRPC Building Delhi, PAC buildings Bhullanpur. Wind Generation at Tirunelveli, Ostro Kutch.

Summary of Generation capacity of Renewable Energy Sources inspected during the year 2018-19 is given below: -

RIOs	NR	SR	WR	ER	NER
Gen.Capacity (MW)	5.103	1475.55	764	0.7	Nil

#### 3.24.3 Cinemas/Theatres installations inspected:

Summary of Cinemas/Theatres installations inspected during the year 2018-19 is given below:

RIOs	NR	SR	WR	ER	NER
No. Of Inspections	Nil	13	2	Nil	Nil

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

Major installations inspected:

**a) Generating plants** - Adani Mundra, JPL Seoni, GMR Chattisgarh, RKM Sasan, Chattisgarh RKM, TRN Korba, Bharuch TPL, SKS Chattisgarh, NTPC Ramagundam, Nuclear powerplant at Kudankulam, Kalpakkam, solar powerplant at AAI Chennai, IOCL Nagapattinam, HAL Bengaluru, BEL Hyderabad, HAL Bengaluru, NTPC Anantapuram. BgTPP Bongaigaon, NHPC Teesta, NTPC - Kahalgaon, Nabhinagar, DVC Chandrapura), GMR Meramundali, MPL Dhanbad, Teesta-III HEP (TUL), Tehri HPP (THDCIL), DVC Raghunathpur, DVC Bokaro.

**b) Substations** -Champa, Raigarh, Jabalpur, Kotra, Tamnar, Indore, Korba, Bina, Seoni, Mundra, Tamnar, Damoh, janjgir Champa, Kutch, Shajapur, Bharuch, Raichur, Thrissur, Kochin, Warangal, Hiruyur, Kudgi, Madurai, Bidadadi, Kudankulam, Kadapa, Greentech, Nellore, NFC Hyderabad, ISRO Mahendragiri, MRPL Mangalore, Hindustan Newsprint Kottayam Bongaigaon Salakati Kokrajhar, Misa (PGCIL), Balipara (PGCIL), PGCIL Jamshedpur, Raghunathpur (DVC), Bokaro (GIS), Nabhinagar (NTPC), Kahalgaon (NTPC), Maithon (MPL).

**c) Electrical installations** of PGCIL, SAIL, GAIL, IOCL, HPCL, BPCL, NPCIL, ONGC, AAI, NALCO, BALCO, AIR, Guwahati Refinery, Bongaigaon Refinery, OIL, Numaligarh Refinery Ltd., Digboi Refinery, Assam, Kolkata Port Trust SBI, BBMB, NFL, SJVNL, etc.

### 3.25 Inspections done in UTs

Details of inspections done in UTs during the year 2018-19 is given below: -

UTs	AN	DNH	DD	PDY
No. of Inspections	3	170	95	80

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

### 3.26 Self-certifications approval issued by RIOs

No. of self-certifications issued during the year 2018-19 is given below: -

RIOs	NR	SR	WR	ER	NER
No.	6	135	48	14	Nil

### 3.27 Investigation of Electrical Accidents

1. Non-fatal accident at Kachigam substation, Daman
2. Fatal accident at ESIC Model Hospital, Andheri, Mumbai
3. Fatal accident at Falandi village, Silvassa
4. Fatal accident at BHEL, Bhopal.
5. Non- Fatal accident at Patiala House Court, Delhi.
6. Fatal accident at Bhiwani, BBMB.

### 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 the RFD, the commissioning of 22647 CKm of transmission lines (6285 CKm of 765 kV, 9931 CKm of 400 kV and 6431 CKm of 220 kV) was targeted for the year 2018-19. Transmission lines of 22437 CKm (6750 CKm of 765 kV, 9146 CKm of 400 kV and 6541 CKm of 220 kV) have been commissioned as on 31<sup>st</sup> March 2019 and overall achievement is about 99.07 %. Details of transmission lines commissioned /completed during 2018-19 (as on 31<sup>st</sup> March 2019) are given in **Annexure-3I**.

Similarly, in the RFD, the commissioning of 62600 MVA of transformation capacity in substations (3000 MW at  $\pm 800$  kV HVDC, 22200 MVA at 765 kV, 21900 MVA at 400 kV and 15500 MVA at 220 kV level) was targeted for the year 2018-19. The transformation capacity of 72705 MVA (0 MW at  $\pm 800$  kV HVDC, 21000 MVA at 765 kV, 30560 MVA at 400 kV and 21145 MVA at 220 kV level) have been commissioned as on 31<sup>st</sup> March 2019 and overall achievement is about 116.1%. Details of substations commissioned/ completed during 2018-19 (as on 31<sup>st</sup> March 2019) are given in **Annexure-3J**.

Voltage-wise/Sector-wise actual achievement vis-à-vis RFD program for the year 2018-19 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.

Aggregate inter-regional transmission capacity by the end of 12th Plan was 75050 MW. Interregional transmission capacity added during plan period 2017-22 (up to Mar'19) is 24,000 MW and cumulative interregional transmission capacity is 99,050 MW (up to Mar'19). The increase in inter-regional transmission capacity would further facilitate smooth flow of power from surplus to deficit regions.

Total 22437 Ckms of transmission line and 72705 MVA of transformation capacity in substations (220kV and above voltage levels) have been added during the current financial year 2018-19 (upto 31<sup>st</sup> March 2019) resulting in all India transmission network of 413,407 ckms of transmission lines and 899, 663 MVA of the transformation capacity (220kV and above voltage level) as on 31<sup>st</sup> March 2019.

The Govt. of India has approved four major transmission schemes namely North-Eastern Region Power System Improvement Project (NERPSIP), comprehensive scheme for Ar. Pradesh & Sikkim, 220kV Transmission System from Alusteng (Srinagar) to Leh and Prime Minister's Development Package (PMDP) 2015 (being implemented by RECPTCL, POWERGRID and PDD of J&K). The construction of 220kV Transmission System from Alusteng (Srinagar) to Leh (via Drass, Kargil, Khalsti and Leh 220/66kV Sub-stations) in Jammu & Kashmir (J&K) was completed during current FY 2018-19. The construction of a 220kV Transmission System for interconnection of Alusteng (Srinagar) with Leh would establish connectivity with Northern Grid and would provide reliable power supply to the strategically important Ladakh region, which is also an area of defence establishment. The other transmission schemes/ projects are at various stages of implementation and are being monitored regularly.

For the year 2019-20, RFD Program for transmission lines and transformation capacity (Substations) is as under.

**(a) Quarter wise Target of Transmission lines:**

Transmission line (ckm)	Q1	Q2	Q3	Q4	Total
Target	7935	2889	5531	7266	2321

**(b) Quarter wise Target of Transformation capacity in Substations:**

Substation (MVA)	Q1	Q2	Q3	Q4	Total
Target	25895	19490	16346	19985	81716

Chart-I

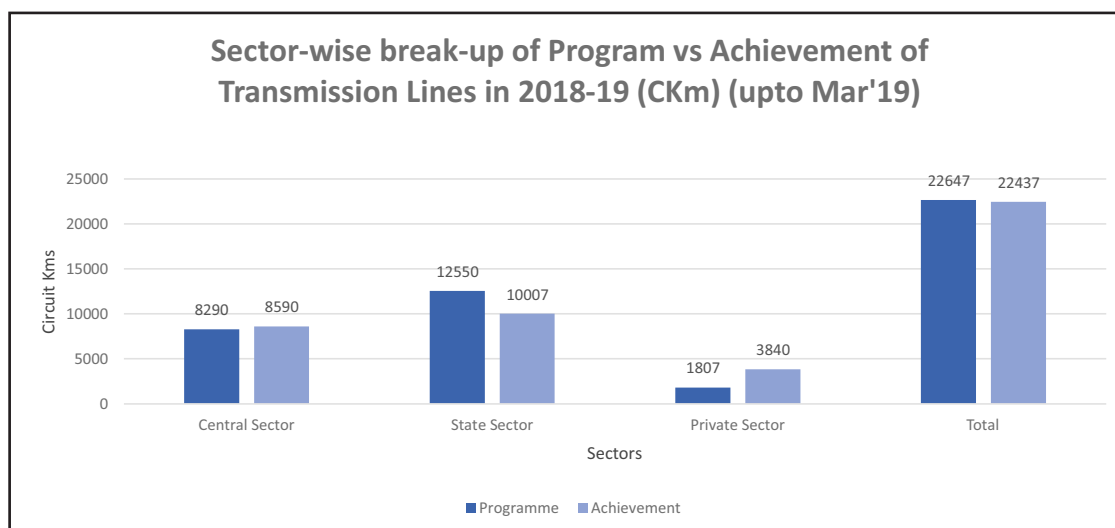


Chart-II

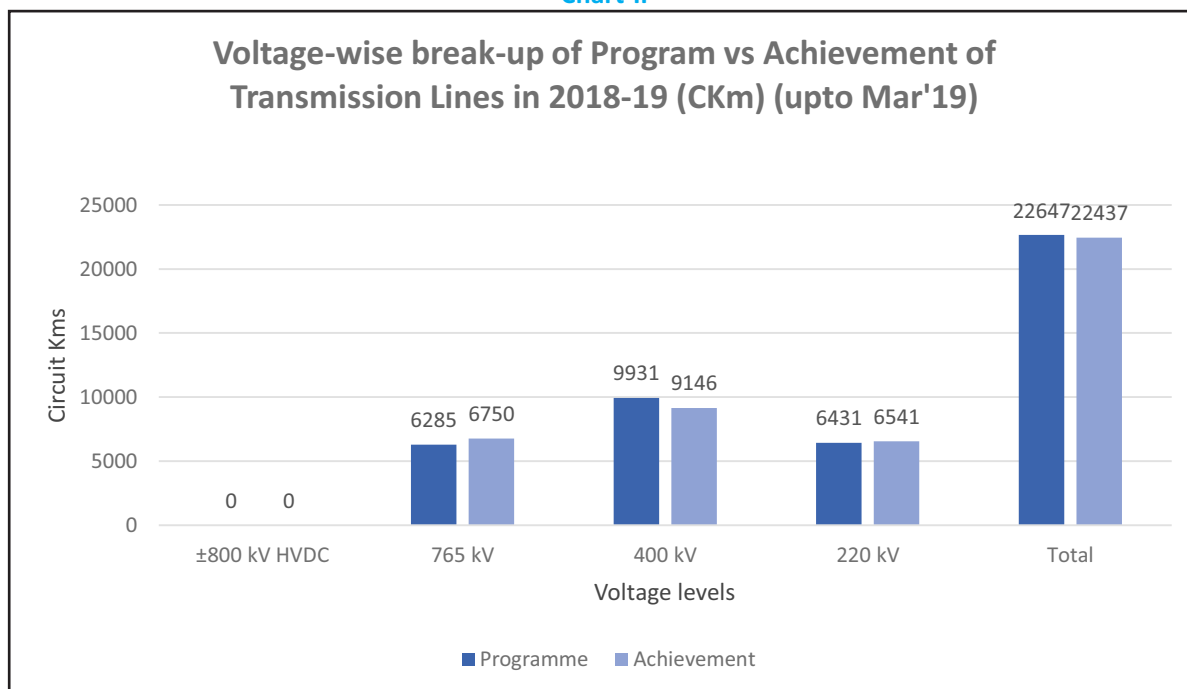


Chart-III

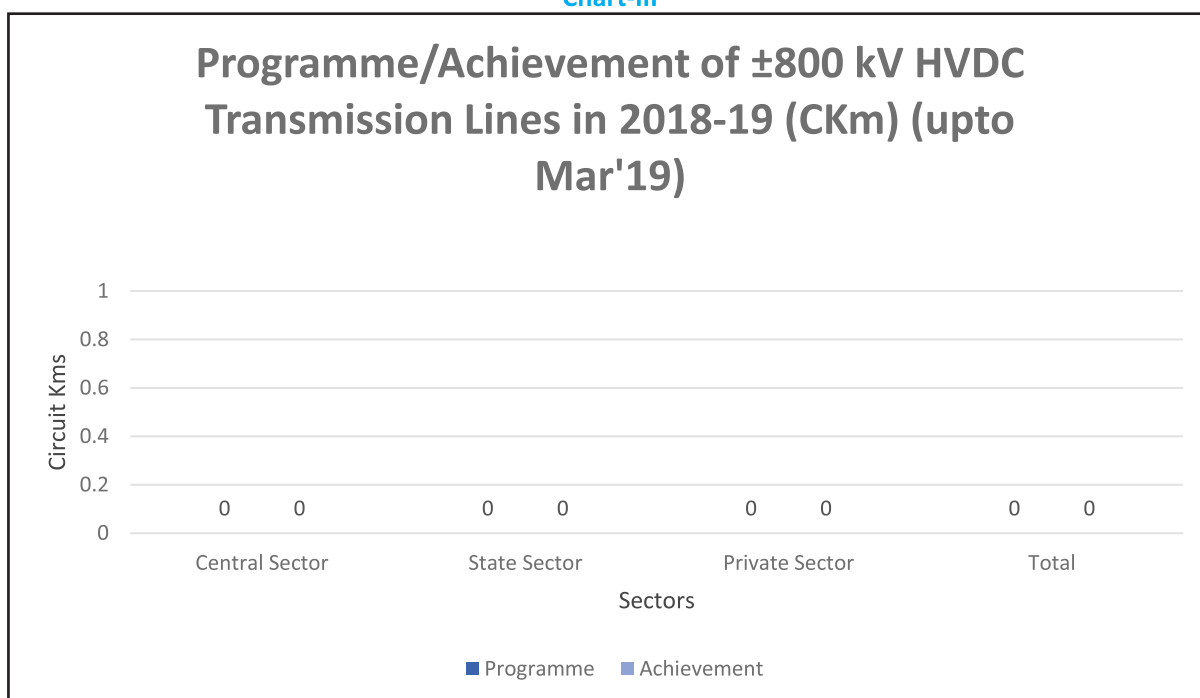




Chart-IV

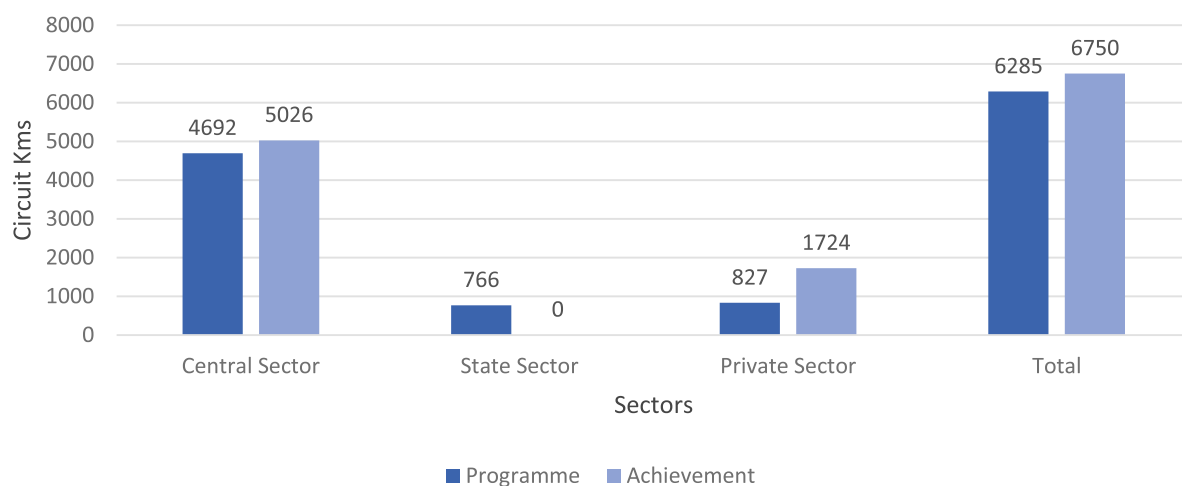
**Programme/Achievement of 765 kV Transmission Lines in 2018-19 (CKm) (upto Mar'19)**

Chart-V

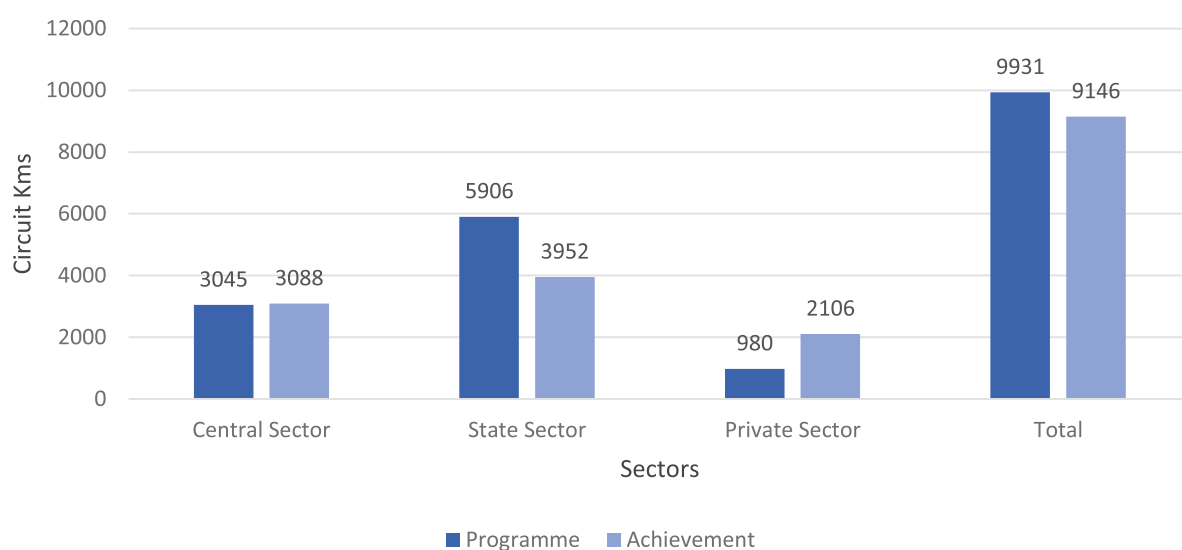
**Programme/Achievement of 400 kV Transmission Lines in 2018-19 (CKm) (upto Mar'19)**

Chart-VI

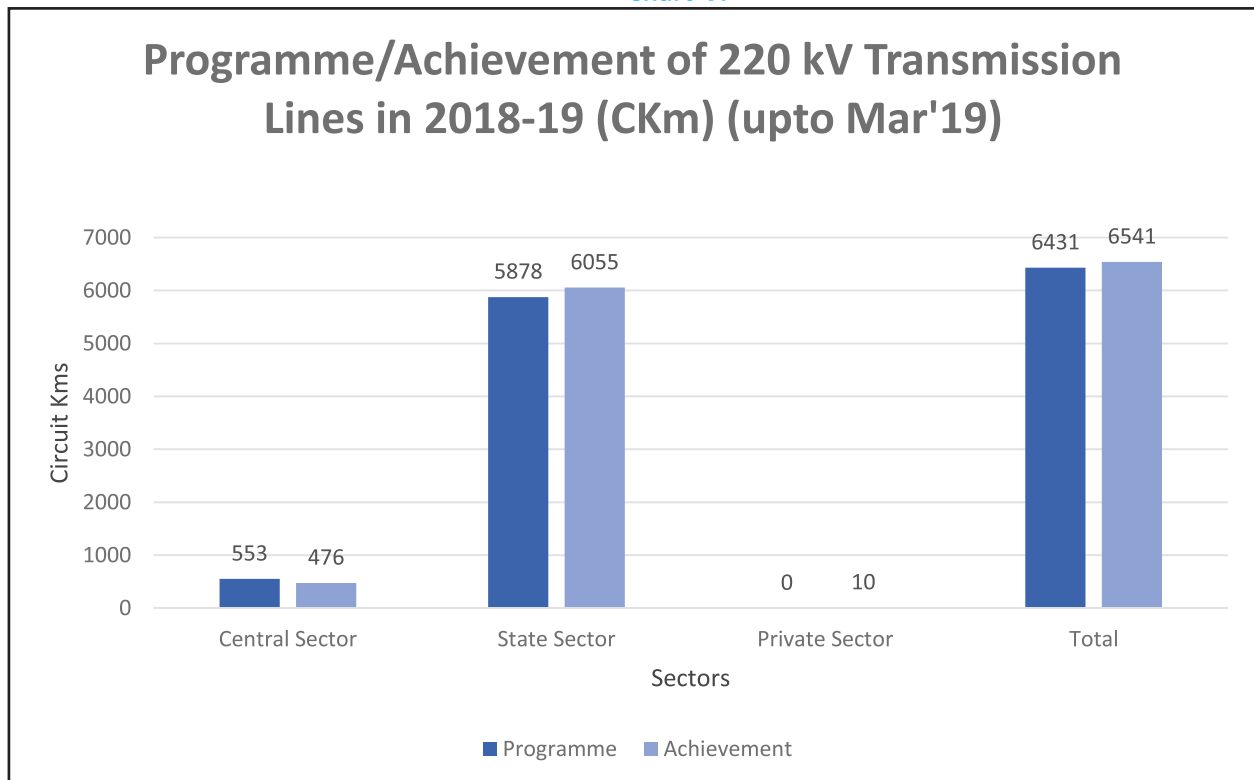


Chart-VII

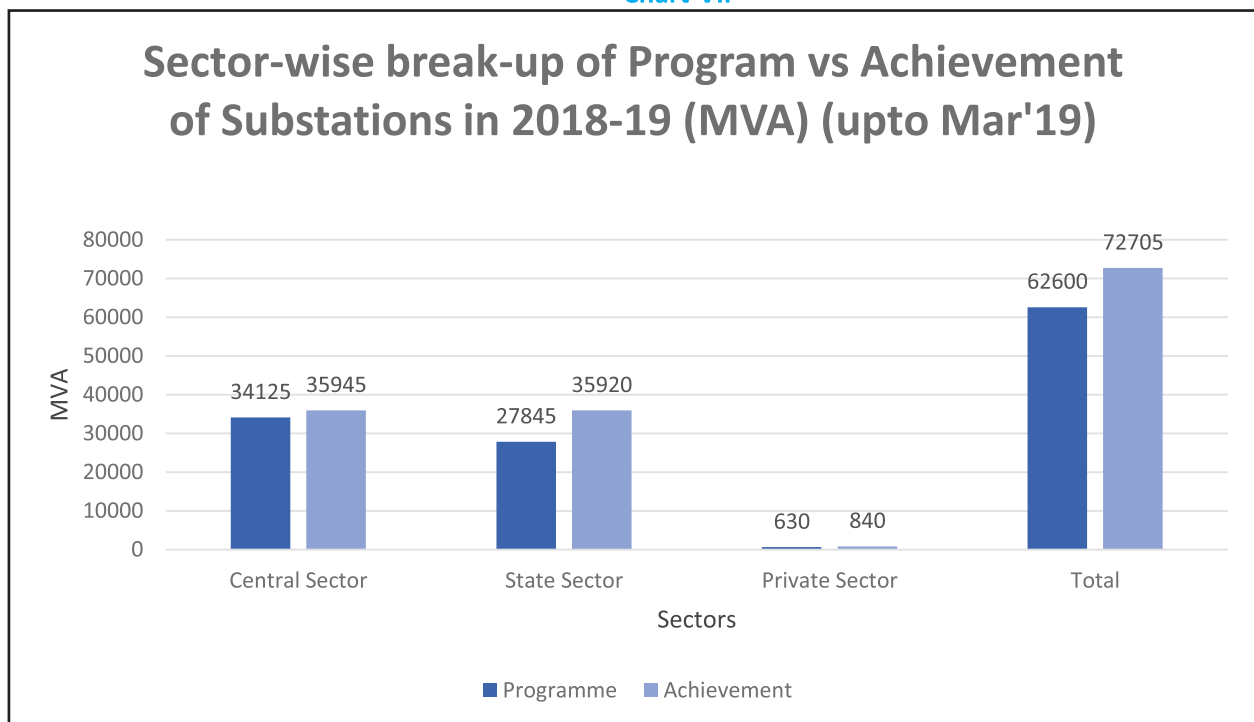


Chart-VIII

### Voltage-wise break-up of Program vs Achievement of Substations in 2018-19 (MVA) (upto Mar'19)

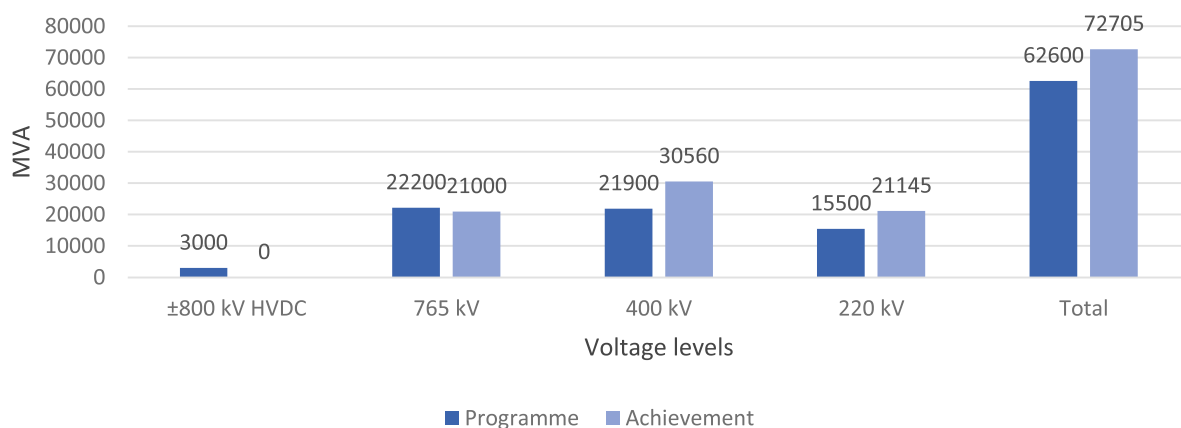


Chart-IX

### Programme/Achievement of ±800 kV HVDC Substations in 2018-19 (MVA) (upto Mar'19)

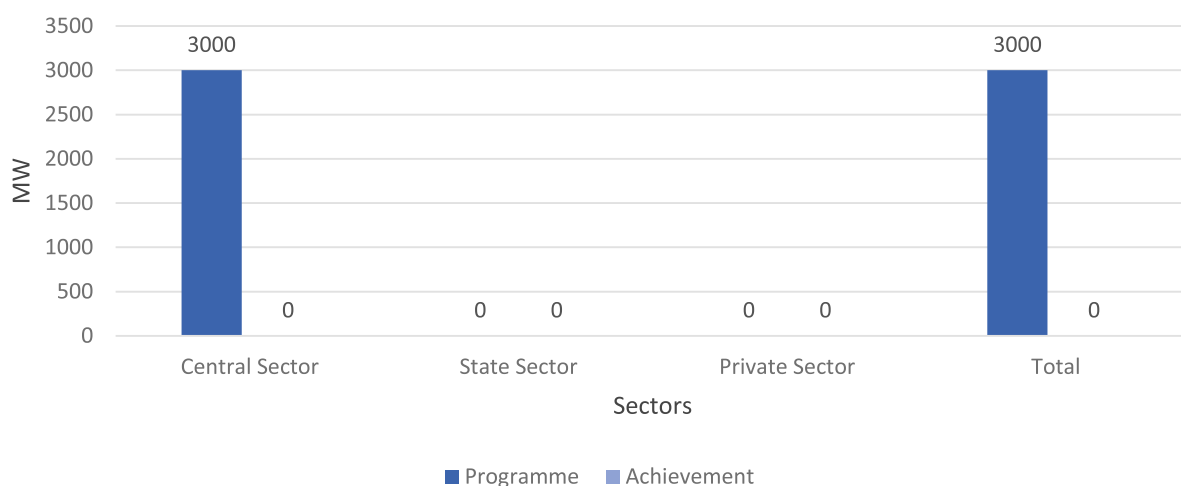


Chart-X

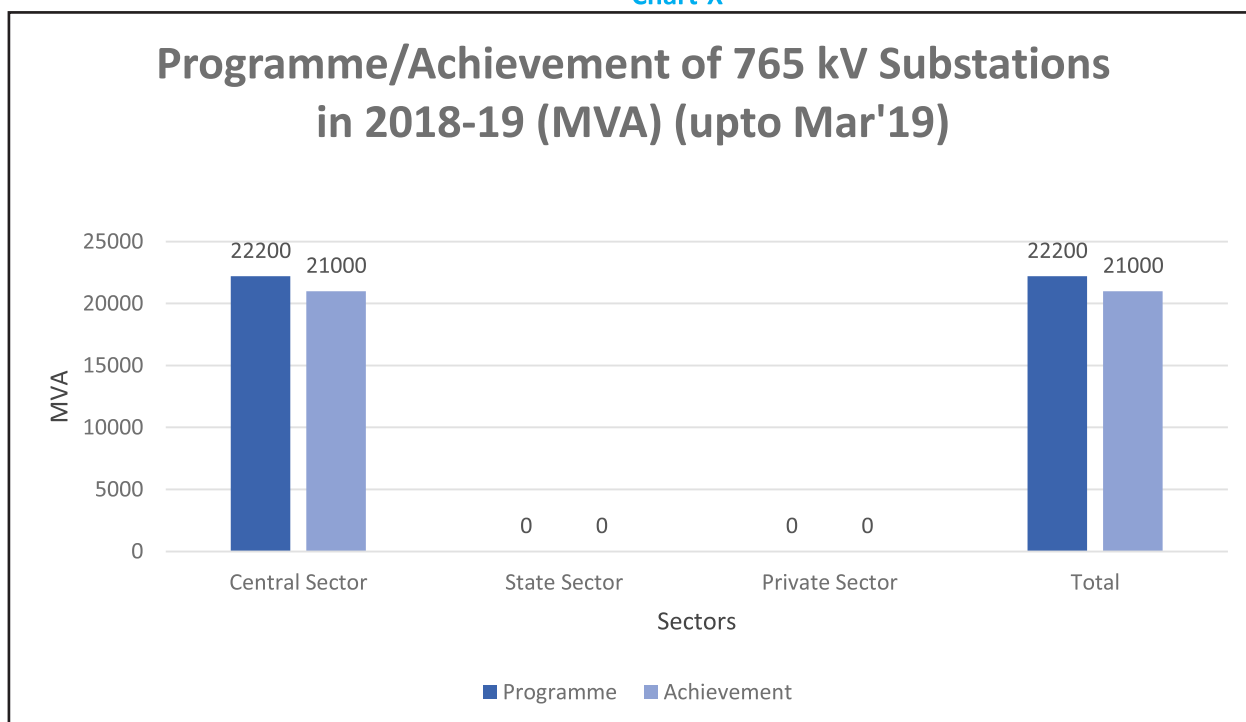


Chart-XI

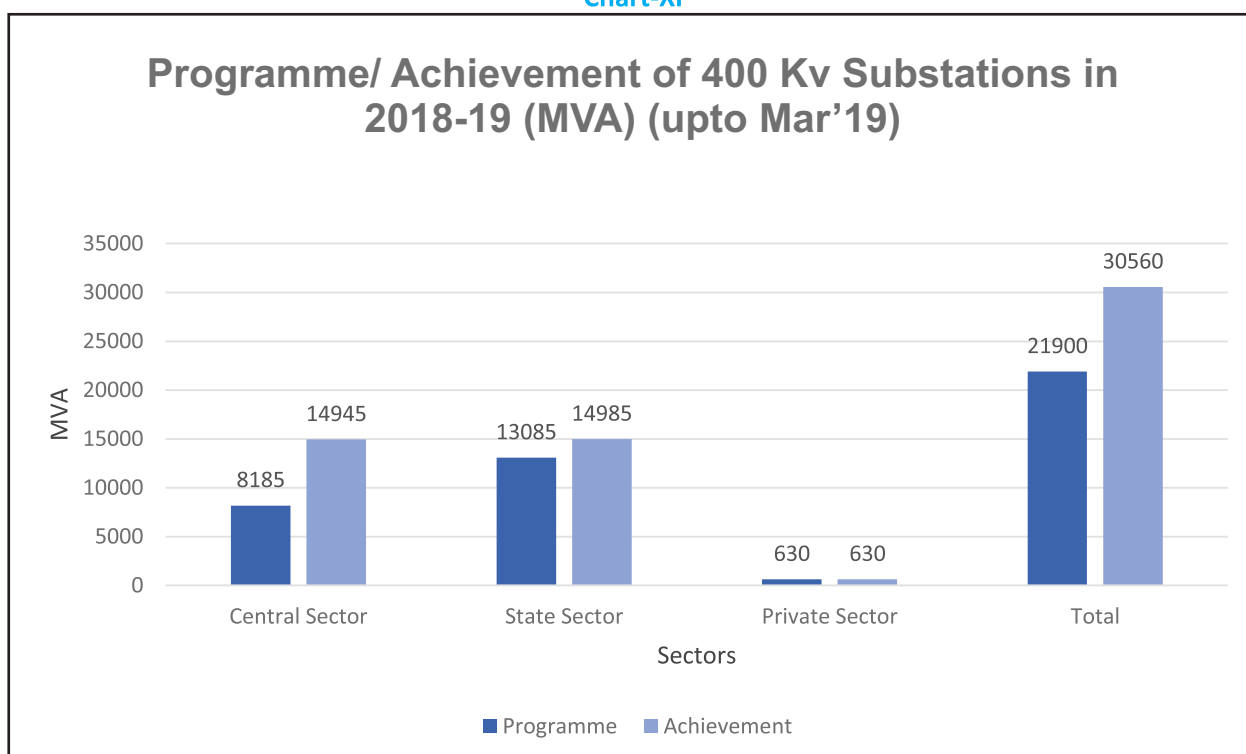
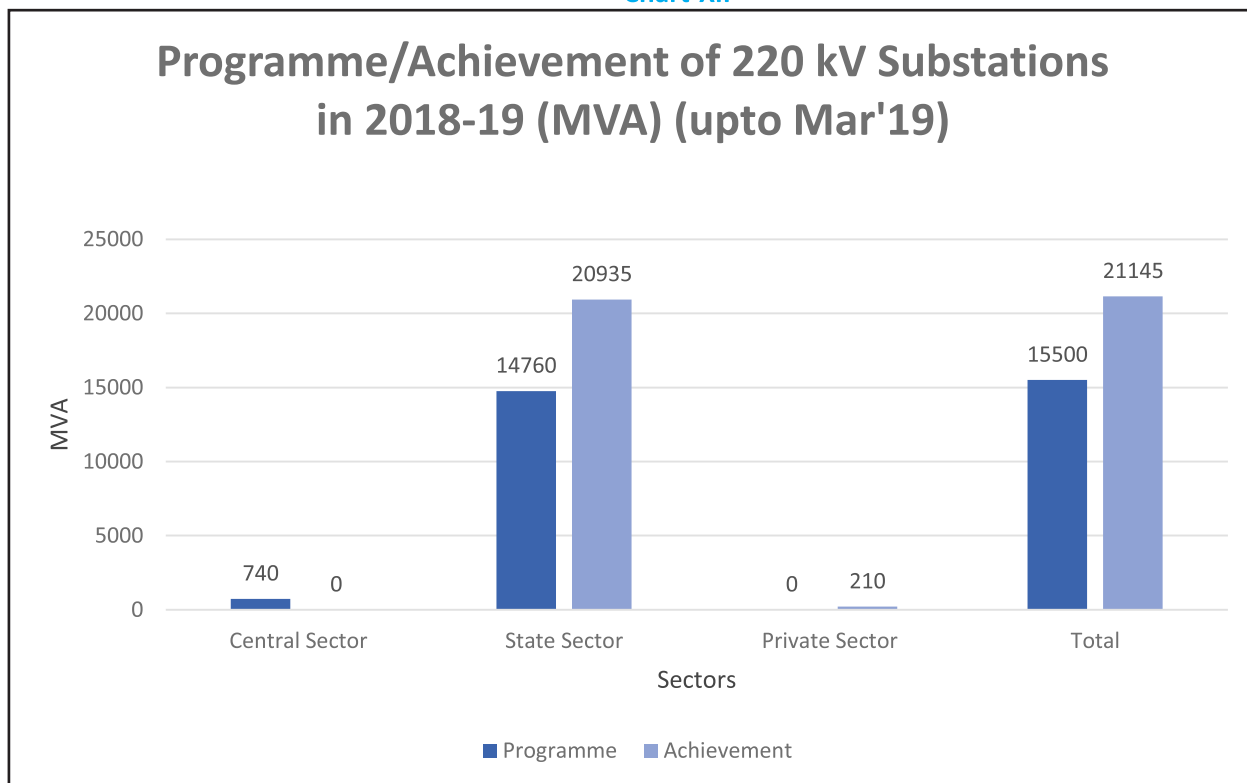




Chart-XII



## CHAPTER – 4

# GRID OPERATION AND MANAGEMENT

### 4.1 Organizational Structure in Grid Operation and Management

Central Government has established Regional Power Committee (RPC) in each region in accordance with 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 review the grid operation in the previous month and plan grid operation for the next month. The Commercial Sub Committee discusses commercial issues viz. energy accounting related matters, matters pertaining to SEMs, settlement of dues, etc. The Protection Sub Committee discusses and analyses various trippings which took place since its last meeting and recommends/monitors the corrective actions to avoid similar trippings. It also finalises protection schemes including protection coordination. The System Studies Sub Committee meets periodically for the purpose of System Studies. The Technical Coordination Sub Committee (TCC) meets before the Regional Power Committee for putting up matters for decision in the Regional Power Committee. The RPCs play an important role in planning grid operation, since

they are responsible for protection coordination, outage planning of generating units and transmission system, planning reactive compensation etc. Member (Grid Operation & Distribution), CEA is also a Member of the Regional Power Committees and guides the Committees to arrive at amicable solutions in case of disputes between Members of the Committees through unbiased decisions. To evolve a common approach to issues related to reliability and security of the grid, National Power Committee (NPC) has been established vide Ministry of Power (MoP) order dated 25th March, 2013.

CEA monitors the power supply position in the country, prepares the all-India monthly power supply position, coordinates 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 coordinates the implementation of the allocation through the Regional Power Committees. The anticipated Power Supply Position for the next year known as Load Generation Balance Report is also prepared every year.

### 4.2 POWER SUPPLY POSITION

The Central Electricity Authority brings out the All India Power Supply Position on a monthly basis, both in terms of energy and peak giving the 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 terms of Mega Watt (MW) and percentage. The total energy requirement in the country during 2018-19 was 1,274,595 Million Units (MUs) as against 1,213,326 MUs during the previous year, registering an increase of 5%. The total energy supplied in the country during 2018-19 was 1,267,526 MUs as against 1,204,697 MUs during the previous year, registering an increase of 5.2%. The energy not supplied

during the year 2018-19, therefore, decreased from 8,629MUs to 7,070MUs with percentage declining from 0.7% to 0.6%, as compared to previous year. The peak demand during the year 2018-19 was 177,022 Mega Watt (MW) as against 164,066MW during the previous year, registering an increase of 7.9%. The peak met during 2018-19 was 175,528MW as against 160,752MW during the previous

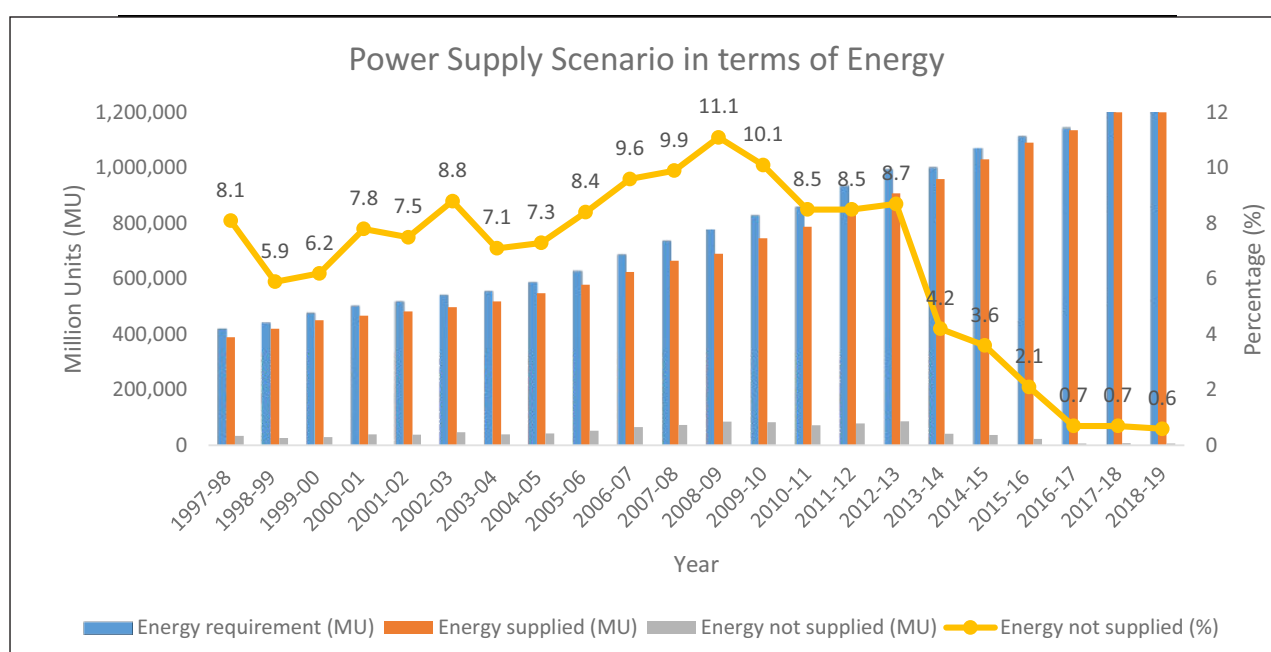
year, registering an increase of 9.2%. The demand not met during the year 2018-19, reduced from 3,314MW to 1,494MW with percentage declining from 2.0% to 0.8% as compared to previous year.

The power supply position since beginning of 9<sup>th</sup> Plan is as under:

### Energy:

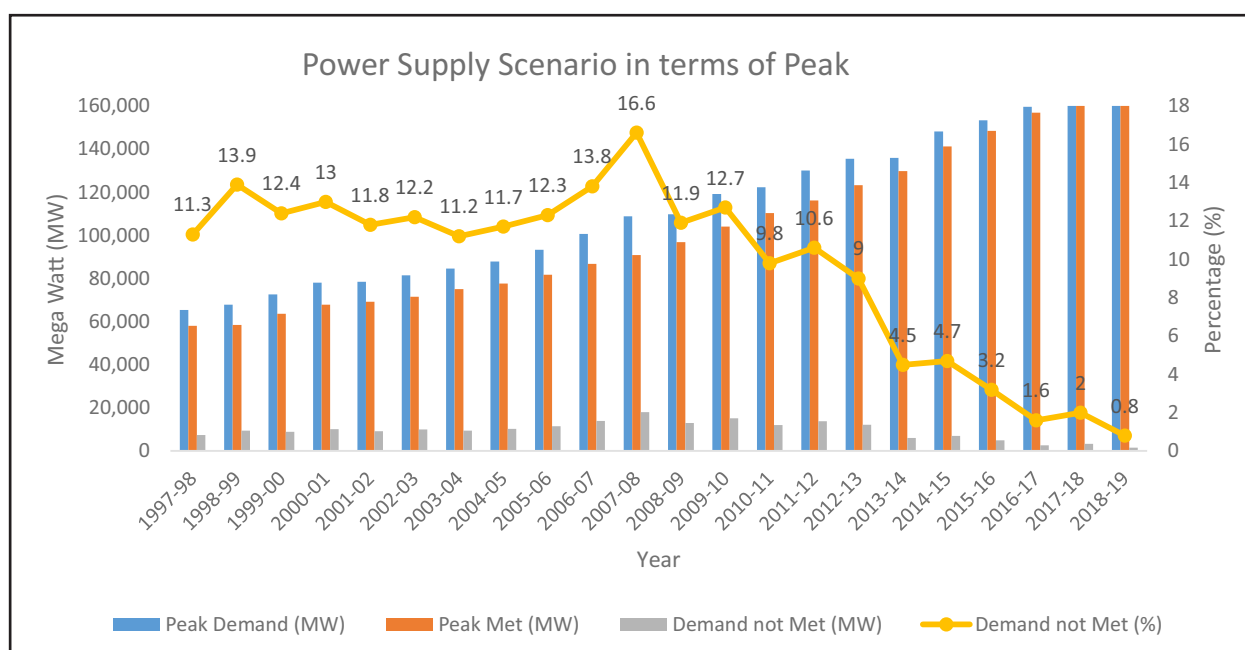
Year	Energy Requirement (MU)	Energy Supplied (MU)	Energy not Supplied	
			(MU)	(%)
1997-98	424,505	390,330	34,175	8.1
1998-99	446,584	420,235	26,349	5.9
1999-00	480,430	450,594	29,836	6.2
2000-01	507,216	467,400	39,816	7.8
2001-02	522,537	483,350	39,187	7.5
2002-03	545,983	497,890	48,093	8.8
2003-04	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

**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



The Power Supply Position in terms of Energy and Peak during 2018-19 is enclosed in **Annexure-I.**

*(for Annexure 4A of Annual Report as given in AR 2018-19)*

Details of the state-wise allocation from the Central Generating Stations in the country as on 31.03.2019 has been enclosed in **Annexure-II.**

*(for Annexure 4B of Annual Report as given in AR 2018-19)*



### 4.3 MERIT (Merit Order Despatch of Electricity for Rejuvenation of Income and Transparency) web portal

A Web Portal 'MERIT' i.e. Merit Order Despatch of Electricity for Rejuvenation of Income and Transparency was launched on 23rd June, 2017. Subsequently, MERIT Mobile App was also launched on 5<sup>th</sup> July 2017. This Mobile App/Web Portal displays the details of power purchased by the states from various power Stations/Sources and the rates thereof on day to day basis transparently and provides opportunity to states for improving their power purchase portfolio. (<http://www.meritindia.in>)

### 4.4 Operation of Regional Grids

#### 4.4.1 Northern Regional Grid

The installed capacity in Northern Region was 93,248.25 MW as on 31.03.2019 consisting of 57,721.46 MW thermal, 19,707.77 MW hydro, 1,620.00 MW nuclear and 14,199.02 MW from renewable energy sources. The Northern Grid faced an energy shortage of 1.3% and peaking shortage of 2.3% during the year 2018-19 as compared to energy and peak shortages of 1.7% and 3.8% respectively during the previous year i.e. 2017-18.

The inter-regional transmission connectivity (220 KV & above) of Northern Region with other regions is as under:

Northern Region is connected to Eastern region through  $\pm 500$  kV HVDC back-to-back station at Sasaram, 765 kV Sasaram-Fatehpur S/C line, 765 kV Gaya-Balia S/C line, 765 kV Gaya-Varanasi S/C (new) line & 765 kV Gaya-Varanasi S/C (LILO of 765 kV Fatehpur-Gaya at Varanasi), 400 kV Allahabad-Sasaram D/C line, 400 kV Bihar Shariff - Balia D/C line, 400 kV Patna - Balia (2 x D/C line), 400 kV Muzaffarpur - Gorakhpur (PG) D/C line (Series compensated), 400 kV Motihari - Gorakhpur D/C line, 400 kV Sasaram-Varanasi D/C line, 400 kV Bihar Shariff-

Varanasi D/C line, 220 kV Pusauli-Sahupuri S / C line.  $\pm 800$  kV Agra - Bishwanath Chariayali (multi-terminal) HVDC link is also available between Northern region and North Eastern region with intermediate poles at Alipurduar in Eastern Region facilitating transfer of power between NR, ER and NER. Northern Region is also connected to Western region through  $\pm 500$  kV HVDC back-to-back station at Vindhyachal,  $\pm 800$  kV Champa-Kurukshetra Bipole HVDC link,  $\pm 500$  kV Mundra-Mohindergarh Bipole HVDC link, 2 nos. of 765 kV Agra-Gwalior S/C line, 2 nos. of 765 kV Phagi-Gwalior S/C line, 2 nos. of 765 kV Jabalpur-Orai S/C line, 765 kV Satna-Orai S/C line, 765 kV Gwalior-Orai S/C line (LILO of 765 kV Satna-Gwalior at Orai), 400 kV Bhinmal-Zerda D/C line, Kankroli-Zerda D/C line, 400 kV RAPP-Shujalpur D/C line, 400 kV Vindhyachal (Pool) -Rihand-III D/C line, 220 kV Auraiya-Malanpur D/C line, 220 kV Auraiya-Mehgaon D/C line, 220 kV Sakatpura-Badod D/C line, LILO of 220 kV Modak-Bhanpura D/C line at Ranpur.

The commissioning of 765 KV Jabalpur-Orai line, LILO of 765 KV Satna-Gwalior at Orai and, LILO of 220 KV Bhanpura-Modak D/C line at Ranpur has enhanced transmission capability between NR and WR.

#### 4.4.2 Western Regional Grid

The installed capacity in Western Region was 117,621.55 MW as on 31-03-2019 consisting of 85,155.11 MW thermal, 7,547.50 MW hydro, 1,840 MW nuclear and 23,078.94 MW from renewable energy sources. The Western Grid faced an energy shortage of 0.1% and a peaking shortage of 1.5% during the year 2018-19 as compared to energy and peak shortages of 0.1% and 0.8% respectively during the previous year i.e. 2017-18.

Western region is connected with Northern region through 765 kV Gwalior-Agra D/C, 765 kV Gwalior - Jaipur D/c, one circuit of 765 kV Satna-Gwalior LILO at Orai SS in Northern Region, 765 kV Banaskantha-Chittorgarh D/c,

500kV Mundra-Mahendergarh HVDC, 400 kV HVDC Vindhyachal(PS)-Rihand, 765 kV VSTPS-Rihand D/c charged at 400 kV, 400 kV Shujalpur-RAPPD/c, 400 kV Zerda-Kankroli, 400 kV Zerda-Bhinmal, 220 kV Malanpur-Auraiya, and 220 kV Bhanpura-Sakatpur(Kota). The East - West corridor is linked through 220 kV D/C Korba-Bhudhipadar, 220 kV Raigarh-Bhudhipadar S/c, 400 kV D/C Rourkela-Raipur, 400 kV D/C Ranchi-Sipat and 400 kV Raigarh-Jharsuguda four no. of ckts. 765 kV D'jaygarh-Jharsuguda D/C, 765 kV D'jaygarh to Ranchi D/c. The Southern region is connected through 765 kV Raichur-Sholapur 2xS/C line, 765 kV Wardha-Nizamabad D/c, 765 kV Kolhapur-Narendra D/c charged at 400 kV, 220 kV Talangade-Chikodi, 220 kV Kolhapur-Chikodi, 220 kV Ponda-Ambevadi, 220 kV Xeldem-Ambevadi, and 500 kV Bhadrawati HVDC back to back.

#### 4.4.3 Southern Regional Grid

The installed capacity in Southern Region was 106,932.27 MW as on 31-03-2019 consisting of 53,217.26 MW thermal, 11,774.83 MW hydro, 3,320 MW nuclear and 38,620.18 MW from renewable energy sources. The Southern Grid faced an energy shortage of 0.1% and peaking shortage of 0.2% during the year 2018-19 as compared to energy and peak shortages of 0.2% and 0.4% respectively during the previous year i.e. 2017-18.

The Talcher Stage-II super thermal power station (4X500 MW) of NTPC in Eastern Region is a dedicated power station for the Southern Region except for 200 MW power allocation to the home state of Orissa in ER. The Southern Region is connected with the Eastern Region through upgraded Talcher - Kolar HVDC bipole link, HVDC back-to-back link at Gajuwaka, Balimela - Upper Sileru 220kV S/C and 765 kV Angul - Srikakulam. Southern Region is also connected with Western Region through HVDC back to back link at Chandrapur in addition to 2xS/C 765kV Sholapur- Raichur, 220kV Kolhapur-Chikkodi D/C line, 765 kV Kudgi - Kolhapur 1&2 (charged at 400 kV level) and 765 kV Wardha - Nizamabad D/C Line.

#### 4.4.4 Eastern Regional Grid

The installed capacity in Eastern Region was 33,907.24 MW as on 31.03.2019 consisting of 27,563.64 MW thermal, 4,942.12 MW hydro and 1,401.48 MW from renewable energy sources. The Eastern Grid faced an energy shortage of 0.7% and peaking shortage of 1.8 % during the year 2018-19 as compared to energy and peak shortages of 0.8% and 1.5% respectively during previous year i.e. 2017-18.

Eastern Region has a unique geographical advantage of having inter-Regional links with all the regions of the country along with international lines to Nepal, Bhutan and Bangladesh. Eastern Region exports power to the neighboring region of the country. Eastern Region receives power from Chukha, Kurichhu, Tala and Dagbachu HPS of Bhutan and exports power continuously to Bangladesh and Nepal. Power export to Bangladesh is through 400 kV D/C Berhampur -Bheramara (Bangladesh) line. Power export from ER grid to Nepal is through 400 kV D/C (charged at 220 kV) Mazaffarpur-Dhalkheber (Nepal) line. Also power to Nepal is supplied from Bihar state network. Eastern Region is connected to Northern Region through 765 kV S/C Gaya-Balia, 765 kV D/C Gaya-Varanasi, 765 kV S/C Sasaram-Fatepur lines, 400 kV D/C Muzaffarpur-Gorakhpur line with TCSC, , 400 kV D/C Motihari - Gorakhpur line, 400 kV 2x D/C Patna - Balia line, 400 kV D/C Biharsharif-Balia and 400 kV S/C Sasaram - Allahabad line, 400 kV S/C Sasaram-Varanasi, 400 kV D/C Biharsarif-Varanasi; to Western Region through 220 kV Korba -Budhipadar T/C lines, Raipur-Rourkela 400 kV D/C lines and Ranchi-Sipat 400 kV D/C line, 765 kV New-Ranchi-Dharamjaygarh; to Southern Region through Talcher - Kolar HVDC bipole link and HVDC back-to-back link at Gazuwaka, 765 D/C Angul-Srikakulam(AP) and to North-Eastern Region through 400 kV D/C Bongaigaon - Binaguri lines, 400 kV D/C Alipurduar-Bongaigaon and Alipurduar -Salakati 220 kV D/C lines.

#### 4.4.5 North-Eastern Regional Grid

The installed capacity in North-Eastern Region was 4,333.11 MW as on 31-03-2019 consisting of 2,581.83 MW thermal, 1,427.00 MW hydro and 324.29 MW from renewable energy sources. The North Eastern Grid faced an energy shortage of 2.8% and a peaking shortage of 3.9% during the year 2018-19 as compared to energy and peaking shortage of 2.8% and 4.1% respectively during the previous year i.e. 2017-18.

North Eastern Regional Grid is connected directly to the Eastern Regional Grid and Northern Regional Grid. The power transfer from North-Eastern Region to Eastern Region is taking place over following 6 lines: 400 kV Bongaigaon - New Siliguri I & II, 400 kV Bongaigaon - Alipurduar I & II and 220 kV Salakati - Alipurduar I & II and to the Northern Region Grid through +/- 800 kV Biswanath Chariali - Agra Pole-I & Pole-II.

#### 4.5 Major Roles of NPC Division are as follows:

- a) Secretariat to National Power Committee.
- b) All works related to Power System Development Fund (PSDF) including assistance in examination of DPRs for funding from PSDF, preparation of their appraisal report, monitoring of funds, monitoring and supervision of various schemes under implementation from PSDF, etc.
- c) Providing assistance to the Grid Study Committee.

##### 4.5.1 National Power Committee (NPC)

NPC was established by Ministry of Power vide order dated 25<sup>th</sup> 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) office regions are members of NPC. Chief Engineer (NPC), CEA is Member Secretary of NPC.

Since its formation, NPC has taken several initiatives on improving defense mechanism (like Under Frequency Relay and rate of change of frequency  $df/dt$  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 CERC. The methodology / procedure for computing actual drawal / injection of entities in case of non-availability of Main/Check/Standby Meter Data were also finalized. NPC also impressed upon ensuring the healthiness of protection system of the entire power system of the country.

Eighth (08<sup>th</sup>) meeting of the NPC was held during 2018-19 and following issues were discussed:

- i) Consideration of request from CTU for Membership in National Power Committee (NPC)
- ii) Review of AUFLS Settings: It was decided to revise AUFLS scheme with 4 stages and raising the frequency by 0.2 Hz viz. 49.4, 49.2, 49.0 & 48.8 Hz,
- iii) Ensuring Proper Functioning of Under Frequency Relays (UFR) &  $df/dt$  Relays: to work out a common approach for  $df/dt$  settings in all the five regions and
- iv) Grid Events reported by RLDCs, Analysis and Remedial Measures recommended by RPCs: RPCs would conduct regular protection meetings for analyzing all the trippings and take remedial actions
- v) Schemes for Protection System Data Base in RPCs: implementing the scheme of Protection Database Management System (PDMS) in a timely manner in all the regions.
- vi) Status of Compliance of Enquiry Committee Recommendations

- vii) National Energy Account (NEA): it was decided that the proposal may be discussed in all the RPCs
- viii) Periodicity of Third Party Protection Audit
- ix) Uniform timeline for issuance of Availability Certificate
- x) Uniformity in methodology for Open Cycle Certification
- xi) Double charging the DICs in PoC regime

NPC was also entrusted to prepare Guidelines on availability of communication system in terms of Regulation 7.3(i) of CERC (Communication System for Inter-State Transmission of Electricity) Regulations, 2017. Accordingly, a Working Group was constituted under Member Secretary, NPC with members from all RPCs, CEA, POSOCO, CTU and NTPC. The Guidelines have been prepared in three (03) meetings of the working group, out of three meetings one meeting was held during 2018-19. The guidelines after obtaining comments from stakeholders were finalized and submitted to CERC.

#### 4.6 Power System Development Fund (PSDF):

- i. Ministry of Power, vide letter No.

29/9/2010-R&R (Vol-II) dated 10<sup>th</sup> 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 31.03.2019 is Rs.15274.70 Crores.

- ii) During 2018-19, ten (10) meetings of Techno-economic subgroup (headed by Member (GO&D)), two (02) meetings of Appraisal Committee (headed by Chairperson, CEA) for scrutiny, two (02) meeting of Monitoring Committee (headed by Secretary (Power)) for sanction of grant from PSDF and three (03) meetings of Project Monitoring Group (headed by Member (GO&D)) to monitor implementation of projects/schemes were held.
- iii) As on 31<sup>st</sup> March 2019, a total of 140 schemes have been sanctioned (117 schemes sanction order issued) with a total grant amount of Rs. 11,252.42 Crores from PSDF. These include 39 numbers of schemes with grant amount of Rs.992.34 Crores sanctioned (16 schemes sanction order issued) during the year 2018-19. Details are as given below:

Project Entity	During 2018-19		Previous Years		Total	
	Number	Grant	Number	Grant	Number	Grant
State/UT	36	951.44	88	5614.22	124	6565.66
RPCs	4	52.07	5	63.54	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
<b>Total</b>	<b>40</b>	<b>1003.51</b>	<b>101</b>	<b>10260.08</b>	<b>141</b>	<b>11263.59</b>

- iv) As on 31.03.2019, an amount of Rs 6081.03 Crs has been disbursed to the project entities for implementation of the schemes under PSDF out of that Rs . 4773.97 Crs was disbursed during the year 2018-19.

#### 4.7 Grid Study Committee:

In pursuance of the recommendation of the Enquiry Committee constituted by Ministry of Power after the grid disturbance on 30-31 July, 2012, Ministry of Power vide its order dated 13<sup>th</sup> December, 2012 had formed a Task Force for power system analysis under



contingencies. The Task Force had detailed deliberations on issues concerning safe and secure operation of the grid and submitted its report to the Ministry of Power in September, 2013, and accordingly two consultants viz. M/s Tractebel, Romania and M/s Powertech Labs Inc, Canada, (PLI) were appointed for this purpose.

A Grid Study Committee under the chairmanship of Member (GO&D), CEA with representatives from POSOCO, CTU, and STUs has been formed to facilitate the Consultant's study/analysis.

Both the consultants had completed the tasks and submitted the final report.

5<sup>th</sup> meeting of Grid Study Committee (GSC) was held during 2018-19. The committee has accepted the Reports of the Consultant M/s Tractebel and M/s Powertech Labs Inc.

#### 4.8 National Reliability Council for Electricity (NRCE)

Hon'ble CERC vide Order dated 11.12.2013 in Petition No.188/SM/2012 with IANo.11/2013 in the matter of calculation of Total Transfer capability (TTC), available

Transfer Capability (ATC) and Transmission Reliability Margin (TRM) directed CEA to constitute a National Reliability Council which shall approve computation of TTC of various Transmission corridors for the month, for the purpose of reliable operation of the Grid.

Accordingly, CEA vide letter No. CEA/NRC/RA-2014/427-452 dated 21.02.2014 had constituted National Reliability Council for Electricity (NRCE).

Consequent upon restructuring of CEA, CEA vide letter No.3/NRCE/NPC/CEA/

2016/245-270 dated 10.02.2016 reconstituted NRCE with the following members:

1. Member (GO & D), CEA - Chairperson of NRCE.
2. Chief Operating Officer (CTU) - Member,
3. Member Secretaries of all RPCs - Member,
4. Director of TANTRANSCO, WBSETCL, MSETCL, UPPCL & AEGCL - Member,
5. Prof. S.C.Srivastava, IIT, Kanpur - Member,
6. Prof. A.R. Abhyankar, IIT, Delhi - Member,
7. Chief Engineer (PSP&A-I, PSP&A-II CEA) - Member
8. Chief Engineer (NPC, CEA) - Member Secretary.

NRCE has constituted two subgroups, one for carrying out examination of the System studies for the purpose of calculation of TTC, ATC and TRM and the other one for Preparation of reliability Standards for "Protection System" for Indian Power System.

The 4<sup>th</sup> meeting of sub-group for issues related to TTC/ATC/TRM was held during 2017-18. Issues related to validation of thermal limits of transmission elements, analysis of determination of transmission reliability margin (TRM), utilization of LTA granted for solar plants, TTC/ATC curtailment on account of bus shut downs etc. were discussed.

The 5<sup>th</sup> meeting of sub-Group for Preparation of reliability Standards for "Protection System for Indian Power System" was held during 2017-18 and the draft standards were finalized and has been circulated to RPCs for comments.

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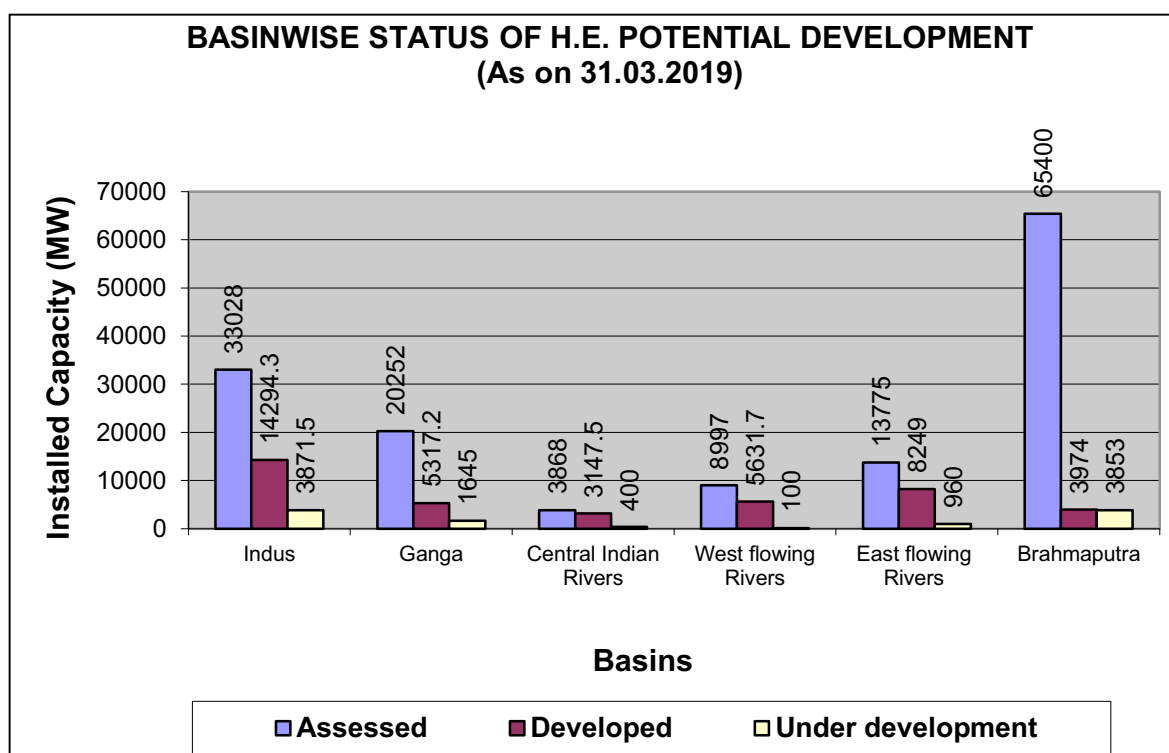
## CHAPTER – 5

### 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 31.03.2019, the hydroelectric schemes in operation account for only 27.95% (40613.6 MW) and those under execution for 7.45% (10829.5 MW) of the total potential in terms of installed capacity. Thus, the bulk of the potential (64.6%) 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 in operation and 3 Pumped Storage project (1205 MW) are under construction.

The work for basin wise reassessment of earlier assessed Hydro Electric Potential have

been taken up by CEA in association with WAPCOS Ltd. in March, 2017. The Reassessment study is being carried out, taking into consideration the actual site constraint in terms of site geology, submergence and other aspects including impact of these projects on the Environment and Forest. The progress of the work is being reviewed by a monitoring committee of CEA, CWC, MOEF, SOI, GSI & NRSC. The work is likely to be completed during 2019-20.

## 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. National Hydro-Electric Power Corporation Ltd., WAPCOS, North-eastern Electric Power Corporation, Satluj Jal Vidyut Nigam Ltd and number of State Power Utilities were associated in preparation of these feasibility Preliminary 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 39 schemes (20765 MW) have already been prepared. Out of which, 1 scheme (105 MW) has been commissioned while 7 schemes (1538 MW) are under construction in the country. A total of 17 schemes (9248 MW) have been concurred by CEA while 6 schemes (633 MW) are under examination in CEA. A total of 8 schemes (3055 MW) are under Survey & Investigation for preparation of DPRs. The work of preparation of DPRs of remaining 115 schemes (24110 MW) is held up due to proposed change in Agency/ Allotment by State Govt., issues related to Environment & Forest Clearance and Law & Order.

## 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 2017-18

Hydro capacity addition of 795 MW was achieved against the targets of 1305 MW for the year 2017-18. Project-wise details are given at **Annex-5B**.

### 5.4.1 Hydro capacity programme 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-5C**.

### 5.4.2 Hydro capacity programme during 2019-20

Hydro Capacity Addition Monitorable Targets planned for the Year 2019-20 is 1190 MW (600 MW in Central Sector, 211 MW in State Sector, and 379 MW in Private Sector.). Project-wise details are given at **Annex-5D**.

### 5.4.3 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 above 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.

A total of 14 HEPs including 5 Pumped Storage Schemes with aggregate capacity of 7477 MW are presently under Survey & Investigation in the country and having cost of more than Rs.1000 Crores & DPRs of which is to be submitted to CEA for concurrence. DPRs of 9 nos. of HEPs with aggregate installed capacity of 3995 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. DPRs of Dugar HEP (449 MW), Bursar (800 MW) & Luhri-I (210 MW) HEPs have been prepared and submitted to CEA/CWC during the period of 2016-17 while DPRs of Mawphu St-II (85 MW), Reoli Dugli (430 MW), Thana Plaun (191 MW) & Goriganga IIIA (150 MW) HEPs have been prepared and submitted to CEA during the period of 2017-18. Out of which, DPRs for Dugar HEP (449 MW) & Luhri-I (210 MW) have since been concurred by CEA.

### 5.5 Project Planning & Optimization Studies

- Rendering of Consultancy Services for

Preparation/ Updation of Detailed Project Report of Kuri-Gongri HEP (2640 MW) in Bhutan and Sharavathy Pumped Storage Project (2000 MW) in Karnataka.

- Rendering of consultancy services for carrying out Power Potential Study and preparation of chapters of DPR for Ujh Multipurpose Project, Jammu & Kashmir and Tlawng H.E. Project, Mizoram.
- Power Potential Studies of Sunni Dam HE Project (382 MW), Himachal Pradesh and Luhri Stage-II (172MW) HE Project were carried out.

### 5.6 Studies & Other Activities Related to Hydro Power Planning

- Notification of Minimum Environmental Flow to be maintained in river Ganga issued by MoWR was examined and commented upon.
- PFR for Japan grant on ADB funded Lower Kopili Hydro Electric Project (120 MW) at Longku, Assam (Improving Community Resilience and Ecosystem management in Kopili River, Assam) was examined and commented upon.
- Proposal for technical Assistance (TA) by the World Bank- IFC for the development of State Energy Index was examined and commented upon.
- Preliminary Project Report (PPR) for financial assistance from ADB under proposed project titled "Power Sector Borpani Middle-II HEP (24 MW)" was examined and commented upon.
- Draft Cabinet Note regarding "In-principal approval" to the proposal for taking up the work of conservation and rejuvenation of the rivers in an integrated
- Manner in ten selected polluted river stretches in the country under the National River Conservation Plan was examined and commented upon.

- Consultation Paper and Draft CERC regulations on TERMS AND CONDITIONS OF TARIFF REGULATIONS for Tariff period 1.4.2019 to 31.3.2024 were examined and commented upon.
- Protocol on operation of dams & release of Water during the monsoon was prepared.
- Proposal for raising of FRL and MWL of Ranganadi Reservoir to moderate the flood peak in the downstream of Ranganadi dam was examined and commented upon.
- Examination of apprehended loss of generation at River Bed Power House (RBPH) of Sardar Sarovar Project (SSP) due to revision in MDDL and maintenance of pondage during generation mode only at Garudeshwar Weir Small Hydro Project (GWSHP) on river Narmada was carried out.
- Inputs were furnished to the Committee on Increasing Peaking Mode Operation of Hydro Power Projects.
- Uprating proposal of Karcham Wangtoo HEP (1000 MW) by enhancing the Installed Capacity from 1000 MW (4x250 MW) to 1091 MW (4x272.5 MW) was examined and commented upon.
- Report on Sedimentation Management practices being followed in Maharashtra was prepared.
- Feasibility Report Proposal for the proposed Mekedatu Balancing Reservoir cum Drinking Water Project, June 2018, Karnataka was examined and commented upon.
- Standard Operating Procedure (SOP) for management of silt in Hydro-electric Projects was prepared and published.
- A perspective plan has been prepared in which 51 no. of HE projects with

aggregating to 31035 MW have been identified for providing benefits during the period of 2022-2030.

- **Indus Water Treaty (IWT) Matters**

- Adequacy of Pondage of Sawalkote & Kirthai-II H.E Projects in J&K and Seli & Sachkhas H.E Projects in Himachal Pradesh as per IWT was examined.
- 115th Meeting of Permanent Indus Commission was attended.

- **Issues of importance in Jammu & Kashmir**

- Examined Models for Joint Venture prepared by State Govt. for implementation of Ratle HEP (850 MW) in J&K.
- Matters relating to issue of pondage in respect of Ratle HEP were dealt with.

## 5.7 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 and Pancheshwar Multipurpose Project (5040 MW) in Nepal.
- Matters relating to the Tariff negotiation of Mangdechhu HEP (720 MW) in Bhutan were dealt with.
- Rendering of Consultancy Services for Preparation/ Updation of Detailed Project Report of Pancheshwar Multipurpose Project (PMP) including Re-regulating dam at Rupaligad in Nepal.



- 8th meeting of Indo-Nepal Joint Committee on Water Resources (JCWR) held on 11<sup>th</sup> January, 2019 and 6<sup>th</sup> meeting of Indo-Nepal Joint Standing Technical Committee (JSTC) held on 9-10<sup>th</sup> Jan' 2019 were attended.
- Inputs were furnished for Fifth India-Bangladesh Joint Consultative Committee meeting.
- The DPR of Kuri-I HEP (1125 MW) was examined by the Indian side and a report on broad appraisal of the DPR from Indian side was sent to Bangladesh. Subsequently, modified appraisal report was sent by CEA to BPDB, Bangladesh incorporating the suggestions of BPDB, Bangladesh.
- Matters related to revision of Tariff of Chukha HEP (336 MW) have been dealt & Rs. 2.55/kwh have been finalized w.e.f.01.01.2017.
- Chief Engineer (HPP&I) was nominated as Member Joint Technical Team- Generation (JTT-G) between India and Myanmar to study the need for construction of new generating stations & Renovation of existing generating stations

### 5.7.1 International Cooperation

- The matters relating to co-operation with the countries like Russia and Afghanistan have been dealt.

### 5.8 Hydro Power Plants Performance & Operation Monitoring

- The report "Review of Performance of

Hydro Power Stations" for the year 2017-18 has been published. Performance of 712 units in 206 Hydro Stations with aggregate Installed Capacity of 45293.42 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 2018-19 was carried out in Dec. 2018 after withdrawal of South-West monsoon by interaction with Power Utilities and the generation targets were reviewed for the remaining part of the year 2018-19 as 134.66 BU.
- Month-wise/station-wise hydro generation targets in respect of HE Stations (above 25 MW) for year 2019-20 were finalised in consultation with various utilities as 136.93 BU which include 56.62 BU, 66.80 BU & 13.51 BU from Central, State & Private Sector Stations respectively.
- To accord recognition to H.E. Stations for their all round performance, data of H.E. Stations having Installed Capacity of 100 MW and above were analyzed and three H.E. Stations were recommended for National Award for best performance under National Award for the year 2016-17 & 2017-18 each for Meritorious Performance in Power Sector.

### 5.9 Hydel Generation Performance during year 2018-19 (As on 31.03.2019)

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

Region	Generation (BU)		Deviation (+/-)
	Target	Actual	(%)
Northern	70.15	72.40	3.21
Western	12.64	9.76	-22.78
Southern	24.00	28.81	20.03
Eastern	16.78	18.90	12.64
N-Eastern	6.44	5.03	-21.90
<b>All India</b>	<b>130.00</b>	<b>134.89</b>	<b>3.76</b>



Against target of 130 BU, the actual energy generation during the year 2018-19 was 134.89 BU, which was 3.76% more than the target.

## **5.10 Renovation & Modernisation of Hydro Electric Projects**

### **5.10.1 R&M Phase-I Programme:**

Renovation & Modernisation, Uprating and Life Extension (RMU&LE) of the existing old hydro electric power projects is considered a cost effective option. It ensures optimization of resources, efficient operations and better availability. Also it augments (uprate) 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.

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

During 2017-22, an aggregate capacity of 9982.80 MW at 53 Hydro Electric Power Station (10 in Central Sector and 43 in State Sector) is programmed for R&M which will accrue benefit of about 5171.35 MW through Life Extension and Uprating. Out of the 53 schemes targeted for completion during 2017-22, 3 schemes in Central Sector with an aggregate installed capacity of about 788.4 MW have been completed till March, 2019 and have achieved a benefit of 48.4 MW through Life Extension.

During 2022-27, an aggregate capacity of 2788 MW at 25 Hydro Electric Power Station (1 in Central Sector and 24 in State Sector) is programmed for R&M, which will accrue benefit of 2786 MW through Life Extension and Uprating.

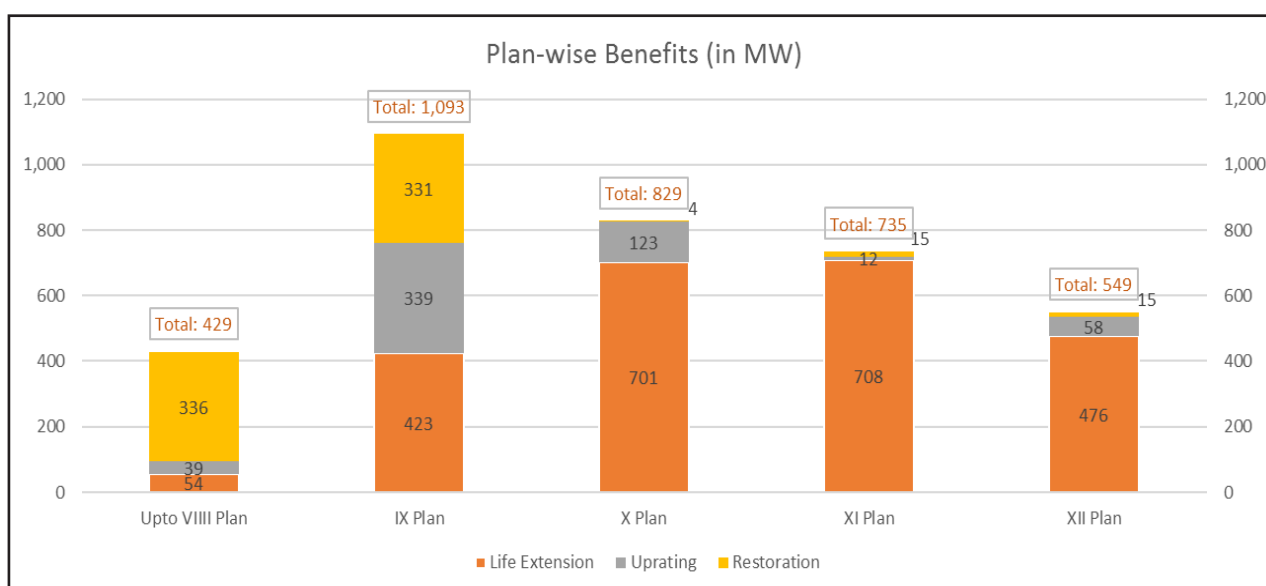
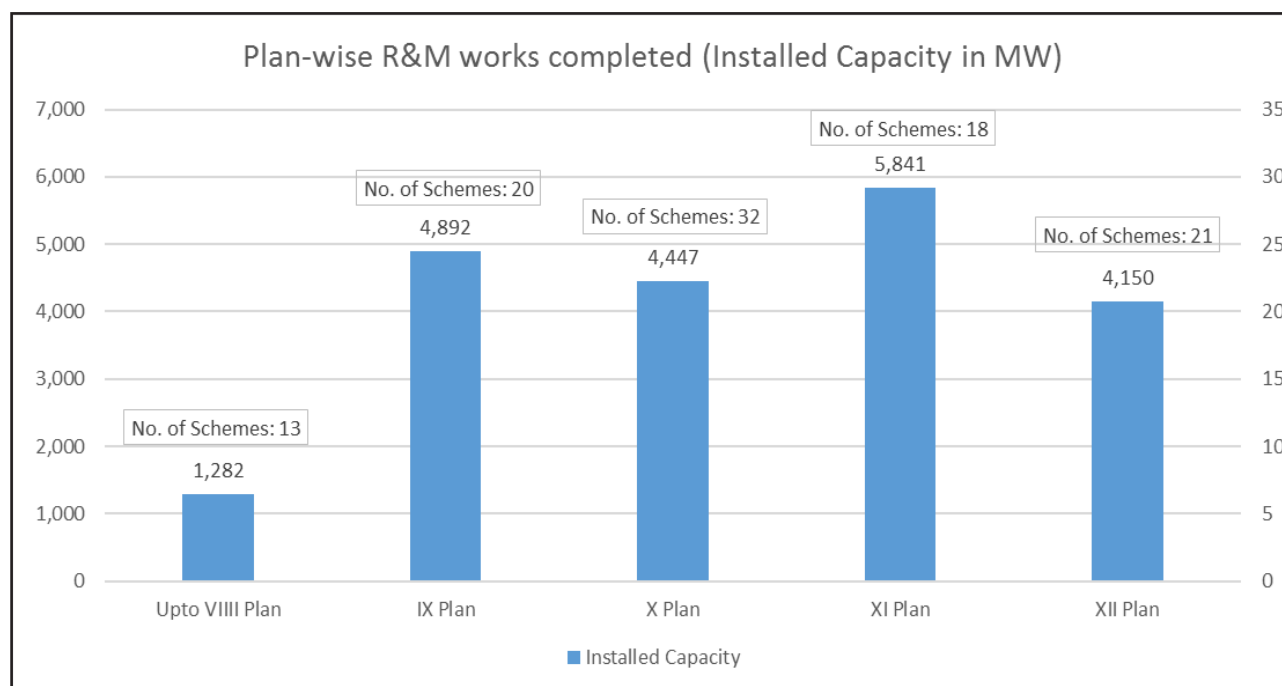
Plan-wise summary of R&M of H.E. Projects starting from VIII Plan is given below:

**Summary of R&M of Hydro Electric Projects**  
(As on 31.03.2019)

**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.)]
<b>6.</b>	<b>Total</b>	<b>21</b>	<b>83</b>	<b>104</b>	<b>20611.50</b>	<b>3137.58</b>	<b>3635.51</b>

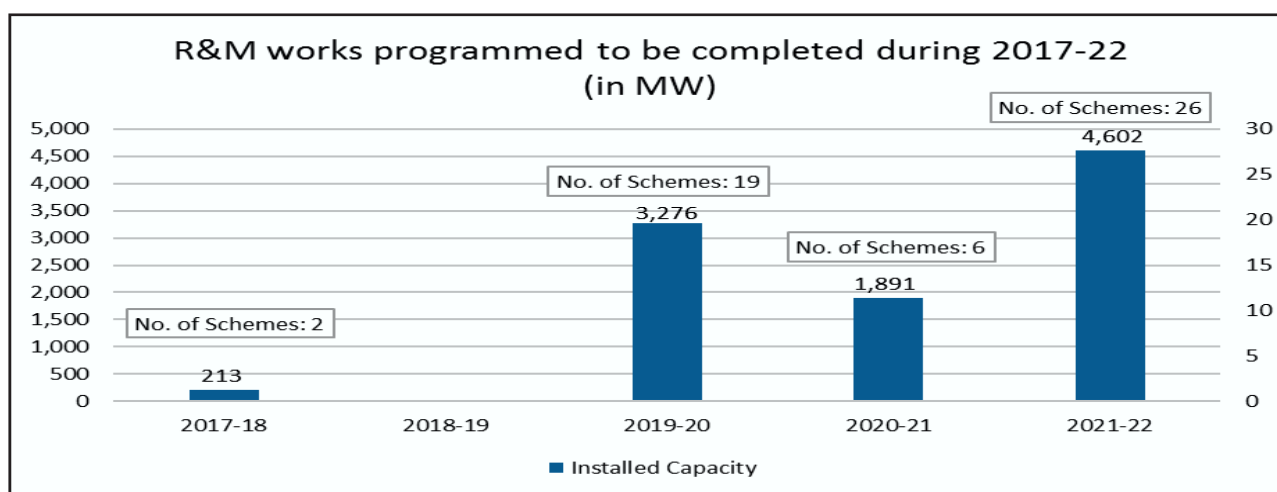
LE - Life Extension, Res. – Restoration, U - Uprating



## II Programme of R&M works during 2017-22

Sl. 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	10	43	53	9982.80	6672.18	5171.35 [5021.65(LE) +149.7(U)]
2.	Completed	3	0	3	788.4	76.66 (Actual Cost)	48.4 (LE)

3.	Under Implementation	3	25	28	5347.10	3406.24	2549.50 [2433.30 (LE) +116.20 (U)]
4.	Under Tendering	2	15	17	2483.10	2579.67	1209.25 [1175.75 (LE) +33.5 (U)]
5.	Under DPR Preparation/ Finalisation/ Approval	2	3	5	1364.20	594.20	1364.20 (LE)



### III Programmed R&M works during 2022-27

Sl. No.	Category	No. of Projects			Capacity (MW) covered under R&M&LE	Benefit (MW)
		Central Sector	State Sector	Total		
1.	Programmed	1	24	25	2788	2786 [2728 (LE)+ 58 (U)]
2.	Under Tendering	0	2	2	96	112.00 [96 (LE)+ 16 (U)]
3.	Under DPR Preparation/Finalisation/Approval	1	7	8	865	907.00 [865 (LE) + 42 (U)]
4.	Under RLA Studies	-	15	15	1827	1767 (LE)

Abbreviations:

MW – Mega Watt; Res. – Restoration; U – Upgrading; LE – Life Extension

### 5.11.2.1 Achievements under R&M in Hydro during the year 2018-19

R&M works of Unit-I of Sholayar Ph-I (2x35MW) Power House of TANGEDCO, having an installed capacity of 35 MW have been completed during the year 2018-19 till March, 2019 and accrued a benefit of about 42 MW through Life Extension and Upgrading.

### 5.11.2.2 Programme for the year 2019-20

For the year 2019-20, it is programmed to complete following 19 schemes having capacity under R&M of 3276.45 MW. On completion of these schemes, there will be a benefit of about 701.50 MW through Upgrading, Life Extension and Restoration at an estimated cost of about Rs. 1384.23 Crores.

S. No.	Name of Scheme	Installed Capacity (No. x MW)	Capacity under R&M (No. x MW)	Cost (Rs. in Cr.)	Agency
1.	Salal	6x115	5x115	58.01	J&KSPDC
2.	Ganderbal,	2x3+2x4.5	2x4.5	31.57	J&KSPDC
3.	Chenani,	5x4.66	5x4.66	39.60	J&KSPDC
4.	Bhaba Power House	3x40	3x40	166.17	HPSEB
5.	Dehar Power House	6x165	1x165 (Unit-3)	23	BBMB
6.	Rihand	6x50	6x50	132.2	UPJVNL
7.	Nagarjuna Sagar Ph-II works	1x110+7x100.8	1x110+7x100.8	22.17	TSGENCO
8.	Nagarjuna Sagar Left Canal Power House,	2x30.6	2x30.6	30.99	TSGENCO
9.	Bhadra River Bed units,	2x12	2x12	31.05	KPCL
10.	Munirabad Dam Power House,	2x9 + 1x10	2x9 + 1x10	4.6	KPCL
11.	Idukki 1 <sup>st</sup> stage	3x130	3x130	89.90	KSEB
12.	Sholayar	3x18	3x18	199.55	KSEB



13.	Sholayar-I	2x35	2x35	90.44	TANGEDCO
14.	Hirakund-I	2x37.5	2x37.5 (Unit-5&6)	158.77	OHPC
15.	Hirakud-II (Chiplima),	3x24	1x24 (Unit-3)	65.67	OHPC
16.	Mukerin St. I,II,III & IV	3x15+3x15+3x19.5 + 3x19.5	3x15+3x15+3x19.5 + 3x19.5	136.07	PSPCL
17.	Shanan HEP	1x150+4x15	1x150+4x15	37.81	PSPCL
18.	UBDC St. I & II	3x15 + 3x15.45	3x15 + 3x15.45	23.55	PSPCL
19.	Anandpur Sahib Hydel Project	4x33.5	4x33.5	43.11	PSPCL
<b>Total</b>		<b>4370.45</b>	<b>3376.45 MW</b>	<b>1384.23</b>	

### 5.12 Concurrence / Appraisal of Hydro Schemes:

accorded concurrence/ appraisal by CEA.  
Details are given as under:

During the year 2018-19, DPRs of **3 nos.** of Hydro Electric Schemes aggregating to installed capacity of **2746 MW** has been

S. No.	Name of Scheme/ State/ Executing Agency	Installed Capacity (MW)	Estimated Cost (₹ in crores)	Date of concurrence/ap praisal by CEA
1.	Sawalkot HEP in Jammu & Kashmir by JKSPDC	6x225 + 1x56+ 2x225= 1856	22190.66 (Price at Feb., 2016 level)	18.04.2018
2.	Luhri Stage-I HEP Himachal Pradesh by SJVN Ltd.	2x80+2x25= 210	1912.59 (Price at July, 2017 level)	01.05.2018
3.	Attunli HEP in Arunachal Pradesh by AHEPC Ltd.	4x170 = 680	6267.81 (Price at completion level)	02.07.2018
<b>TOTAL</b>		<b>2746</b>		

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## CHAPTER – 6

### THERMAL POWER DEVELOPMENT

#### 6.1 SETTING UP OF ULTRA MEGA POWER PROJECTS (UMPPs)

The Government of India had launched an initiative in 2005-06 for the development of coal-based Ultra Mega Power Projects (UMPPs), each with a capacity of 4,000 MW. The objective behind the initiative is to ensure cheaper tariffs utilizing economies of scale, catering to the need of a number of States and to mitigate the risk relating to tie up of land, fuel, water and other statutory clearances etc. The projects are awarded to the successful developers on the basis of tariff based International Competitive Bidding (ICB) route employing Super Critical Technology. To tie-up for necessary inputs and clearances such as land, fuel through captive mining blocks, water

and in-principle environment and forest clearances, project-specific shell companies (SPVs) are set up as wholly owned subsidiaries of the Power Finance Corporation (PFC) Ltd. – the nodal agency for these projects. The Operative SPV alongwith the various clearances etc. are subsequently transferred to the successful developer.

Four UMPPs namely Sasan in Madhya Pradesh, Mundra in Gujarat, Krishnapatnam in Andhra Pradesh and Tilaiya in Jharkhand have already been awarded to the successful bidders. Mundra UMPP and Sasan UMPP are fully commissioned and are generating electricity. A brief detail of these projects are as below:

Sl. No.	Name of UMPP	Type	Date of Transfer	Levelling 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.

\* The developer has stopped the work at site citing the new regulation of coal pricing in Indonesia. Procurers have issued Termination Notice. The matter is subjudice.

\*\* The Developer has issued Termination Notice citing non-transfer of land by Govt. of Jharkhand. Procurers have decided to accept the Termination Notice. SPV has been transferred to the lead procurer-Govt. of Jharkhand on 16.05.2018.

#### Other UMPPs in Pipeline:

- For Odisha UMPP (village Bedabahal in Sundergarh district) afresh bid would be issued after finalization of revised SBDs. Reallocation of coal blocks in the name of Infra SPV for Odisha UMPP is under progress.
- Initially **Cheyur UMPP** (Cheyur in Kanchipuram district in Tamil Nadu) was proposed on imported coal due to coastal location. However, in the meeting held on

02.11.2017 in Ministry of Power with procurers it was decided that Cheyur UMPP would be developed on domestic coal on the same location having capacity of 4000 MW. Accordingly, development of Cheyur UMPP on domestic coal at existing location is under process.

- A site at Kakwara in Banka dist. has been identified for setting up of UMPP in Bihar. ToR for EIA study has been issued by MoEF&CC. Site specific studies and land acquisition are under progress. Power

Allocation from this UMPP has been made to Bihar, Jharkhand, Uttar Pradesh and Karnataka.

- Initially, a site at Husainabad in Deoghar district has been identified for setting up of **2<sup>nd</sup> UMPP in Jharkhand**. In this site water availability is a critical issue. In the meeting held in MoP on 22.11.2018, it was decided to undertake techno-economic study for sourcing water from Ganga River for Deoghar UMPP. 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 Mohanpur Anchal in Deoghar district. The site visit has been made and the developmental activities at the new site are under progress.
- A site at Bijoyapatna in Chandbali Tehsil of Bhadrak district for coastal location and another site at Narla & Kasinga sub division of Kalahandi district for inland location have been identified for setting up of **additional UMPPs in Odisha**. Consent of state Govt. is awaited.
- **UMPP in Maharashtra** has been closed as of now because site could not be firmed up due to resistance by local people. CEA has requested Govt. of Maharashtra to propose new site.
- The proposed site for 2<sup>nd</sup> UMPP in Tamil Nadu is not environmentally suitable. State Govt. agreed to propose alternate suitable site and proposal is awaited.
- For 2<sup>nd</sup> UMPP in Gujarat, the land available is not sufficient in the proposed site at Chikhli-kob in Gir-Somnath District and private land needs to be acquired. CEA requested Govt. of Gujarat (GoG) to identify Pvt. land adjacent to the site and furnish the details. Response from GoG is awaited.
- For UMPP in UP, proposed at Etah, the major portion of land is agricultural land and is far away from coal fields.

The matter was discussed in the RPM meeting held on 10.08.2016 with Secretary (Power) and thereafter no response has been received from Govt. of UP.

- For UMPP in Karnataka, CEA and Government of Karnataka has identified a site at Niddodi village. Further progress on this site could not be taken up due to local resistance. CEA has requested Government of Karnataka to propose new site.

## 6.2 CONSTRUCTION MONITORING OF THERMAL POWER PROJECTS

As on 31.03.2019, Thermal capacity of 65041.15 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.

### 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 in the recent past as the role of a facilitator include 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 projects.

- Participation in various review meetings held in the Ministry of Power, Ministry of Heavy Industries, Project Monitoring Group and Niti Aayog etc.
- Thermal projects visited 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

#### 6.3.1 Thermal Power Projects accorded Environment Clearance

During the year 2018-19, Environment clearance has been granted to 03(three) nos. of thermal power project totaling to a capacity of 2,840 MW. The list of such plants is as below:

Sl. No.	Name of the project	Date of Clearance	EC Capacity (MW)
01	(1x135 MW) & (1x65 MW) MG Power Projects Limited, Tehsil Mattam pal District Nalgonda, Telangana	24/04/2018	200
02	2x660 MW (stage-III) Ultra STPP, near Talcher town, Tehsil Talcher Sadar, Angul district, Odisha by NTPC	12/09/2018	1320
03	Proposed expansion of 2x660 MW Super Critical Lignite based TPP at villages Mudanai, Kunakurichi, Uthangal, Tehsil Vridhachalam, District-Cuddalore, TN by NLC India Ltd.	29/10/2018	1320
<b>Total</b>			<b>2840 MW</b>

During the year 2018-19 LOA for 660 MW thermal capacity has been placed as per following details:

Sl.	Project	Implementing Agency	Plant Configuration	Capacity (MW)	Main Plant (BTG)
01	Sagardighi Thermal Power Station Unit-5	WBPDCCL	1x660	660	BHEL

### 6.4 Coal Block Allocation

Since the cancellation of 204 nos. of coal blocks by the Hon'ble Supreme Court in 2014, 51 nos. of coal blocks catering to 62,330 MW have been allocated to various Power Utilities. Out of which 22 nos. of coal blocks (catering to 17,190 MW capacity) are Schedule-II and balance 29 nos. of coal blocks (catering to 45,140 MW capacity) are Schedule-III. Schedule-II coal blocks are those which were under production or under advance

stage of development whereas Schedule-III coal blocks are those which were in initial stage of development at the time of cancellation.

Out of the 51 nos. coal blocks allocated so far, 09 nos. coal blocks have been allocated through e-Auction process whereas 42 nos. have been allocated to government sector as per Coal Mines (Special Provisions) Act, 2015. Out of the coal blocks allotted through e-Auction process, 05 falls under Schedule-II and

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

Of the 42 nos. of Coal blocks allocated to government sector, 17 nos. are Schedule-II and 25 nos. are Schedule-III coal blocks. Out of which 3 nos. of Schedule-II coal blocks namely Parsa East, Kanta Basan & Barjore and 02 nos. of Schedule-III coal blocks namely Dulanga & Tadicherla are producing coal. Further, 01 no. coal block allotted through Screening Committee to NTPC namely Pakri Barwadih has also come under production.

As per the respective Project Authorities/Generating utilities, around 28.16 MTPA coal production has been achieved during year 2018-19.

### 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), 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 31<sup>st</sup> Mar'19 is as under:

**B(i) Central/ State Sector Projects** - SLC (LT) has accorded coal Linkage to 19 nos. Thermal Power Projects totaling 22,380 MW under Central /State Sector category, out of which 6,760MW capacity has been accorded linkage during year 2018-19.

**B(ii) Coal Linkage to IPPs having PPA**—Under this clause, coal linkage may be granted on notified price on auction basis for power producers/IPPs having already concluded long term PPAs based on domestic coal. Power

Producers shall bid for discount on tariff. Therefore, 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 PPA was available for 9,045 MW capacity. CIL has allotted coal to various developers totaling to 32.68 MTPA (G-13 grade equivalent).

**B(iv) Coal Linkage to States for fresh PPAs** - Under 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/SDAs. The states/Discoms may, based on such linkage, undertake tariff based competitive bidding for long-term and medium-term procurement of Power. Four (04) states viz. Gujarat, U.P., M.P. & Maharashtra for a total capacity of 10,860 MW have applied for coal linkage under this policy. Recommendations have been given for allocating coal linkages to Gujarat state for 4000 MW, UP state for 1600 MW power and to Madhya Pradesh state for power capacity of 2,640 MW to be raised through tariff based competitive bidding.

### 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, 29 nos. Thermal Projects totalling 34,620 MW were granted Bridge Linkage so far. A capacity of 1,300MW has been accorded linkage during financial year 2018-19.



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

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 10<sup>th</sup> Plan (2002-07) is 2,670 MW comprising 1,970 MW of Thermal and 700 MW of Hydro. During the 11<sup>th</sup> Plan (2007-12) and 12<sup>th</sup> 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 11<sup>th</sup> and was 21,720 MW and 1,292 MW, while that added during 12<sup>th</sup> Plan was 53,660 MW and 619 MW, respectively.

During the year 2017-18, Private Sector has contributed 2,935 MW to generation capacity comprising 2,730 MW of Thermal & 205 MW of Hydro generation capacity. During FY2018-19, Private Sector has contributed 5921 MW generation capacity comprising of 5781 MW Thermal & 140 MW Hydro Generation capacity.

## 6.9 Retirement of Old & Inefficient Thermal Power Units

Thermal units totaling 2179 MW capacity have been retired during the year 2018-19. Thus a total of 8470MW capacity of old & inefficient coal based thermal power units have been retired in Govt. Sector by various power utilities since Mar' 2016 to March'2019.

## 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, Koradi TPS (2,400 MW) and Nasik TPP Phase-I (1,350 MW) in Maharashtra and IPGCL in Delhi are utilizing STP water. Out of 1,179 MLD identified potential of STP water (catering to 21,238MW), 250 MLD STP water is being utilized and balance 929 MLD is under active consideration for utilization by Thermal Power Stations.

## 6.11 Clean Development Mechanism:

Central Electricity Authority (CEA), brings out a CO<sub>2</sub> Database for all grid connected Power Stations in the country on annual basis. The objective of this Database is to facilitate the consistent and accurate quantification of CO<sub>2</sub> emissions baseline to be used by CDM project developers in country. Version 13.0 & 14.0 of Database for the years 2016-17 and 2017-18 respectively is available on CEA's website [www.cea.nic.in](http://www.cea.nic.in).

### 6.11.1 Environment aspects of electricity generation:

CEA collected and compiled the monthly environmental data viz. Stack emission, Ambient Air Quality and Effluent Discharge for the year

2017-18 for thermal power stations. This database has been compiled and reviewed on Quarterly basis. Data base for the year 2018-19 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.

### 6.11.3 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 CO<sub>2</sub> 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.

#### 6.11.4 National Energy Conservation Awards 2018:

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 2017-18 proposals received from three industrial sectors viz. Cement, Food Processing, Tyres and Heavy Engineering were evaluated by CEA. The awards to the best performing firms in three sectors except Heavy Engineering were given during National Energy Conservation Day function held in New Delhi on 14<sup>th</sup> December, 2018.

#### 6.11.5 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), SO<sub>x</sub>, NO<sub>x</sub>, 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 PROGRAMME

#### 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 up to 31.03.2019. 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 (In MW)	
	Target	Actual
CENTRAL	2760	1960
STATE	4506.15	2849.755
PRIVATE	0	972
<b>TOTAL</b>	<b>7266.15</b>	<b>5781.755</b>

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

A thermal capacity addition programme of

10296.15 MW has been finalized for the year 2019-20. The details of programme are as follows:

SECTOR	THERMAL (In MW)
	Target
CENTRAL	6040
STATE	4256.15
PRIVATE	0
<b>TOTAL</b>	<b>10296.15</b>

The details of the Thermal Capacity Addition programme 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. The indigenous manufacturers (except M/s BGRE) are indicated to 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/cm<sup>2</sup>, 537/565 deg C. Subsequently, the parameters of 247 kg/cm<sup>2</sup>, 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<sup>2</sup> 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 2% 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 are already with steam parameters of Ultra- supercritical class.

#### 6.14 Important Activities

Following activities were also undertaken:

- (a) Various aspects of operation norms for thermal generating stations were examined comprehensively on the basis of data received from Thermal Power Plant utilities and the recommendations on Operation Norms for thermal generating stations for the tariff period 2019-24 starting from



- 01.04.2019 were forwarded to CERC. In continuation to these norms, recommendations on additional operation norms pertaining to implementation of new Environmental emission control measures in thermal power stations were also forwarded to CERC.
- (b) Standard technical specification for retrofit of sea water based flue gas desulphurization (FGD) system in thermal Power Plant was taken up and is in progress.
  - (c) Specification on agro- residue based Biomass pellets for co-firing in pulverized coal based thermal power stations was prepared and uploaded on CEA web site. Preparation of guidelines for blending of Biomass pellets (5%-10%) with coal in coal based thermal power stations are under preparation.
  - (d) Various issues arising due to MoEF&CC Notifications related to new emissions norms, specific water consumption and Open/ Closed cooling water system were dealt with.
  - (e) 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 under progress.
  - (f) 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.
  - (g) Investigation of the accident that occurred in 500 MW Unit- 6 of NTPC Unchahar TPS on 1.11.2017 was carried out by the committee constituted under Member (Thermal), CEA and report of the committee was submitted to Ministry of Power.
  - (h) Study by Expert Group on CFBC Technology set up by Ministry of Power under Chairmanship of Member (Thermal), CEA was completed and Report on its feasibility for Adoption in Power Sector was submitted to MoP.
- (i) 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).
  - (j) The issue of upward revision of the Technical Minimum load of 55% in respect of lignite based generating units of NLCIL, as referred by CERC to CEA, was examined.
  - (k) The list of items/ equipment and their minimum local content intended to be notified under the Public Procurement (Preference to Make in India) Order 2017 for thermal power plants for local procurement by public entities was prepared in the Division and same was forwarded by CEA to MoP.
  - (l) Officers of this Division represented in the various Committees :
    - i. CE (TE&TD) is a member of Standing Committee on PMP under Member (Thermal) CEA for monitoring & imposition of Liquidity Damages (LD) for Phased Manufacturing Programme (PMP) under the bulk tender –I (660 MW) & Bulk tender- II (800 MW).
    - ii. Director (TE&TD) is a member of the water tube boiler Sub-Committee constituted by Central Boilers Board (CBB).
    - iii. Officer from TE & TD Division is nominated as a Member on Board of Directors of Puducherry Power Corporation Limited, Puducherry.



- |   |   |
|---|---|
| <p>iv. CE (TE&amp;TD) is Member-secretary of Task Force constituted under Chairmanship of Member (Thermal), CEA for Review of Regulations entitled Central Electricity Authority (Technical Standard for construction of Electrical plants and Electric lines) Regulations, 2010.</p> <p>v. CE (TETD) is the member of the Technical Committee on Thermal Research and dealing with R&amp;D proposals received from CPRI under NPP/ RSOP/ IHRD.</p> <p>vi. Director (TE&amp;TD) is the member of the committee for Periodic Comprehensive review of the Regulations entitled, “Central Electricity Authority (Measures relating to safety and Electric Supply) Regulation, 2010”.</p> <p>vii. CE(TE&amp;TD) was member of the committee constituted by MoP under Chairmanship of Member (Thermal) to investigate into the causes of the accident occurred at 500 MW Unit- 6 of NTPC, Unchahar Thermal Power Plant on 1.11.2017.</p> <p>viii. CE(TETD) is Member-Secretary of the committee constituted under chairmanship of Member (Thermal) to prepare specification and guidelines on Biomass pellets, based on agro based residue, for co-firing in pulverized coal based thermal power stations.</p> <p>ix. CE(TETD) was one of the Members of the Expert Group on CFBC Technology set up by</p> | <p>Ministry of Power under Chairmanship of Member (Thermal), CEA to study and submit report on its feasibility for Adoption in Power Sector.</p> <p>x. Director (TE&amp;TD) is a member of the committee of experts on National Clean air Programme initiated by Min. of Agriculture &amp; Farmers Welfare.</p> <p>xi. Director (TE&amp;TD) is a member of the Committee to suggest modalities for considering power generated from biomass co-firing as RE power constituted by MNRE.</p> <p>xii. Director (TETD) is a member of the BIS Committee on Boilers and Pressure Vessels Sectional Committee MED 01.</p> <p><u>Visits:</u></p> <p>i. One officer from TETD division visited Japan to attend “clean coal technology (CCT) training program for the project on efficiency and environment improvement of coal fired power stations under CEA-JCOAL MoU” from 25<sup>th</sup> October, 2018 to 31<sup>st</sup> October, 2018.</p> <p>ii. One officer from TETD division visited Germany for participation in “Flexpert FC 1 training for flexible operation of coal fired power plants” from 9<sup>th</sup> December, 2018 to 16<sup>th</sup> December, 2018.</p> <p>iii. One officer from TETD division visited power plants in Denmark regarding “Utilization of agro- residue based biomass pellets for power generation” from 25<sup>th</sup> Feb, 2019 to 01<sup>st</sup> March, 2019.</p> |
|---|---|

- iv. One officer from TETD division visited power plants in Denmark as a member of working group constituted by MoP on “Study on Flexibility of power plants” from 11<sup>th</sup> March, 2019 to 15<sup>th</sup> March, 2019.

### 6.15 Renovation and Modernisation 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 7<sup>th</sup> Plan onwards till 12<sup>th</sup> Plan.

R&M Programme in a structured manner was initiated in 1984 as a centrally sponsored programme during 7<sup>th</sup> 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	7 <sup>th</sup> Plan & 2 Annual Plans	85-86 to 89-90 & 90-91, 91-92	<b>34 / 163</b>	<b>13570</b>	10000	2000
2	8 <sup>th</sup> Plan (R&M) (LEP)	1992 to 1997	<b>44 / 198</b> 43/(194) 1 /(4)	<b>20869</b> (20569) (300)	5085	763
3	9 <sup>th</sup> Plan (R&M) (LEP)	1997 to 2002	<b>37 / 152</b> 29/ (127) 8/ (25)	<b>18991</b> (17306) (1685)	14500	2200
4	10 <sup>th</sup> Plan (R&M) (LEP)	2002 to 2007	<b>9/25</b> 5/(14) 4/(11)	<b>3445</b> (2460) (985)	2000	300
5	11 <sup>th</sup> Plan (R&M) (LEP)	2007 to 2012	<b>21/72</b> 15/(59) 6/(13)	<b>16146</b> (14855) (1291)	5400	820
6	12 <sup>th</sup> Plan (R&M) (LEP)	2012 to 2017	<b>18/37</b> 8/16 10/21	<b>7202.5</b> 4560.50 2641.76	----	----

\*Tentative figure.

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

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

71 thermal generating units with aggregate capacity of 14929 MW have been identified for implementation of R&M/LE works during 2017-22 period. Out of this total of 35 nos. thermal generating units with aggregate

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

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)

### 6.16 Achievements of R&M & LE Projects during 2017-22 upto 31-03-2019:

R&M works on 2 thermal generating units with aggregate capacity of 67 MW were completed during 2017-22 upto 31-12-2018. Details of achievements is furnished below:

Life Extension works on 4 thermal generating units with aggregate capacity of 820 MW and

	Name of the TPS	Unit No.	Date of S/D	Capacity (MW)	Utility	Sector	Date of Achievement
1. 2017-18							
LE	Ukai TPS	4	07-12-2016	200	GSECL	State	17.05.2017
	Wanakbori TPS	3		210	GSECL	State	27-11-2017
R&M	Kathalguri CCGT	3	--	33.5	NEEPCO	Central	20-07-2018
	Kathalguri CCGT	6	--	33.5	NEEPCO	Central	31-03-2018
Sub Total		34 (Units)		477.00			

2. 2018-19							
LE	Koradi TPS	6	25-08-2015	210	MAHAGENCO	State	16-07-2018(oil firing) 20-08-2018(coal firing)
	Obra TPS	12	01-10-2016	200	UPRVUNL	State	24-09-2018
R&M	--	--		--	---	--	--
Sub Total		02(unit)		410			
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				

### 6.17 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.

### 6.18 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)
1.	Obra TPS	UPRVUNL	U.P.	7	100
2.	Barauni TPS	BSPGCL	Bihar	6	110
3.	Obra TPS	UPRVUNL	U.P.	13	200
Total					410

## 6.19 Implementation of Phasing Plan for FGD installation/ ESP upgradation in respect of new Environmental Norms

Ministry of Environment, Forest & Climate Change (MoEF&CC) notified "Environment (Protection) Amendment Rules, 2015" for thermal power stations on 07.12.2015. All existing stations are required to comply with the new Standards within 2 years (i.e. by Dec. 2017) and the new stations including all station presently under construction are required to meet the new norms by 01-01-2017.

To review the various issues arising out of new environmental norms for thermal power stations, a meeting was held on 01.09.2017 in MoEF&CC

among Secretary MoEF& CC, Secretary, MoP and Chairperson, CEA and it was decided that the action plan submitted by MoP to MoEF& CC extending up- to 2024 should commence from 2018 and implemented before 2022.

The MOEFCC gave its concurrence to the revised implementation plan for FGD installation/ESP upgradation vide letter no. F. No. Q-15017/40/2007-CPW dated 07.12.2017.

Further, it has been decided that the target date for environmental compliance in respect of thermal plant located in NCR is December, 2019. The progress report of installation of measures of 10 nos. thermal power plant situated in NCR region is given separately.

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

### i) Year wise FGD Phasing Plan

Year	Capacity (MW)	No. of Units
2018	500	1
2019	4940	8
2020	26330	53
2021	64268	174
2022	64055	178
Total	160092 as on 31-08-2017	414
	*166917 as on 31-03-2019	*441

\*Now the total capacity for monitoring the implementation of FGD as on 31-03-2019 is 166917 MW & no. of units are 441 after including the units commissioned after 31-08-2017.



## ii) Year wise ESP Upgradation Plan

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

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.

6.19.1 Summary of Current Status of Implementation of phasing plan for FGD InstallationGeneral Summary (MW)

S.No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specificatio ns Made	NIT Issued	Bids Awarded	FGD Commi ssioned
1	Central Sector	53350	53350	51510	50510	47960	12040	0
2	State Sector	51885	49025	38195	17475	11315	0	0
3	Private Sector	61737	59107	42080	33720	21150	1820	1820
	Total	166972	161482	131785	101705	80425	13860	1820

General Summary (no. of units)

S.No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specificatio ns Made	NIT Issued	Bids Awarded	FGD Commi ssioned
1	Central Sector	143	143	135	133	123	24	0
2	State Sector	164	152	126	60	44	0	0
3	Private Sector	134	128	82	62	37	3	3
	Total	441	423	343	255	204	27	3

Units > 500 MW & located in areas either critically polluted or having population density > 400/km<sup>2</sup> (MW)

S.No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specificatio ns Made	NIT Issued	Bids Awarded	FGD Commi ssioned
1	Central Sector	29320	29320	29320	29320	29320	6620	0
2	State Sector	13980	13980	10680	3200	2000	0	0
3	Private Sector	13510	13510	9610	7370	4970	1320	1320
	Total	56810	56810	49610	39890	36290	7940	1320

Units > 500 MW & located in areas either critically polluted or having population density > 400/km<sup>2</sup> (No. of units)

S.No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specificatio ns Made	NIT Issued	Bids Awarded	FGD Commi ssioned
1	Central Sector	57	57	57	57	57	12	0
2	State Sector	25	25	20	6	4	0	0
3	Private Sector	22	22	16	12	8	2	2
	Total	104	104	93	75	69	14	2

## NCR Summary (MW)

S.No.	Sector (Capacity in MW)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specificatio ns Made	NIT Issued	Bids Awarded	FGD Commi ssioned
1	Central Sector	3320	3320	3320	3320	3320	1820	0
2	State Sector	4770	4560	2800	2800	500	0	0
3	Private Sector	4700	4700	4700	4700	4700	1320	1320
	Total	12790	12580	10820	10820	8520	3140	1320

## NCR Summary (No. of units)

S.No.	Sector (No. of units)	FGD planned	Feasibility Study Started	Feasibility Study Completed	Tender Specifica tions Made	NIT Issued	Bids Awarded	FGD Commis sioned
1	Central Sector	9	9	9	9	9	6	0
2	State Sector	17	16	8	8	2	0	0
3	Private Sector	7	7	7	7	7	2	2
	Total	33	32	24	24	18	8	2

## 6.19.2 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  DE-Nox: Statutory limits being complied.  ESP: Statutory limits being complied.
	Dadri (NCTPP), U.P Unit 5-6 (490X2 MW) NTPC	31.12.2019	FGD: Awarded on 01 Feb 18. Work in progress  DE-Nox: Awarded on 29 June 18 for combustion modification  ESP: Statutory limits being complied.
2	GHTP (LehraMohabbat), Punjab Unit 1-4(210X2 &250X2 MW) PSPCL	31.12.2019	FGD: Work order cum contract agreement for consultancy services for preparation of TS issued to M/s NTPC  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: Order has been placed to M/s NTPC on 29.11.18 for pre-award services  De-NOx: NIT floated on 08.03.2019
4	Indira Gandhi STPP, Haryana Unit 1-3 (500X3 MW) NTPC	31.12.2019	FGD: FGD package retendered on 18 Oct 2018  DE-NOx: Awarded on 29 Oct 2018  ESP: Statutory limits being complied.
5	Mahatma Gandhi TPP, Haryana Unit-1-2(660x2 MW) CLP	31.12.2019	FGD: FGD Installed and is Under Renovation  ESP: Statutory limits being complied.  DE-Nox: A third party has been engaged to control NOX emission through combustion optimisation technique.

Sl. No.	Name of Thermal Power Station	Timeline for FGD	Current Status
6	Panipat TPS, Haryana Unit-6 (1X210 MW) HPGCL	31.12.2019	FGD: Tender specification made ESP: SPM values are within limits. De-NOx: Low NOx burner to be installed
	Panipat TPS, Haryana Unit-7-8 ( 2X250 MW) HPGCL	31.12.2019	FGD: Tender specification made ESP: SPM values are within limits. De-NOx: Preliminary pilot study is being carried out by NTPC. Subsequent action will be taken thereafter.
7	Rajiv Gandhi TPS, Hisar, Haryana Unit-1(2X600 MW) HPGCL	31.12.2019	FGD: Tender specification made. ESP: Only revival and repair for Unit-1, RGTPP, Khedar, Hisar. Revival of 02 nos. ESP fields and overhauling of balance 62 nos. fields will be carried out in the forthcoming overhauling scheduled in Oct-Nov., 2019. De-NOx: Preliminary pilot study is being carried out by NTPC. Subsequent action will be taken thereafter.
8	Yamunanagar (DCTPS), Haryana Unit-1(2X300 MW) HPGCL	31.12.2019	FGD: Tender specification made ESP: Only revival and repair for Unit-1, RGTPP, Khedar, Hisar. Revival of 02 nos. ESP fields and overhauling of balance 62 nos. fields will be carried out in the forthcoming overhauling scheduled in Oct-Nov., 2019 De-NOx: Preliminary pilot study is being carried out by NTPC. Subsequent action will be taken thereafter.
9	Talwandi Sabo TPS, Mansa, Punjab Unit-1-3(660x3 MW) TSPL	31.12.2019	FGD: Technical bids opened. ESP: SPM are within the limits. Need to be certified by state govt. De-NOx: NIT issued. PPA issue pending with regulator
10	Nabha Power Ltd, Rajpura, Punjab Unit-1-2(700x2 MW) GMR	31.12.2019	FGD: NIT issued. ESP: Statutory limits being complied. De-Nox: SNCR to be installed after results of NTPC pilots.
11	GGSTP Ropar (4x210 MW) PSPCL	31/12/2019	FGD: DSI technology has been proposed by consultant. Technical Specifications have been submitted and are under review. ESP: Statutory limits being complied. Need to be certified by state
			govt. De-NOx: NOx values are below specified limits
	Total	12790 MW	

## 6.20 Flexible Operation of Thermal Power Stations

India's Intended Nationally Determined Contributions (INDCs) include a reduction in the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level, and to create an additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent. Generating power from renewable sources of energy is of cardinal importance if India is to meet its INDC targets. With the aim to ensure future security & reliability of power supply and stability of electricity grids while maximizing generation from renewables flexibilization of existing coal-fired power plants is an important measure.

A committee was constituted in CEA to find out the level of flexibilization required from thermal power stations and future roadmap for integration of 175 MW RES generation into Indian grid by 2022. The final report of the committee was released by Secretary (Power) on 18th March 2019. The report has been shared with the stakeholders of power sector. A pilot test of 40% minimum load operation and 3% ramp up/ ramp down (i.e. 15 MW/ Min) has been successfully conducted in Dadri TPS of NTPC. Anpara-B TPS of UPRVUNL and Vindhyachal TPS of NTPC is being conducted by JCOAL to improve the flexibility of the plants. Another test is being conducted at unit no. 1 of Mauda TPS of NTPC by BHEL.

## 6.21 World Bank Funded Energy Efficiency Pilot R&M Projects (Component-1)

### Koradi TPS (Unit-6, 210 MW)

Mahagenco issued Letter of Award (LOA) to BHEL on May 31, 2013 for BTG Package. The contract was signed on December 18, 2013. Letter of Award issued to M/s ABB Ltd on March 19, 2012 for Electrical Package and the final contract was signed on May 25, 2012. Letter of Award (LOA) for Cooling Tower Plant Package, Ash Handling Plant package and Fire Detection, Protection & Inert Gas System Package are issued and contract is signed on 23.09.2016, 26.10.2016 &

05.11.2016 respectively. The unit was under shutdown from 20-07-2015 to 16-07-2018. The R&M works of unit- 6 of Koradi TPS have been completed and the Unit has been synchronized on 16-07-2018 with oil & on 20-08-2018 with coal.

## 6.22 Japan-India Co-operation for Study on Efficiency and Environmental Improvement of Coal Fired Stations

A MOU between Central Electricity Authority and Japan Coal Energy Centre (JCOAL) for preliminary study of Efficiency and Environment improvement study in coal fired power plants was signed on 30.4.2010 to carry out necessary diagnostic activities in few coal-fired power plants pertaining to Energy Efficient Renovation & Modernisation works and suggest measures to overcome barriers for promoting R&M, measurement for environmental improvement of coal-fired power plants in India.

Under 3<sup>rd</sup> MoU, CEA-JCOAL Co-operation, O&M enhancement study of unit#1 of 500 MW, DSTPS, DVC was undertaken. Final Report has been prepared and was submitted in May 2018.

A study on utilization of biomass pallets was conducted on 21<sup>st</sup> January 2019 in PSPCL and on 30<sup>th</sup> January 2019 in WBPCL power plants.

Mini-workshops were organized on 30-1-2018 at GSECL (Gujrat) and on 01-02-2018 at APGENCO (Andhra Pradesh) respectively for the year 2017-18 under CEA-JCOAL Cooperation for the project on Efficiency and Environment improvement of Coal Fired Power Stations in India.

Under CEA- JCOAL Co-operation a study is being carried out by JCOAL on adoption of available technologies to meet new environment standards and the economic viability of using such technologies in existing power plants. Combustion test of Indian Coal has been done at Japan. The Report of Combustion test of Indian Coal has been



done at Japan. The Report of Combustion test of Indian Coal has been submitted. SCR Pilot test at NTPC's Sipat TPS is being carried out to meet the NO<sub>x</sub> level in the flue gas as per new environmental norms. A diagnostic study for optimal environmental measures at Dadri TPS was conducted in February, 2018 and debriefing meeting was held in June 2018.

Study on Flexibilisation has been carried out by JCOAL during the year 2018-19 at the following thermal power stations to enhance the flexible operation of the unit.

1. Anpara-B TPS of UPRVUNL: Unit 4&5 (2x 500 MW) in November and December 2018
2. Vindhyachal STPS of NTPC: Kick-off was held on 04-03-2019. Study carried out from 04-03-2019 to 09-03-2019.

4<sup>th</sup> MoU to be signed between CEA and JCOAL is under process. 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 4<sup>th</sup> MoU:

- Update on the current and future policy trend in the Indian power sector.
- 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

such as IGCC, IGFC.

- Flexibilization measures and biomass utilization are also of high priority. Biomass study includes:
  - *Co firing of biomass pellets*
  - *Dedicated firing in Coal based plants*
  - *Dedicated biomass fired plants and*
  - *Waste to Energy Technologies*
- Study on Coal Washery and Coal GCV loss in power plant and its remedies
- Implementation of an annual workshop in India and CCT Training Programme in Japan

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

### 6.23.1 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.

### 6.23.2 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 14<sup>th</sup> September, 1999 on fly

ash utilization and subsequently issued amendments to the said notification on 27<sup>th</sup> August, 2003, 3<sup>rd</sup> November, 2009 and 25<sup>th</sup> January, 2016. The 3<sup>rd</sup> 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 3<sup>rd</sup> November, 2009 within four years.

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

This latest MoEF&CC's Notification of 25<sup>th</sup> 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 Guarantee Act, 2005, Swachh Bharat Abhiyan, etc.

### 6.23.3 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.

### 6.23.4 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.

### 6.23.5 Status of Ash Generation & Utilization for the Year 2017-18

The report for the Year 2017-18 bringing out the status of fly ash generation and its utilization including status of compliance of MoEF&CC's notification has been prepared.

#### (A) Brief Summary

As per data received from coal/lignite based thermal power stations for the Year 2017-18, the present status of fly ash generation & utilization is given in the table below:

Description	Status in Year 2017-18
Nos. of Coal/Lignite based Thermal Power Stations from which data was received	167
Data received for an installed capacity (MW)	177070.00
Coal consumed (Million ton)	624.88
Ash content (%)	31.44
Fly Ash Generation (Million ton)	196.44
Fly Ash Utilization (Million ton)	131.87
Percentage Fly Ash Utilization	67.13

It may be seen from above that 67.13 % 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 2017-18. This is on higher side from the previous year i.e. 2016-17.

#### (B) Modes of Ash Utilization during year 2017-18

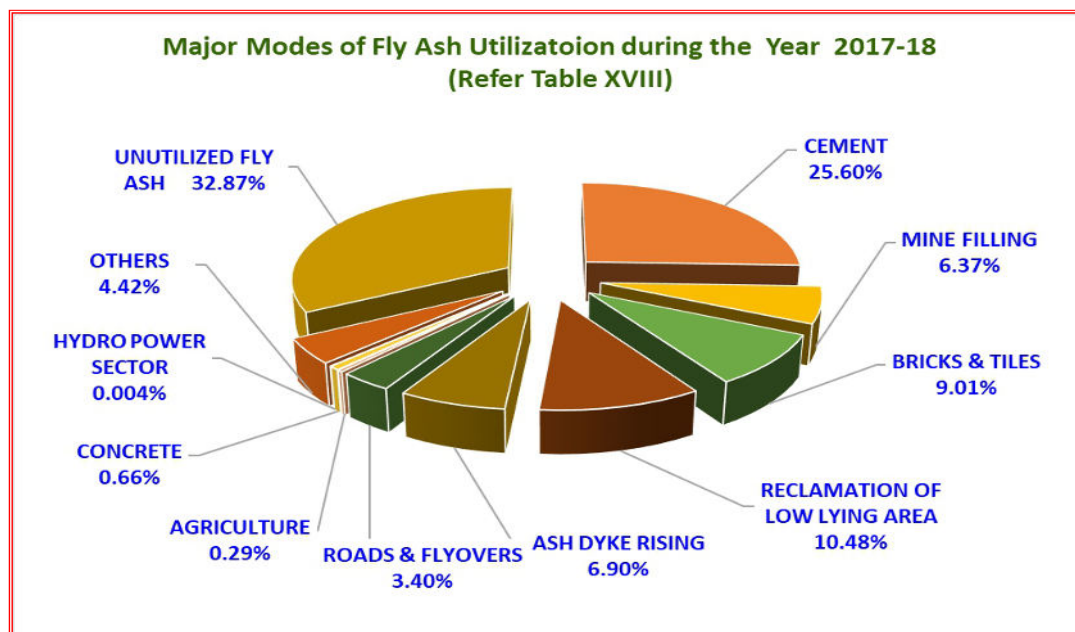
The major modes in which ash was utilized during the year 2017-18 is given in table below:

#### MAJOR MODES OF FLY ASH UTILIZATION DURING THE YEAR 2017-18

Sl. No.	Modes of utilization	Fly ash utilization in the Year 2017-18	
		Quantity (Million-ton)	Percentage (%)
1	Cement	50.2909	25.60
2	Bricks & Tiles	17.6943	9.01
3	Ash Dyke Raising	13.5500	6.90
4	Mine filling	12.5159	6.37
5	Reclamation of low lying area	20.5779	10.48
6	Roads & flyovers	6.6733	3.40
7	Agriculture	0.5732	0.29
8	Concrete	1.2974	0.66
9	Hydro Power Sector	0.0077	0.004
10	Others	8.6857	4.42
11	Unutilized Fly Ash	64.5747	32.87
<b>Total</b>		<b>196.4410</b>	<b>100.00</b>

The utilization of fly ash in various modes in percentage during 2017-18 in the form of a pie-diagram is given below:

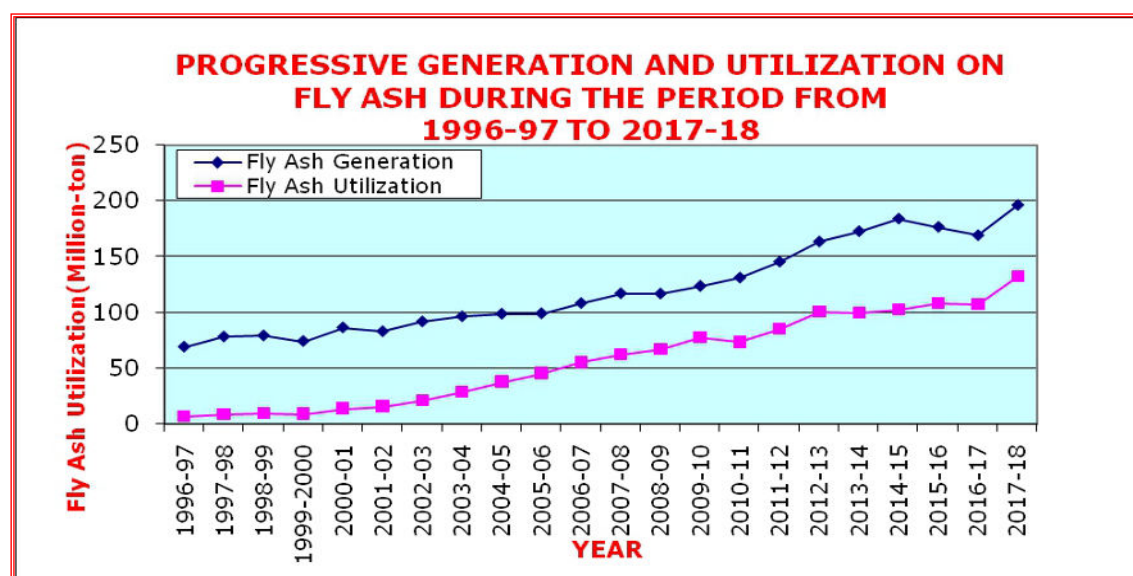
The utilization of fly ash in various modes in percentage during 2017-18 in the form of a pie-diagram is given below:



The maximum utilization of fly ash during 2017-18 to the extent of 25.60 % has been in Cement sector, followed by 10.48% in Reclamation of low lying area, 9.01 % in making of bricks & tiles, 6.90 % in ash dyke raising, 6.37 % in mine filling, 3.40 % in roads & flyovers, etc.

#### 6.23.6 Progressive Fly Ash Generation & Utilization during the Period from 1996-97 to 2017-18

The fly ash utilization has increased from 6.64 million tonnes in 1996-97 to a level of 131.87 million tonnes in 2017-18. A graph showing about progressive trend in fly ash generation and its utilization for the period from 1996-97 to 2017-18 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 and 2012-13 and again a slight drop during 2013-14 it picked up in 2014-15 and 2015-16 with miniscule drop in the year 2016-17 and again picked up in the year 2017-18.

### 6.23.7 Conclusion

The highest level of fly ash utilization of about 67.13% is achieved during the year 2017-18. It could not be possible to achieved the target of 100% utilization of fly ash by 31st December, 2017 as stipulated in MoEF's Notification of 25th January, 2016. The stipulations of notification of 2009 and amendments should be effectively implemented. As per this report about 32.87% fly ash is unutilized for the year 2017-18.

### 6.23.8 WEB BASED MONITORING SYSTEM AND A MOBILE APPLICATION FOR UTILIZATION OF FLY ASH

Annual Fly ash utilization has remained about 67% 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 tone
- Cumulative stock of fly ash available in the ponds for the month as on 30<sup>th</sup> 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 28<sup>th</sup> 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 being done.

The mobile application "ASHTRACK" 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



## 6.24 PERFORMANCE AWARDS IN POWER SECTOR

### 6.24.1 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 J&K distribution utilities in operation & maintenance and early completion of thermal, hydro & transmission projects. To promote, encourage and recognize the efforts of rural distribution franchisees, an award was introduced in 2007-08. Recognizing the

need to promote environment protection, a category of award was introduced in 2008-09 to be given to best performing coal/lignite-based thermal power station for environment management. Keeping in view the technological developments in equipment and machinery, construction techniques of power projects and transmission lines, recognizing need to promote environmental protection, to further encourage improvement in operational performance, huge capacity addition through super critical units, the comprehensive award schemes was revised and approved by Ministry of Power for the year 2013-14 onwards. As regards award scheme to be followed for the year 2016- 17, some modifications have been proposed in 7 nos. of schemes by concerned Divisions as felt necessary. As regards number of awards, it is to mention that maximum possible number of awards for year 2016- 17 shall increase from previous year's 40 nos. plus 1 consolation award to 43 nos. plus 1 consolation award.

The Comprehensive award scheme includes the following ten (10) categories of the award schemes with their respective number of awards:

Award Schemes	No. of Awards
• Thermal power station performance	- 8
• Early completion of Thermal Power Projects	- 9
• Hydro Power Station Performance	- 3
• Early Completion of Hydro Power Projects	- 3
• Transmission System Availability	- 3
• Early Completion of Transmission Projects	- 6
• Nuclear Power Station Performance	- 1+1*
• Performance of Govt. owned distribution companies	- 3
• Performance of Pvt. distribution companies	- 3
• Performance of Rural Distribution Franchises.	- 3
• Environment Management for coal based Thermal Power Stations.	- 1
<b>Total Award</b>	<b>- 43+1*</b>

### 6.24.2 Awards for the year 2016-17

The evaluation process of award schemes for the year 2016-17 is in progress.

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## CHAPTER – 7

### DISTRIBUTION SCHEMES AND INITIATIVES

#### 7.1 Preparation and Monitoring of 24x7-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 8<sup>th</sup> December 2016, set up a Central Programme 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 for sorting out the issues for achieving the goal of 24x7 power for all.

As per the status available in MIS of DDUGJY for March 2019, the achievement of 24x7 Power for all is as below:

Item	Name of State*
24 Hrs of Supply in 8 States	Gujarat, Himachal Pradesh, Kerala, Tamil Nadu, Telangana, West Bengal, Punjab, Maharashtra
<24 to 23 Hrs of Supply in 6 States	Andhra Pradesh, Uttarakhand, Tripura, Chhattisgarh, Madhya Pradesh, Manipur
<23 to 20 Hrs of Supply in 4 States	Rajasthan, Nagaland, Odisha, Bihar
< 20 Hrs of Supply in 10 States	Assam, Jharkhand, Uttar Pradesh, , Sikkim, Jammu & Kashmir, Haryana, Arunachal Pradesh, Mizoram, Karnataka,

\* Excluding Goa & UTs

#### 7.2. Development of SMART GRID in the Country

- Govt. of India launched 'National Smart Grid Mission (NSGM)' in March, 2015 for planning and monitoring the implementation of policies &

programmes related to smart grid activities in India. In May, 2018, MoP sanctioned continuation of NSGM upto 2020 with a total outlay of Rs 990 Cr including budgetary support of Rs 312 Cr from Govt. of India.

- The 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. The Technical Committee is supporting NSGM on technical aspects, standards development, technology selection guidelines and other technical matters.
- To test the various smart grid technologies and various functionalities of smart grid , 10 pilots projects were sanctioned by Ministry of Power with 50% funding as a grant. Additionally, establishment of Smart Grid Knowledge Center was also approved with 100% funding by GOI. All the pilot projects have been completed/ declared live and Smart Grid Knowledge Center at Manesar, Haryana has also been inaugurated by Hon'ble MoS for Power and NRE in September 2018 for providing technical support for capacity building & development of technical manpower in the State etc.
- DP&T Division is the nodal division in CEA assisting Technical Committee of NSGM in technical examination & evaluation of Smart Grid Projects and other technical matters and providing technical support to National Smart Grid Mission.
- Under NSGM, 5 projects for Chandigarh (sub-division 5), Chandigarh (complete city without sub division 5), Kochi, Ranchi and Rourkela cities have been sanctioned at an approved cost of Rs 685.8 Cr with Govt of India grant of Rs 198.27 Cr.
- Technical Committee headed by Chairperson, CEA in its 6th meeting held in December 2018 recommended the following additional smart grids projects for consideration of Empowered Committee for implementation under NSGM :-
  - i. Smart Grid project for 6 urban towns of Rajasthan (JVVNL)
  - ii. Smart Grid projects at Raipur & Bilaspur city of Chhattisgarh (CSPDCL)
- CEA assisted NSGM to finalize model RfP document & model DPR for Smart Grid projects in the Country.
- A committee under Chief Engineer

(DP&T) was constituted by Ministry of Power to study the issues of Opex based solutions with special reference to cloud based/server based solutions through GOI capital grants. The Committee deliberated on the issues and submitted the report to MoP in November 2018.

- A committee under Additional Secretary, MOP with member from CEA, NSGM, EESL & UP was constituted by Ministry of Power to look into the issues regarding smart meter rollout in the country. CE(DP&T) , CEA was nominated as a member of the Committee. The Committee deliberated the various issues and CEA provided valuable material /comments for the Report. The Report of the Committee has been submitted to MoP.
- As decided during the Governing Council Meeting of NSGM held under the Chairmanship of Hon'ble Minister of State for Power and NRE on 16<sup>th</sup> January, 2019, a Committee under Member (GO&D), CEA with Members from PGCIL, NPMU, POSOCO, CESC Kolkata, CESC Mysuru & UGVCL Gujarat has been constituted in CEA to study and prepare a report on “Development and Implementation of Smart Grid” in the country. The Committee convened two meetings in CEA and the report of the Committee is under preparation.

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

#### ♦ AWARD SCHEME FOR DISTRIBUTION COMPANIES:

Govt. of India has instituted award schemes for various segments of the Power Sector from the year 2004-05 onwards. The scheme was reviewed during 2016-17 to incorporate the features of various ongoing schemes of Govt of India, and at the same time, to promote more competition among the Distribution companies, the existing award scheme has been segregated for Govt Discoms and Private Discoms to be implemented from 2016-17 and

onwards. The eligibility criteria for Private Discoms is made stringent than Govt discoms. The revised award scheme is linked to the performance of Distribution Companies based on various parameters such as:

- AT&C losses
- Financial Turnaround
- Metering of Feeders, DTs and consumers
- Power supply and Reliability
- Consumer care and safety
- Demand Side Management.

On the basis of the final approved scheme, data is requested from Distribution Companies across the country. The data received is analyzed and evaluated for the performance of Distribution Companies is done on the basis of various parameters listed above. Under the scheme for the year 2016-17, proposals were received only from 12 Govt. Distribution Companies & 7 Pvt Distribution Companies which was analyzed and the recommendations for award has been submitted to Ministry of Power for its further consideration. The request for the proposal for the consideration year 2017-18 has been issued and proposals are awaited from Discoms.

#### ♦ **AWARD SCHEME FOR RURAL DISTRIBUTION FRANCHISEES (RDFs):**

From the year 2007-08 onwards, another award scheme was instituted by Ministry of Power in the area of Distribution for giving awards to Rural Distribution Franchisees for their performance based on various parameters such as:

- Type of Activity undertaken by RDF
- Metered service connections
- Revenue Management
- AT&C Losses.

This scheme is also reviewed every year and the modifications proposed are sent for the approval of Chairperson, CEA. On the basis of final approved scheme, data is requested from Distribution Companies across

the country. Award scheme for the consideration year 2017-18 was sent to various Distribution Companies by CEA requesting them to send data/information on various parameters outlined in the Award Scheme.

Under the scheme for the year 2016-17, proposals were received only from 04 Rural Distribution Franchisees which was analyzed and the recommendations for award has been submitted to Ministry of Power for its further consideration. The request for the proposal for the consideration year 2017-18 has been issued and proposals are awaited from Discoms.

#### **7.4 Research & Development Projects in the Distribution Sector**

As a nodal division for examination of distribution sector of R&D projects, DP&D Division examined R&D Projects during the year received from CPRI.

#### **7.5 Integrated Power Development Scheme (IPDS):**

Integrated Power Development Scheme (IPDS) was launched by MoP on 3<sup>rd</sup> 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 crore 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 12<sup>th</sup> and 13<sup>th</sup> 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.

As a member of Monitoring committee of this scheme, CEA has been attending meeting at MOP and providing requisite inputs and support for implementation. The achievement/Progress of the schemes (based on MIS of IPDS as on 31.03.2019) is given as below:

**a) Component wise Status of IPDS;**

**i) Strengthening of sub-Transmission and Distribution:**

Item	No. of Circles covered	Towns Covered	Sanctioned Project Cost (in Crores)	Amount Released (in Crores)	Status of Projects
Strengthening & Augmentation	545	3634	28260	7801 (44.01 %)	At various stages of implementation

**ii) IT Phase-II**

States/UTs	Utility/ DISCOMs	Towns Covered	Total Approved Cost (Rs. Crores)	Fund Released (Rs. Crores)	Status of Work
21	45	1931	985	38 (3.85%)	Yet to be awarded

**iii) Metering of Consumers, Feeders and Distribution transformers**

Utility	Consumer Meter (No)			Feeder / DT / Boundary Meter (No)			Smart Meter (No)			Pre-Paid Meter (No)		
	Sanctioned Qty	Award Qty	Achieved	Sanctioned Qty	Award Qty	Achieved	Sanctioned Qty	Award Qty	Achieved	Sanctioned Qty	Award Qty	Achieved
	9,010,726	8,876,430	5,749,968	128,729	113,900	43,162	182,144	1,169,609	61,086	127,928	104,654	42,679



iv) **Solar Panels**

Solar Panels (KWp)		
Sanctioned Qty	Award Qty	Achieved
46,889	48,679	29,440

b) **R-APDRP component:**

RAPDRP Status	Nos. of Towns covered	Approved Cost (Rs crores)	Disbursement (Rs. Crores) @	Status of Projects/Go-Live
Part-A RAPDRP(IT Enabled System)	1405	5297.42	4022.137 (75.92 %)	Go-Live - 1376
Part-A RAPDRP(SCADA)	59	1251.13	551.51 (44.08 %)	57 awarded and 52 SCADA completed
Part-B RAPDRP(Network Strengthening)	1227	28148.52	7087.52 (24.65 %)	1227 Awarded/ 1195 Completed
<b>Total</b>	---	37,297.07	11661.16 (33.03 %)	---

@ includes PMA charges

### 7.6 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

- ❖ Officers from DP&R division were a part of the Central Team constituted by Ministry of Home Affairs/Ministry of Agriculture for on-the-spot assessment of Damages caused to Power Sector by natural calamities in the States of Andhra Pradesh, Karnataka, Odisha, Tamil Nadu and Kerala. 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.

### 7.7 AMENDMENT IN EXISTING CEA REGULATIONS

- ❖ **3<sup>rd</sup> Amendment of Central Electricity Authority (Installation & Operation of Meters) Regulations, 2006**

This Amendment was taken up as the Gazette notification on the last Amendment to these Regulations were

published in 2014. In the Draft Amendment now proposed, certain provisions as regards Smart Meters and capability in new interface meters for 5/15 minutes scheduling, metering, accounting and settlement for facilitating large scale integration of renewables have been introduced. The Draft Regulations prepared on the basis of comments received from various stakeholders, after approval of the Authority were sent to Legal Division, CEA for pre-publication. Last date for comments on the draft Regulations is 10<sup>th</sup> April, 2019.

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

The comments received from various stakeholders on the Draft Regulations earlier placed on the web-site of CEA were analyzed and discussed. Based on the discussions held, the Draft Regulations were modified and after approval of the Authority were sent to TE&TD Division, CEA for further action as regards Gazette Notification.

❖ **3<sup>rd</sup> Amendment of Central Electricity Authority (Technical Standards for construction of Electrical plants and Electric lines) Regulations, 2010**

This Amendment of the Regulations was taken up to ensure uniformity in Supply Voltage at the point of commencement of supply to single phase and three phase LT consumers by various Distribution utilities across the country. The draft Regulations after approval of the Authority were sent to Legal Division, CEA for pre-publication. Last date for comments on the draft Regulations is 4th April, 2019.

## 7.8 Ease of Doing Business

- ❖ Ministry of Power constituted a Committee under Member (Grid Operations & Distribution), Central Electricity Authority with Chief Engineer (Distribution Policy & Regulations, 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. Three meetings of the Committee have been held so far and based on the discussions held, the Report of the Committee is under finalization.

## 7.9 Uniformity in Methodology for calculation of Aggregate Technical & Commercial (AT&C) Losses and ACS-ARR Gap

Chief Engineer (Distribution Policy & Regulations, Division), CEA was part of the Committee constituted by Ministry of Power to deliberate on the methodology for calculation of AT&C losses as there was lack of uniformity in the methodology

adopted for calculation of AT&C losses and ACS-ARR Gap by various utilities in the country. Further discussions were held at Power Finance Corporation and Ministry of Power regarding treatment of sub-parameters finalised based on the deliberations held at the Workshop on Revised Methodology for calculation of AT&C losses in May, 2018 at PFC. An Addendum along with the Revised methodology for addressing the treatment of sub-parameters used for calculation of AT&C losses and ACS-ARR Gap was circulated by CEA to Energy Departments and Distribution Utilities of all the States and Forum of Regulators in August, 2018.

## 7.10 Time of Day (ToD) Metering

Ministry of Power constituted a Study Group under Member (Grid Operations & Distribution Division), CEA with Chief Engineer (Distribution Policy & Regulations, Division), CEA as its convener for implementation of ToD Tariffs on Supply and Demand Side. Three meetings under this Group have been held so far. Formats were developed for obtaining data from Regulatory Commissions and Distribution Utilities and the data obtained is being compiled and analyzed.

## 7.11 Work regarding Power Quality

- a) A Panel was constituted under the convenership of the Chief Engineer (DP&R), CEA by ETD 01 Sectional Committee of Bureau of Indian Standards working in the area of Power Quality for developing an Indian Standard on "**Distribution System Supply Voltage Quality**". After detailed deliberations, the draft Standard was finalised and after approval of the Sectional Committee, Indian Standard 17036 was published by BIS in August, 2018.

- b) Another Panel has been constituted under the convenership 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 one meeting so far and the Standard is in Draft Stage.

### 7.12 Work regarding Low Voltage Direct Current(LVDC)

A Panel has been constituted under the convenership 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 one meeting so far and the draft is under discussion.

### 7.13 WORKS RELATED TO UNION TERRITORIES(UT)

The following works pertaining to UTs were taken up and completed during 2018-19

#### 7.13.1 UT of Daman & Diu

- Technical clearance was accorded for the scheme for Installation of 6.8 MW Wind Energy Project in Diu
- The schemes for Normal Development Works and Release of Service Connections (ND&SC) for UT of Daman & Diu during 2019-20, 2020-21 to 2021-22, power supply to M/s Wellknown Polysters Ltd, scheme for laying of underground cables in UT of Daman & Diu and the scheme for replacement of 4 nos of 10 MVA, 66/11 KV old Power Transformers by 15 MVA transformer in Daman were examined and comments furnished.

#### 7.13.2 UT of Andaman & Nicobar Islands

- Attended various meeting taken by Hon'ble Minister of State for Power and New & Renewables Energy in

MoP & MNRE to discuss the development of 25 MW Solar power plants & 50 MW gas based power plant in Andaman & Nicobar Islands.

- Examined and comments furnished for Visionary and Strategic Plan for UT of Andaman & Nicobar Islands to mitigate power crisis in A&N Islands-Formation of expert study group.
- Furnished information to MoP on Latest Power Supply Position in Andaman & Nicobar Islands and status of ongoing works in Andaman & Nicobar Islands.
- Furnished comments to MoP on views of Standing Committee on Energy regarding Electricity Generation in UT of Andaman & Nicobar Islands.
- Proposal for JICA grant assistance for improvement of power supply in A & N Islands by installation of 15 MW DG, 1 MW Battery System & SCADA was examined & comments furnished to MoP.

#### 7.13.3 UT of Puducherry

- Technical concurrence was accorded to the DPR for improvement in Distribution system in UT of Puducherry under JICA funding

#### 7.13.4 UT of Lakshadweep:

- Tender documents for procurement of Smart Meters for Electricity Department of Lakshadweep was examined and technically cleared.
- In view of the installation of 25 MW Solar power plant by SECI in different islands of UT of Lakshadweep, the power supply position in all the islands of UT was examined and comments furnished to UT Administration.

#### 7.13.5 UT of Chandigarh

- Detailed Project Report of estimated cost of Rs 2773 Cr regarding Integrated Power Development Scheme for UT of Chandigarh was examined and comments were furnished to UT Administration.

#### 7.14 TECHNICAL APPRAISAL OF DISTRIBUTION SCHEMES OF STATES

- Technical concurrence was accorded to the proposal for grant of ADB loan for laying of Under Ground Cabling system under Uttarakhand Transmission strengthening and Distribution Program.
- Technical concurrence was accorded to the proposal for financial assistance from World Bank for strengthening of distribution network of WBSEDCL
- Technical concurrence was accorded to the PPR of Uttar Pradesh for distribution sector improvement under ADB funding.
- Technical concurrence was accorded to the Project proposals from Government of Meghalaya for financial assistance from ADB for Externally Aided Project (EAP) under Meghalaya Power Sector Improvement project.
- Technical concurrence was accorded to the DPR for finance & technical assistance by World Bank for Himachal Pradesh distribution development projects.
- Technical concurrence was accorded to the proposal of High Voltage Distribution System (HVDS) for availing ADB loan by MSEDCL for providing new Agriculture connections in the State.
- Technical approval was accorded to the PPR for external assistance from ADB for Bengaluru smart energy efficient power distribution project by BESCOM.
- Technical concurrence was accorded to the PPR for Strengthening of Distribution System in Tripura under ADB funding.
- The matter regarding Reallocation of loan proceeds under JICA loan No. (IDP-216) A.P Rural High Voltage Distribution system of TSSPDCL was examined and comments furnished.
- The proposal of Assam Government for availing ADB Loan for upgradation of Distribution Network was examined and comments furnished.
- DPR for improvement of distribution system including smart metering in Arunachal Pradesh was examined & comments furnished.
- The three DPRs for augmentation of sub-transmission & Distribution system in the States of Nagaland, Sikkim and Arunachal Pradesh received from NEC, M/O DONER

were examined and comments furnished.

#### 7.15 Committee for Inspections/ Investigation across the country for checking up complaints under DDUGJY/RAPDRP

- In order to address the concerns raised by various stake holders including Hon'ble MPs for quality of works under Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)/ RAPDRP in the country, MoP constituted 4 teams headed by CEA officers for field inspections. Teams were to carry out field inspections as and when complaints received from the stake holders by visiting the place in their allotted regions and submit their inspection report regarding the quality of works carried out in village.
- Director (DP&T) was nominated for Head of the team for Northern Region and the field inspections for checking the quality of works under DDUGJY & RAPDRP in Mirzapur, Pratapgarh & Faizabad Districts were carried out during the year and the reports were furnished to MOP:

#### 7.16 Preparation of Distribution Perspective Plan-2022:

In order to help the DISCOMs to evolve integrated approach for strengthening of Distribution sector in the country for providing 24x7 reliable & quality power to all consumers in the country and also to meet the various targets under Uday scheme, the first Distribution Perspective Plan for distribution sector upto 2021-22 was taken up by DP&T Division under guidance of Ministry of Power. This Plan is prepared with the detailed consultation with DISCOMs and is 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.



This Plan will help various planning agencies in optimal utilization of resources by coordinating their activities. The present distribution perspective plan (DPP) would provide a broad picture of infrastructure requirement of distribution utilities upto 2021-22. The plan has been discussed in MoP during the various meetings taken by Secretary (Power) & Joint Secretary (Distribution), MoP and is under approval by MoP.

### **7.17 Preparation of Distribution Planning Criterion for distribution utilities:**

In the meeting chaired by Secretary (Power) to discuss the draft Distribution Perspective Plan 2022, it has been observed that distribution utilities generally face difficulty in planning their distribution system, as there is no standard distribution planning criteria is available. Secretary (Power) desired 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 Manual on Distribution Planning Criteria would be prepared after wide consultation with all the stake holders.

### **7.18 Preparation of Guidelines for Distribution Utilities for judicious selection of various items for distribution infrastructure development.:**

Ministry of Power directed CEA to prepare guidelines and reports which may be used by Discoms in judicious selection of various items for infrastructure development.

Accordingly, DP&T Division in consultation with various discoms prepared the following guidelines and these guidelines were released by Chairperson, CEA & Joint Secretary, MoP:

- (a) Guidelines for usages of proper communication system in Advanced Metering Infrastructure (AMI)
- (b) Guidelines for usages of Air Insulated Substation(AIS) or Gas Insulated Substation(GIS)
- (c) Guidelines for usages of pole mounted or plinth mounted distribution sub-station
- (d) Guidelines for usages of High Voltage Distribution System (HVDS) vs Low Voltage Distribution System(LVDS)
- (e) Guidelines for usages of Amorphous core or CRGO core distribution transformer
- (f) Guidelines for usages of underground (UG) cabling system or overhead conductor system
- (g) Guidelines on introduction of automation in distribution system
- (h) Guidelines for power quality and safety issues in roof top Solar PV system

### **GENERAL**

- Participation in various meetings in MoP, MNRE, REC, PFC, Department of Heavy Industries etc on various technical issues
- Attended meetings in BIS as a member of various technical committees.
- Furnished material for framing reply to Parliament Questions, VIP references, Annual Report of MOP, Standing Committee on Energy, Consultative committee on Power etc regarding AT&C losses, smart grid and other distribution related issues.
- Material furnished for various speech/questionnaire/news item for Hon'ble Minister of Power/ Secretary(P) and Chairperson, CEA



- Examination/ furnishing of the material regarding RTI, Grievance Petition etc. pertaining to MOP/CEA and related to distribution sector.
- Inputs given in respect of Review of Crisis Management Plan (CMP) of MHA.
- Inputs given in respect of Constitution of the Industrial Tripartite Committee (ITC) on Electricity Generation and Distribution Industries.
- Information furnished pertaining to distribution sector for reference book on Energy in India.
- Comments furnished for RoD of the meeting chaired by Principal Secretary to PM on measures for economic growth.
- Information furnished on report of the second Asian and Pacific Energy Forum to be discussed at 74<sup>th</sup> session of the economic and social commission for Asia and the Pacific (UNESCAP).
- Comments furnished on reference of NITI Aayog on action plan on Energy Demand and supply for 2022.
- Material furnished in respect of distribution sector for 8<sup>th</sup> session of India-Oman Joint Commission meeting (JCM).
- Furnished replies to the list of points on the spot study visit of the Standing Committee on Energy to Shillong, Guwahati and Gangtok from 11<sup>th</sup> to 14<sup>th</sup> May, 2018.
- Material furnished in respect of distribution sector for 12<sup>th</sup> India-Saudi Arabia Joint Commission meeting.
- Material furnished in respect of energy efficiency programme for G20 Energy Ministers communique
- Material furnished in respect of VIP reference reg. Damage to crops due to snapping of conductors.
- Furnished comments on PMO reference on Clean Cooking options and State Energy Index finalized by NITI Aayog.
- Furnished comments on effect of electrocution on wild life due to electrical lines.
- Furnished comments to R&D Division on Identification of some of the major National Technology Challenges for consideration under IMPRINT-II Programme of MHRD and DST
- Furnished comments to TPE&CC, CEA on identification of major sources of PM 2.5 & PM 10 pollutant.
- Comments on DO letter from Secretary, Inter- state Council Secretariat, Ministry of Home Affairs, regarding laying of transmission lines in forest areas
- Furnished comments to coordination division on Standing Committee on Energy (2018-19)-Examination of the subject “Role of Regulators in Electricity Sector-An Evaluation
- Material furnished on the draft MoU on Indo-Denmark Energy cooperation between the Ministry of Power, Government of India and the Ministry of Energy, Utilities and Climate, Government of Denmark.
- Material furnished on Representation received for opposing and restraining the process of Procurement of Amorphous Core Transformer by Punjab State Power Corporation Limited (PSPCL).
- Status provided to MoP reg assistance provided by CPSUs to Kerala Govt due to heavy flood.
- Furnished comments on representation from CII regarding usage of lead based underground power cable despite availability of greener power cable alternatives.
- Furnished comments on Adoption of Principles of Life Cycle Cost (LCC) analysis for distribution transformers
- Furnished comments on VIP reference received from Shri Prem Singh Chandumajra, MP (Lok Sabha) regarding installation of “Prepaid Electricity Meters” in the Country
- Furnished material for Economic Survey 2018-19.

- Furnished comments on VIP reference from Shri B. Senguttuvan, MP (LS), Vellore, Tamil Nadu in connection with free power supply for agriculture purposes

## 7.19 Rural Electrification

### 7.19.1 Status of Rural Electrification in the Country:

As per the information furnished by States and UTs in GARV App, as on 01.04.2015, there were 18,452 balance un-electrified villages (Census-2011) in the country which have been covered for electrification under Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) under mission mode by 01<sup>st</sup> May 2018. All these balance un-electrified villages have been electrified (including 1,271 uninhabited villages) by 28-04-2018, achieving thereby 100% electrification of villages (census 2011) in the country.

As per the data furnished by State Govts, 282913 number of pumpsets/tubewells energized during 2018-19 and cumulatively, 21354379 pump sets/tube wells have been energized at the end of March 2019 in the Country. Overall status of Rural Electrification in the Country is shown under DDUGJY at Para 7.19.2.

### 7.19.2 Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY):

Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY) was launched by MoP on 3<sup>rd</sup> December 2014 with the following components in Rural Areas:

- Separation of agriculture and non-agriculture feeders facilitating judicious rostering of supply to agricultural & non-agricultural consumers;
- 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 12<sup>th</sup> and 13<sup>th</sup> 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 State 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.

As a member of Monitoring committee of this scheme, CEA has been attending meeting at MOP and providing requisite inputs and support for implementation. The achievement/Progress of the schemes (based on MIS of DDUGJY as on 31.03.2018) is given as below:

## Progress of DDUGJY : (As per MIS of DDUGJY as on 31.03.2019)

PLAN	Financial (Rs Cr)			
	Sanction Cost	Loan	Subsidy	Release
OLD Component	65878	5385	49264	54678
NEW Component	56947	31	21288	21290
Total	120600	5416	70552	75968

Sr. No.	Particulars	Units of Measurement	Sanctioned Quantity	Achievement	Progress (%)
1	Village Electrification	Nos.	All the un-electrified inhabited census villages stand electrified on 28.04.2018		
2	Intensive Electrification of Villages		594454	594454	100
3	BPL Households Connection		35177651	35177651	100
4	33 & 66 KV Line	Ckms	17688	11507	65.1
5	11 KV Line		646385.89	420299	65.0
6	33/11 KV Substation:	Nos.			
	(a) New		902	808	89.5
	(b) Augmentation		2172	1723	79.3
7	Distribution Transformer	Nos	1125485	846152	75.2
8	LT Line	Ckms	731555.3	632199.64	86.4

DDUGJY NEW					
1	Intensive Electrification of Villages	Nos.	185839	185839	100
2	BPL Households Connection		3851205	3851205	100
3	SAGY Villages		756	650	86
4	33 & 66 KV Line	Ckms	25631.32	12734.3	49.68
5	11 KV Line		109835.82	89855	81.8
6	33/11 KV Substation:	Nos.			
	(a) New		1825	1128	61.8
	(b) Augmentation		1692	1186	70
7	Distribution Transformer		410146	231882	56.5
8	Feeder Separation	Ckms	160000.19	70350.26	43.96
9	LT Line		123403.52	165484.1	134.1
10	Metering:	Nos.			
	(a) Consumer		14889629	9698749	65.1
	(b) Distribution Transformer		376234	161843	41.9
	(c) 11 kV feeder		29336	9322	31.77

### 7.19.3 Decentralized Distributed Generation (DDG) Projects under RE component of DDUGJY (RGGVY)

Under RGGVY, there was a provision for Rs.540 crores during 11<sup>th</sup> plan for Decentralized Distributed Generation (DDG) which has been revised to Rs.1000 crores for implementation during 12<sup>th</sup> and 13<sup>th</sup> 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 31.03.2019:

Under DDG, 4379 projects covering 203166 Nos. of Households (including BPL Household of 172040) in 4637 un electrified villages/hamlets in 15 States (Andhra Pradesh, Assam, Arunachal Pradesh, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Odisha, Telangana, Uttar Pradesh, Uttarakhand, Manipur & J&K) at an estimated cost of Rs.1466.78 crores have been sanctioned (release Rs.713.79 crores) by the Monitoring Committee and out of which 3050 (69.65%) projects have been commissioned.

### 7.20 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, should 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 Reliability Indices in the proforma prescribed by CEA for consumer and feeders covering all cities and towns up to the District Headquarter and also for rural areas has been compiled for 2016-17 and published on website of CEA.

Further, to align with the Standards of Performance of SERCs, the formats for collection of RI data has been modified 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 Reliability Indices viz System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI for feeders covering all cities and towns up to the District Headquarter and also for rural areas has been compiled for 2017-18 and the same for 2018-19 is under progress.

### 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. 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 Under Saubhagya, all the remaining 300 lakh (estimated) un-electrified households are targeted to be electrified (excluding non poor urban households) throughout the country by 31<sup>st</sup> March, 2019.

As a member of Monitoring committee of this scheme, CEA has been attending meeting at MOP and providing requisite inputs and support for implementation. The achievement/Progress of the schemes (based on Saubhagya portal as on 31.03.2019) is given as below:



A total of 2,62,84,350 un-electrified households have been electrified in 29 states and one UT since the launch of the scheme on 11<sup>th</sup> October 2017 and 18,734 households (0.008 % of total 21,30,36,453 households) are balance for electrification. The state wise details are at **Annexure-7A**

### Monitoring of projects under Prime Minsters development (PMDP) 2015 for J&K

Honorable 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 the above package, Total amount sanctioned is Rs 2570.14 Crores for Distribution Strengthening in the state of J&K. The details of the project sanctioned by Government of India for as below:

- a) Rural Area: Projects for 21 districts amounting to Rs 1157.75 Crores 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, for which JKPDD & PGCIL are the nominated Project implementing Agency (PIA).
- b) Urban Area: Project for 12 circles amounting to Rs 1144.59 Crores for strengthening the Urban distribution area which includes establishment of 33 Nos of meter testing labs has been sanctioned, for which JKPDD & RECPDCL are the nominated PIA.
- c) Smart metering projects: Projects for providing meter to 2 lakh consumers at the cost of 126.54 Crores has been sanctioned, for which JKPDD & RECPDCL are the nominated PIA.
- d) Smart Grid projects: Projects worth Rs 141.26 Crores has been sanctioned and PGCIL is the PIA.

All these projects except smart metering

and smart grid projects have been awarded up to 20<sup>th</sup> October 2018 and the works are at various stages of implementation and Rs 551 cr has been released to implementing agencies (as on Feb. 2019). CEA is regularly monitoring the progress through PMA/PIA and sending the compiled report to Ministry of Power on monthly basis.

### 7.21 CONDUCTION OF MOCK TEST EXERCISE AT PARLIAMENT HOUSE

To ensure reliability of power supply to Parliament house before onset of each Parliament session, 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. The reports of the Mock Test Exercise were sent to MOP, CPWD & NDMC.

### 7.22 ASSISTANCE TO BEE/REC/EESL

- a) Technical assistance was provided to BEE on issues related to PAT-II scheme for Discoms
- b) Technical assisted was provided to REC in examination of issues related to SBD of DDUGJY/IPDS.
- c) Inputs furnished on adoption of new Electric Pole WPB160 developed by SAIL for Electrification Schemes of GOI under DDUGJY.
- d) Examined DPRs of EESL for 2<sup>nd</sup> line of Credit & 3<sup>rd</sup> Line of Credit for US \$ 500 million each from ADB and comments furnished to MOP.
- e) The issue related to amendments in technical specification of cable accessories in SBD of DDUGJY/IPDS was examined and technical advise was conveyed to REC for necessary action.
- f) Furnished report to MoP on additional fund requirement for infrastructure development for 100% household electrification over and above approved outlay of Saubhagya Scheme.



- g) Furnished comments for SFC meeting to consider the proposal of "Promoting Energy Efficiency Activities in different Sectors of Indian Economy" being implemented by BEE.
- h) Furnished monthly report on outages of 11 KV rural feeder to MoP.
- I) Examined the REC project proposal of 200 million Euro from KfW to support energy efficiency initiative of UP State Power Utility under Indo German Development Corporation and comments furnished.

### 7.23 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 & MoP etc. The following actions were taken by CERT-D during 2018-19.

- 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, 56 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 conduct regular security audits of their IT Infrastructure through CERT-IN empaneled agencies etc.
- 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.
- A meeting was conducted to discuss the preparedness of DISCOMs of Metropolitan Cities on Cyber Security Issues.
- For Cyber Security in power distribution system in VVIP area, the issue for Identifying the Critical Information Infrastructure (CII) in NDMC, Delhi was taken up.

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## CHAPTER – 8

### DESIGN & ENGINEERING SERVICES

#### 8.1 Design & Engineering of Hydro Electric Projects

engineering consultancy of electro-technical works of the following HE Projects were carried out:

During the year 2018-19, the design and

Sl. No.	Name of the H.E. Project	Executing Agency/ State	Capacity
Main Consultancy			
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 HEP's	THDCIL	2868 MW

\*Meghalaya Power Generation Corporation Ltd.

#### 8.2 Scrutiny / Examination/Preparation of DPRs of HE Projects

Chapters on Electro-Mechanical equipments, related drawings and bill of quantities of 23 nos. (22 nos. in India+ 1 no. in Nepal) of DPR of new H.E Projects aggregating to 17421 MW including clarifications/ drawings/ documents etc. as

received from time to time were examined and commented upon. General layout Plan/Salient features of new HEPs (Total 13 nos.) under Survey & Investigation (S&I) at pre-DPR stage aggregating to about 3850 MW were examined & commented upon. A list of these hydro electric projects has been indicated below:

List of DPRs of new HEPs examined for E&M aspects during the year

S.No.	Name of the Project	State	Installed Capacity(MW)
<b>Hydro Projects in India</b>			
1.	Luhri	H.P.	601
2.	Parbati-II	H.P.	800
3.	Parbati-III	H.P.	520
4.	Sachkhas	H.P.	267
6.	Dugar	H.P.	421
7.	Reoli Dogli	H.P.	430
8.	Sunni Dam	H.P.	355
9.	Sawalkote	J&K	1856
10.	UJH Multipurpose	J&K	212
11.	Kirthai-I	J&K	390
12.	Bursar	J&K	800
13.	Bowala Nand Prayag	Uttarakhand	300
14.	Sirkari Bhyol Rupsiabagar	Uttarakhand	120
15.	Goriganga –III A	Uttarakhand	150

S.No.	Name of the Project	State	Installed Capacity(MW)
16.	Ken Betwa Link Project Phase-I	M.P.	78
17.	Bina Complex HEP	M.P.	25
18.	Dibang MPP	Arunachal Pradesh	2880
19.	Oju Subansiri HEP	Arunachal Pradesh	259.25
20.	Kamla HEP	Arunachal Pradesh	1800
21.	Magochu HEP	Arunachal Pradesh	96
22.	Par-Tapi Narmda Link Project	Gujrat & Maharashtra	21
<b>Hydro Projects in Abroad</b>			
23.	Pancheshwar MPP	Nepal	5040

B. List of new 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.	Thana Plaun HEP	H.P.	191
2.	Reoli Dugli HEP	H.P.	420
3.	Nakhtan HEP	H.P.	460
4.	Luhri Stage.II	H.P.	172
5.	Anjaw HEP	Arunachal Pradesh	270
6.	Yamne -I HEP	Arunachal Pradesh	111
7.	Rho Multipurpose HEP	Arunachal Pradesh	93
8.	New Milling HEP	Arunachal Pradesh	90
9.	Attunli HEP	Arunachal Pradesh	680
10.	Turga PSP	West Bengal	1000
11.	Maphew HEP	Meghalaya	75
12.	Myntdu Leshka ( Stage – II) HEP	Meghalaya	210
13.	Teesta Low dam I & II HEP	West Bengal	78

### 8.3 Proposals for Foreign Assistance/ Bilateral Co-operation.

The 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:

1. Armenia.
2. Tajikistan.
3. Croatia.
4. Vietnam.
5. Russia.
6. Afghanistan.
7. Morocco.
8. Colombia
9. Quito Protocol.
10. China.

11. Romania.
12. Sri Lanka.

### 8.4. Miscellaneous Works:

- i) Work of revision of regulations under Electricity Act 2003 on the technical standards for construction of Hydro Electrical Plants, Safety requirements for construction, operation & maintenance of Hydro Power Plants was taken up and draft revised. Regulations were finalised for further comments/suggestion.
- ii) Participation in panel meeting of BIS for preparation/amendments in draft of various Indian standards as and when required.

## 8.5 Design and Engineering of Thermal Projects

The design & engineering issues and assignments pertaining to thermal power plants/ projects as and when referred are taken up by the TCD Division.

## 8.6 Design and Consultancy Assignments (Civil Aspects) for Thermal/Hydro/Power Transmission Projects during 2018-19

TCD Division of CEA carried out the following specific works in respect of thermal/hydro/power transmission projects during 2018-19:

### 8.6.1 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.

### 8.6.2 Hydro Power Projects

- (a) Punatsangchhu-I HEP (6 X 200 MW), Bhutan
  - Analysis of Support Structure for Isolated Phase Bus Duct, Cast in-situ Footing Load test report at pothead yard dumping area, foundation load data of equipment have been examined and necessary advice was communicated to project Authorities.
- (b) Punatsangchhu-II HEP (6 X 170 MW), Bhutan

- Designs/drawings & Soil Investigation Report of Pothead Yard were examined and necessary advice was communicated to Project Authorities.
- (c) Ganol (3 x 7.5 MW), Meghalaya.
  - Designs/ drawings of Gantries and Towers were examined and necessary advice was communicated to Project Authorities.
- (d) DPR for construction of 225Kv Double Circuit and 132Kv Single Circuit transmission line Sierra Leone.
  - Route alignment survey and soil investigation report transmission line Sierra Leone.

## 8.7 Consultancy services and assistance to various utilities by Power System Wing

### a) Power Development Department, Govt. of J&K:

220kV and 132kV Transmission System covered under Hon'ble Prime Minister's Reconstruction Plan (PMRP-2004) which includes number of Transmission Lines and Substations of 220kV and 132kV voltage levels.

### b) Technical Advice to MoP/CPSUs/State Utilities/CPRI/BIS etc.

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

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## CHAPTER – 9

### ECONOMIC AND COMMERCIAL ASPECTS OF POWER INDUSTRY

The Electricity Act, 2003(hereinafter referred to as 'Act') was notified in June, 2003. The Act replaces the earlier three Acts, namely, the Indian Electricity Act 1910, Electricity (Supply) Act, 1948 and the Electricity Regulatory Commissions Act, 1998. As per the Act, 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 Average realization vis-à-vis Average Cost of Supply

The Table below gives the average cost of supply and average realization covering all sectors in the country on the basis of the data made available by various State Power Utilities:

#### Average Cost of Supply and Average Realization of Electricity from All Sectors

(Figures in paise /unit)

Year	Average Cost of Supply	Average Realization	Gap (without Subsidy)
2013-14	519	400	119
2014-15	521	415	106
2015-16	543	423	120

**Source:** PFC Report on the Performance of the State Power Utilities for the years 2013-14 to 2015-16

##### 9.1.2 Aggregate Losses

Various power utilities in the country have been suffering losses over the years. The losses incurred by the power

utilities (without accounting for subsidy) for the period 2013-14 to 2015-16 are indicated below: -

#### Aggregate Losses (without subsidy) of Power Utilities

Year	Losses (Rs. Crore)
2013-14	1,05,014
2014-15	1,02,523
2015-16	1,21,001

**Source:** PFC Report on the Performance of State Power Utilities for the years 2013-14 to 2015-16



### 9.1.3 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.

### 9.1.4 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 payable by various power utilities to CPSUs, is Rs.20888.48 Crore up to 31<sup>st</sup> March, 2019. The details of outstanding dues payable by power utilities to CPSUs is given in **Annexure-9A**.

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

In-fulfillment of its obligation under section 73(i) & (j) of the Electricity Act, 2003, CEA

brings out a publication titled “Electricity Tariff & Duty and Average Rates of Electricity Supply in India”. The latest edition (March, 2018) contains information on retail electricity tariff applicable in various States / Utilities effective during the year 2017-18.

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, 2018 edition, tariff revisions subsequent to the last edition of the publication have been incorporated and tariff applicable in 45 Distribution Utilities have been indicated.

The sanctioned load and monthly energy consumption have been assumed for each category of consumer and considering the tariff notified by the respective Regulatory Commissions, the total amount payable by a particular category of consumer is worked out for the assumed load and monthly energy consumption. The Taxes and Duties are then added up 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 at **Annexure-9B**.

### 9.3 References on techno-financial matters in power sector

During the year, comments/ recommendations of CEA were furnished on the following important references on issues concerning financial/ commercial matters of power sector:

#### (i) Examination of Detailed Project Reports(DPRs) and Revised Cost Estimates(RCEs)–

- DPR of Goriganga-III HEP (150 MW) in Uttarakhand-M/s NHPC
- Kishanganga HEP (332.40 MW) in J&K by NHPC– RCE.
- Vishnugad Pipalkoti HEP (4x111 MW) in Uttarakhand by THDC-RCE
- Subansiri lower HEP (2000MW) in Arunachal Pradesh by NHPC– RCE
- Teesta IV HEP (520 MW) in Sikkim by NHPC –vetting of updated cost
- Parbati-II HEP (4x200 MW) in H.P. by NHPC – RCE
- Karnali Hydropower Project in Nepal (900 MW) by GMR- Project Proposal
- 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-WAPCOS
- Pare HEP (110 MW) in Arunachal Pradesh by NEEPCO-RCE
- Pancheswar Multipurpose Project (5040 MW) by PDA- WAPCOS
- Tuirial HEP (60 MW) in Mizoram by NEEPCO-RCE

#### (ii) Examination of PIB Proposals-

- Buxar TPP (2x660MW) in Bihar SJVNL
- Kiru HEP (624 MW) in J&K by CVPPL.
- Kwar HEP (540MW) in J&K by CVPPL.
- Khurja STPP (2x660 MW) in Uttar Pradesh and Amelia coal mine by THDC.
- Teesta VI HEP (500 MW) in West

Bengal by NHPC

- (iii) Review of Tariff Policy.
- (iv) Preliminary Project Report for power sector improvement project for Uttar Pradesh.
- (v) Mangdechhu HEP (720 MW), Bhutan regarding tariff negotiation with Royal Govt. of Bhutan.
- (vi) Reference regarding request for financing for Nakthan HEP (460 MW) in Kullu district.
- (vii) Issue relating to viability of Maheshwar HEP in the state of Madhya Pradesh.
- (viii) Working group on estimation of gross subsidy in distribution sector in India.
- (ix) Allocation of 60 MW as merchant capacity to RGPPL and 40 MW to Daman and Diu on the lines of allocation of Indian Railways.
- (x) Guidelines for procurement of power by distribution licensees.
- (xi) Reference from Secretary, Ministry of Petroleum and Natural Gas regarding issues related to Refinery Industry.
- (xii) Selection of solar developers for 2000 MW grid connected solar PV power plants to be set up anywhere in India under open category.

### 9.4 Standard Bidding Documents and Competitive Bidding Guidelines

#### (a) Standard Bidding Documents for UMPPs/Case-II

To address the issues raised by the Association of Power Producers (APP) on the Model Bidding Documents (MBDs) issued on 21.09.2013 for UMPPs and other location specific projects under Case-II bidding route, the Ministry of Power had constituted an Expert Committee under the chairmanship of Shri Pratyush Sinha, former CVC on 28.01.2015 to review the same. The Committee is supported by the Ministry of Power, M/s PFC Consulting, CEA and other Legal Consultants. Based on the recommendations of this Committee, following Guidelines and SBDs have been notified by Ministry of Power:

- (1) Procurement of Power on Long Term Basis (Design, Build, Finance, Own and Operate Basis; DBFOO) covering SHAKTI policy provisions (A5; B1,3,4).
- (2) Procurement of Power on Medium Term Basis (Finance, Own and Operate Basis; FOO) covering SHAKTI policy provisions (B1,3,4).

**(b) Tariff Based Competitive Bidding Guidelines for Transmission Service.**

To revise the SBDs for transmission projects notified by MoP in October, 2008, mainly due to implementation of the sharing regulations (introduction of Point of Connection), introduction of reverse auction through e-bidding etc, MoP vide letter dated 31.08.2015 constituted a Committee headed by Member(E&C), CEA to finalize the changes. The committee has prepared the draft Standard Bidding Documents (SBDs) for inter-state transmission projects and submitted to MoP on 08.04.2016 for approval. The SBDs for intra-state transmission projects has also been prepared by the committee and the draft documents submitted to MoP on 19.10.2016 for approval.” As part of the SBD, Draft Implementation Agreement and Authorization Agreement were got developed by RECTPCL. These documents were uploaded on CEA's website for comments of stakeholders. For wider discussion, meetings were held with DICs, STUs and transmission developers on 23<sup>rd</sup> January, 2018 and 13<sup>th</sup> April, 2018. Further consultations were held on specific issues. Final draft has been submitted to the Ministry of Power.

## 9.5 Financial and Operational Turnaround of Power Distribution Companies

### UDAY (Ujwal Discom Assurance Yojana)

Ujwal DISCOM Assurance Yojana (UDAY) was launched in November 2015 with the objective of financial turnaround of Power Distribution Companies (DISCOMs). The objective of the UDAY scheme is to improve

the operational and financial efficiency of the State DISCOMs.

According to the information presently available in CEA, 27 States and 5 UTs have signed MOU and joined UDAY Scheme. The achievements under the scheme are as under:

- Issuance of Bonds: Bonds for Rs 2,08,642 lakh Crore (by States) and Rs.23,859 Crore (by DISCOMs) have so far been issued and remaining bonds for Rs.32,304 Crore are yet to be issued by DISCOMs (Based on the information made available during the 13<sup>th</sup> meeting of Monitoring Committee of UDAY held on 26<sup>th</sup> November 2018).
- Reduction in Book Loss: As against all India base of Rs.51,480 Crore, the book loss for the years 2016-17 and 2017-18 were Rs.37,925 Crore & Rs.15,132 Crore respectively.
- Reduction of AT&C loss: As against all India base year AT&C loss of 20.74%, the achievement for the years 2016-17 and 2017-18 were 20.25% & 18.76% respectively.
- Reduction in ACS (Average Cost of Supply)-ARR (Average Revenue Realized) gap: As against all India base year ACS- ARR gap of 0.59 Rs/Unit the achievement for the years 2016-17 and 2017-18 were 0.42 Rs/Unit & 0.17 Rs/Unit respectively.

## 9.6 Economic Analysis of Policy Issues

CEA has been regularly providing analytical inputs on various policy issues referred by the Ministry of Power such as power sector performance, material for speech of Hon'ble power minister at different forums and material for Standing Committee on Energy related to various facets of power sector.

## 9.7 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 2018-19 (upto 31.03.2019), the information for 125 IPPs with an installed capacity of 88,998 MW, having tied and untied capacity of 63,666 MW & 20,261 MW respectively has been compiled.

### 9.8 Reforms Monitoring Unit

Under Section 3 of the Electricity Act, 2003, the National Electricity Policy and Tariff Policy are notified by the Central Government in consultation with the State Governments

and the Central Electricity Authority. In this regard, 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.

### 9.9 Expenditure in Power Sector

Investment expenditure in different segments of the Power Sector in the year 2016-17 to 2018-19 (upto 31.12.2018), is shown in the table:

#### Investment Expenditure in Power Sector in India

(Figures in Rs. Crore)

Sector/Segment	2016-17	2017-18	2018-19 (Provisional)
<b>CENTRAL Sector</b>	<b>53072.46</b>	<b>56187.16</b>	<b>10635.77</b>
(i) THERMAL	24172.04	26097.08	8595.49
(ii) HYDRO	4390.52	4195.88	2040.28
(iii) TRANSMISSION	24509.90	25894.20	-
<b>STATE Sector</b>	<b>39066.86</b>	<b>29223.17</b>	<b>5895.04</b>
(i) THERMAL	15537.13	9825.78	4891.96
(ii) HYDRO	1844.73	1091.14	1003.08
(iii) TRANSMISSION	17422.09	18306.22	-
(iv) DISTRIBUTION	4262.91	-	-
<b>PRIVATE Sector</b>	<b>13064.07</b>	<b>3712.27</b>	<b>3743.95</b>
(i) THERMAL	11030.55	3184.61	2369.58
(ii) HYDRO	819.23	527.66	1374.37
(iii) DISTRIBUTION	1214.29	-	-
<b>GRAND TOTAL Sector wise</b>	<b>105203.39</b>	<b>89122.57</b>	<b>20274.76</b>
(i) THERMAL	50739.72	39107.47	15857.03
(ii) HYDRO	7054.48	5814.68	4417.73
(iii) TRANSMISSION	41931.99	44200.42	-
(iv) DISTRIBUTION	5477.20	-	-
<b>GRAND TOTAL Segment wise</b>	<b>105203.39</b>	<b>89122.57</b>	<b>20274.76</b>

Note-

- 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.
- Data on renewable energy, Nuclear energy and captive generation is not captured.
- Data on Private Transmission is not available.
- Figures are updated upto Nov./Dec. 2018.



## 9.10 The Electricity Act, 2003 and subsequent developments

### 9.10.1 Electricity (Amendment) Bill, 2014

The Electricity Act, 2003 was enacted on 10<sup>th</sup> June 2003. The Act was further amended in the year 2003 and year 2007 by the Electricity (Amendment) Act, 2003 and the Electricity (Amendment) Act 2007 respectively. In order to further amend the Act, the Electricity (Amendment) Bill, 2014 has been introduced by the Government of India in the Parliament on 19<sup>th</sup> December, 2014 and referred to the Standing Committee on Energy for examination. Based on the recommendations of Standing Committee and subsequent discussion in PMO and MoP, changes/suggestions were incorporated. A meeting was held with States Governments / Discoms on 03.11.2018 at Delhi to discuss the proposed amendments. The salient features of the proposed Electricity (Amendment) Bill, 2014 are as under:

- Provision for National Renewable Energy Policy in addition to the existing National Electricity Policy.
- Setting up of Renewable Energy Generating Stations and provision for spinning reserves
- Separation of carriage and content in electricity by granting separate license for Distribution & Supply and for specific exemptions to promote Renewable Energy.
- To amend sections 29, 33, 142 & 146 of the said Act so as to enhance penalties.
- To prescribe the manner of collection and realization of any dues under the relevant laws for the time being in force in that State, along with the Electricity dues.
- To promote hydro power and reduction in regulatory assets.
- Insertion of a new section 109 A relating to “Review of performance of Appropriate Commissions” through a Committee to be constituted for reviewing the performance of the said

Commissions.

- 24x7 power supply and penalty on non-compliance of obligation to supply power 24x7.

### 9.10.2 Amendment to the Electricity Rules, 2005

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

- Variation in consumption of power restricted to fifteen percent and upto thirty percent for Renewable energy source
- Change in ownership definition i.e. ownership mean “the issued and paid up share capital in the form of equity share capital with voting rights”
- Certification of Captive Plant.
- Conversion from IPP to Captive Plant

### 9.10.3 Framing and Amendments of the CEA Regulations 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 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) Regulations, 2007	09.03.2007
4	Central Electricity Authority (Furnishing of Statistics, Returns & Information) Regulations, 2007	19.04.2007
5	Central Electricity Authority (Grid Standards) Regulations, 2010	26.06.2010
6	Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations, 2010	24.09.2010
7	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010	20.08.2010 (English Version) & 07.09.2010 (Hindi Version)
8	Central Electricity Authority (Safety requirements for construction, operation and maintenance of electrical plants and electric lines) Regulations, 2011	14.02.2011
9	Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013	07.10.2013
10	Central Electricity Authority (Technical Standards for Communication System in Power System Operations) Regulations, 2019	Under Process

#### B. Notified/proposed to be notified Amendments of 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/proposed to be notified by the Authority during previous years since the enactment of the Electricity Act, 2003 are as under:

Sl. No.	Regulation	Notified on
1	Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2010	26.06.2010
2	Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2013	15.10.2013
3	Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations 2014	26.11.2014
4	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) (Amendment) Regulations, 2015	06.04.2015
5	1 <sup>st</sup> Amendment to Central Electricity Authority ( Measures relating to Safety and Electricity Supply) (Amendment) Regulations, 2015	13.04.2015

6	2 <sup>nd</sup> 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	3 <sup>rd</sup> Amendment to the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010	Amendment under process
10	4 <sup>th</sup> Amendment to the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010- <b>Periodic Comprehensive Review</b>	Amendment under process
11	2 <sup>nd</sup> Amendment to the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010- <b>Periodic Comprehensive Review</b>	Amendment under process
12	3 <sup>rd</sup> Amendment to the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010	Amendment under process
13	1 <sup>st</sup> Amendment to the Central Electricity Authority (Furnishing of Statistics, Returns and Information) Regulations, 2007	Amendment under process
14	3 <sup>rd</sup> Amendment to the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006	Amendment under process

### 9.11 Court Cases

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

Presently, Legal Division is involved in more than 100 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).

### 9.12 Assistance to Ministry of Power

**Comments were furnished to the Ministry of Power on various references/issues with the important ones listed hereunder -**

- Request from Secretary, Ministry of Shipping for grant of Deemed

Distribution Licensee Status to 11 major Ports of India under the Electricity Act, 2003

- Reference from Hon'ble Chief Minister of Rajasthan on proposed amendment in provisions relating to Captive Power Plant in Electricity Rules, 2005.
- Request from DMRC for grant of "Deemed Licensee Status" to DMRC.
- The Electricity (Maharashtra Amendment) Bill, 2018.
- Smart City SPV to be declared as deemed distribution license.
- Operationalization of "Deemed Licensee" Status of Indian Railways.
- Reference regarding Hon'ble High Court of Chhattisgarh order dated 12.01.2018 in the matter of WP(S) No. 2656/2010 filled by Shri P.A.D. Aggarwal.

- Amendments proposed in Tariff Policy, 2016 issued by the Ministry of Power.
- Discussion on the Draft World Bank Report “In the Dark: How much Do Power Sector Distortions Cost South Asia?”.
- Material for Economic Survey 2018-19.
- Detailed Note on All India Energy Accounting from Generation to Consumer level with illustrative example for FY 2015-16.
- Background Note on “Role of Regulators in Electricity Sector – An Evaluation” for Standing Committee on Energy (2018-19).
- Material for Note on the subject – 'Contribution of Central Electricity Authority in the balanced development of Electricity Sector', for the Standing Committee on Energy (2018-19).
- Material for Note on the subject – 'Development of Power Sector', for the Standing Committee on Energy (2018-19).
- Inputs for Final Action taken by Ministry of Power on the recommendations contained in the 34<sup>th</sup> Report of the Standing Committee on Energy (2017-18).
- Memorandum of Understanding on Indo-Denmark Energy Cooperation.

### 9.13 Legal Assistance/Advice to Utilities

**Comments were furnished to the stakeholders/utilities on the following important references/issues -**

#### Legal:

- Reference on Mega Power Certificate to 1000 MW Raigarh TPP of Jindal Power Ltd..
- Application by India Power Corporation Ltd. (IPCL) for prior approval of Central Govt. under Section 68(1) of Electricity Act, 2003 for laying overhead electric line from Maithon 400kV to Debipur Substation

of M/s IPCL.

- Power distribution operations/distribution licensee model for smart cities.
- Electrical Inspectorate Amendment proposals of CEA (Measures Relating to Safety and Electric Supply) Regulations, 2010.
- Inclusion of Vedanta's thermal power plant (3x600MW) in CPP category.
- Regarding Standing Committee on Energy (2015-16) – Examination of the subject “Pricing of imported coal and its impact on power tariff: CERC/APTEL order and finding of DRI.”
- Issues raised by Additional Chief Secretary, Govt. of Himachal Pradesh regarding Medium Term Power Procurement from Hydro Power Stations.
- Reference from Secretary, Ministry of Petroleum and Natural Gas regarding issues being faced by the Refineries in procurement of grid power through Open Access mode.
- Reference from Ministry of Commerce and Industry regarding High cost of Electricity and Implementation of SEZ Act, 2015.
- Reference received from Association of Power Producer regarding Impact on FSA and PPA, on account of change of ownership-either by way of resolution or by going to NCLT.
- Reference from Torrent Power regarding “Suggestion to revive the Stranded Gas Based Power Plants”.

### 9.14 References on Policy and Regulatory aspects in the Power Sector

The important references on issues concerning draft Regulations of CEA/CERC/SERCs, Implementation of Regulations of CEA/CERC/ SERCs and Policy Matters

received from Ministry of Power (MoP), Ministry of New and Renewable Energy (MNRE), other Ministries, NITI Aayog, Industry Associations etc. during the year on which comments/ inputs of CEA were sent to MoP/ concerned organisations, are listed below:

- Draft National Energy Policy circulated by NITI Aayog.
- Compilation of comments of CEA on the Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2019, and forwarding the same to CERC with due approval of Authority.
- Agenda for the Meeting to be taken by Hon'ble Railways and Coal to discuss the Solar related regulatory issues.
- Reference received from Govt. of Kerala & KSEB Ltd. seeking clarifications/ advice on the bidding conducted by KSEB for long term procurement of Power through Case-I bidding under DBFOO Model.
- Inputs for meeting of the Hon'ble Minister of State (IC) for Power & NRE with Electricity Regulators.

#### **9.15 Implementation issues related to Regulations/Standards of CEA/CERC/SERCs**

**Material/Comments were furnished on the following important references –**

- Writ Petition (C) No. 4554 of 2018 filed by M/s. Fortune Five Hydel Power Projects Pvt Ltd. versus CERC & Others before the Hon'ble High Court of Delhi, seeking the waiver of inter-state transmission charges and losses to be equally applicable to all solar and wind power generators without any discrimination.
- Writ Petition No. 1145 of 2003 filed by M/s. Eastern Coalfields Ltd. versus Dishergarh Power Supply Co. Ltd. & Others before the Hon'ble High Court at Calcutta in the matter of alleged

arbitrary and illegal overcharging for power consumption.

- Writ Petition No. 5785 of 2018, Tamil Nadu Generation & Distribution Corp. Ltd. (TANGEDCO) versus CERC & Others before the Hon'ble High Court of Delhi, challenging the Amendments/Notifications all dated 08.12.2017 issued by the Central Electricity Regulatory Commission (CERC) under Clause 5.6(vi) of Ministry of Power's Notification on "Guidelines for Determination of Tariff by Bidding Process for Procurement of Power by Distribution Licensees" dated 19.01.2005, as amended from time to time.
- Writ Petition No. 700 of 2018 filed by M/s. Indian Wind Power Association versus Union of India & Others before the Hon'ble High Court of Delhi challenging the bidding processes approved/endorsed by MoP and MNRE for country-wide wind power procurement through competitive bidding.
- Writ Petition No. 22734 of 2017 filed by National Steel and Agro Industries Ltd. versus State of Madhya Pradesh & Others before the Indore Bench of Hon'ble High Court of Madhya Pradesh, challenging the assessment and penalty levied by MPPKVVCL (for the alleged "unauthorized use of electricity").
- Writ Petition (C) No. 4815 of 2018 filed by M/s. Sandhya Hydro Power Projects Balargha Pvt Ltd. versus CERC & Others before the Hon'ble High Court of Delhi, seeking parity between Renewable Energy Generation Sources in relation to exemption/waiver of transmission charges for use of Inter-State Transmission System.
- Compliance of Commission's (CERC) Order dated 26.03.2018 in Petition No. 09/SM/2015 with reference to CEA and RPCs regarding follow up actions on the recommendations of CAC Sub-Committee on Congestion in Transmission.

### 9.16 Nomination of officers to the following Committees:

- |  |  |
|--|--|
| <p>(i) MoP has constituted a Committee <b>National Committee on Transmission</b> (NCT) under Chairperson, CEA wherein Member (E&amp;C), CEA has been nominated as one of its Members.</p> <p>(ii) C E A has constituted a Committee/Working Group on <b>Estimation of Cross Subsidy in distribution sector in India</b> under Member (E&amp;C), CEA in which Chief Engineer (F&amp;CA) has been nominated as one of its Members.</p> <p>(iii) MoP has constituted a Committee on <b>review/ formulation of bidding Guidelines/Documents for procurement of power from Hydro power plants under Medium Term and Long Term</b> under Member (Hydro), CEA in which Chief Engineer (F&amp;CA) has been co-opted as a Member.</p> <p>(iv) MoP has constituted a Committee on <b>Implementation of ToD Tariff</b> under Additional Secretary, MoP in which Chief Engineer (F&amp;CA) has been nominated as one of its Members.</p> <p>(v) CEA has constituted a Committee <b>to finalize the design requirement and content for Dynamic website of CEA</b></p> | <p>under Chief Engineer (IT), CEA in which Director (F&amp;CA) has been nominated as one of its Members.</p> <p>(vi) MoP has constituted a Committee <b>to look into the issue of delayed payment by DISCOMs to GENCOs/ IPPs</b> under Chairperson, CEA wherein Member (E&amp;C), CEA has been co-opted as a Member and Chief Engineer (F&amp;CA) has been nominated as its Member Secretary.</p> <p>(vii) MoP has constituted a Committee on <b>Efficient Regulation of Electricity Derivatives</b> under Additional Secretary, MoP in which Member (E&amp;C), CEA has been nominated as one of its Members.</p> <p>(viii) MoP has constituted a Committee on measures to promote Hydro Power Sector under Member (Hydro), CEA in which Chief Engineer (F&amp;CA) has been nominated as one of its Members.</p> <p>(ix) Chief Engineer (RA) was nominated as Member in the Study Group constituted under Chairmanship of Member (GO &amp; D), CEA on “Implementation of ToD Tariff in Supply and Demand side”.</p> <p>(x) Legal Division of CEA has participated in the Committees to finalize the “Amendments in the Electricity Act, 2003” and “Amendments in the Electricity Rules, 2005”.</p> |
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## CHAPTER – 10

### POWER GENERATION

#### 10.1 Power Generation

Generation of power by the Central Sector, State Sector, Pvt. utilities & IPPs was

about 1249336.70 million units during the Year 2018-19. This represents a growth of about 3.57 % over the same period during previous year 2017-18 as per details given below:

#### Power Generation during 2018-19

Category	Programme (MU)	Actual (MU)	Shortfall (-)/ Excess(+)	% of Programme	Growth (%) with respect to previous year Actual Gen.
Thermal	1091500	1072223.88	-19276.1	98.23	3.39
Nuclear	38500	37812.59	-687.41	98.61	-1.39
Hydro	130000	134893.61	4893.61	103.76	6.95
Bhutan Imp	5000	4406.62	-593.38	88.13	-7.88
<b>TOTAL</b>	<b>1265000</b>	<b>1249336.70</b>	<b>-15663.30</b>	<b>98.76</b>	<b>3.57</b>

**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 2018-19 are as under:

- Gross annual generation of the country was 1249.34 BU.
- The annual growth in the energy generation during the year was 3.57%.
- Thermal, Nuclear, Hydro and Import from Bhutan achieved a growth rate of 3.39%, -1.39%, 6.95% and -7.88% respectively. The electricity generation during the year 2018-19 from coal based thermal power stations was 987.68 BU showing a growth rate of 3.77% against 4.57% over same period last year.
- In North Eastern Region the growth in thermal generation was 17.92% with respect to last year-highest amongst all regions.
- The national average PLF for thermal stations was 61.07% and 84 Stations with an aggregate installed capacity of 112527 MW, achieved PLF above national average.

06 number of thermal power stations with an aggregate installed capacity of 12580MW achieved above 90% PLF.

The sector wise Generation and PLF during 2018-19 is given below:

Category / Sectors	Programme (MU)	Actual	PLF (%)
		(MU)	
CENTRAL SECTOR			
THERMAL	352307	368157.49	72.64
NUCLEAR	38500	37812.59	63.67
HYDRO	56176	55155.29	
TOTAL	446983	461125.4	
STATE SECTOR			
THERMAL	350620	334961.12	57.81
HYDRO	61106	66171.29	
TOTAL	411726	401132.4	
PVT. SECTOR IPP			
THERMAL*	369997	349977.58	54.95
HYDRO	11418	11998.85	
TOTAL	381415	361976.4	
PVT. SECTOR UTL.			
THERMAL	18576	19127.69	61.34
HYDRO	1300	1568.18	
TOTAL	19876	20695.87	
TOTAL PVT	401291	382672.3	
BHUTAN IMP	5000	4406.62	

ALL INDIA REGION			
THERMAL	1091500	1072223.88	61.07
NUCLEAR	38500	37812.59	63.67
HYDRO	130000	134893.61	
BHUTAN IMP	5000	4406.62	
<b>TOTAL</b>	<b>1265000</b>	<b>1249336.70</b>	

\* Includes import from some of the Captive Plants

## 10.2 Plant Load Factor of Thermal Power Stations

During the year 2018-19 the average PLF of Thermal Power Stations was 61.07 % and for Nuclear Power Stations was 63.67%.

**84** thermal power plants achieved PLF higher than the All India average PLF of 61.07 % as per details given in the table below:

**List of Thermal Power Stations which have achieved PLF above National Average of 61.07 % during the year 2018-19**

Sl. No.	NAME OF THE STATION	Installed Capacity (MW)	SECTOR	State	PLF (%)
1	SASAN UMTTP	3960	PVT	MADHYA PRADESH	94.78
2	CHAKABURA TPP	30	PVT	CHHATTISGARH	91.91
3	SIPAT STPS	2980	CENTRAL	CHHATTISGARH	91.58
4	BUDGE BUDGE TPS	750	PVT	WEST BENGAL	91.5
5	RATIJA TPS	100	PVT	CHHATTISGARH	90.61
6	VINDHYACHAL STPS	4760	CENTRAL	MADHYA PRADESH	90.03
7	TALCHER (OLD) TPS	460	CENTRAL	ORISSA	89.51
8	AMARKANTAK EXT TPS	450	STATE	MADHYA PRADESH	88.94

Sl. No.	NAME OF THE STATION	Installed Capacity (MW)	SECTOR	State	PLF (%)
9	KORBA STPS	2600	CENTRAL	CHHATTISGARH	88.18
10	SABARMATI (D-F STATIONS)	362	PVT	GUJARAT	87.84
11	HALDIA TPP	600	PVT	WEST BENGAL	87.8
12	ANPARA TPS	2630	STATE	UTTAR PRADESH	87.42
13	DSPM TPS	500	STATE	CHHATTISGARH	87.4
14	KOTHAGUDEM TPS (NEW)	1800	STATE	TELANGANA	87.32
15	RIHAND STPS	3000	CENTRAL	UTTAR PRADESH	86.33
16	BARH II	1320	CENTRAL	BIHAR	85.14
17	SINGRAULI STPS	2000	CENTRAL	UTTAR PRADESH	84.46
18	SGPL TPP	1320	PVT	ANDHRA PRADESH	84.2
19	IB VALLEY TPS	420	STATE	ORISSA	83.86
20	NEYVELI TPS-II	1470	CENTRAL	TAMIL NADU	83.44
21	CHHABRA TPP	2320	STATE	RAJASTHAN	83.22
22	SINGARENI TPP	1200	STATE	TELANGANA	82.75
23	DAHANU TPS	500	PVT	MAHARASHTRA	82.58
24	PATHADI TPP	600	PVT	CHHATTISGARH	81.68
25	RAMAGUNDEM STPS	2600	CENTRAL	TELANGANA	81.44
26	BANDAKHAR TPP	300	PVT	CHHATTISGARH	81.34
27	SANTALDIH TPS	980	STATE	WEST BENGAL	81.11
28	TALCHER STPS	3000	CENTRAL	ORISSA	80.83
29	KORBA-WEST TPS	1340	STATE	CHHATTISGARH	80.7
30	FARAKKA STPS	2100	CENTRAL	WEST BENGAL	80.7
31	KAHALGAON TPS	2340	CENTRAL	BIHAR	80.43
32	SURAT LIG. TPS	500	PVT	GUJARAT	80.41
33	KASAIPALLI TPP	270	PVT	CHHATTISGARH	80.35
34	KAKATIYA TPS	1100	STATE	TELANGANA	80.19

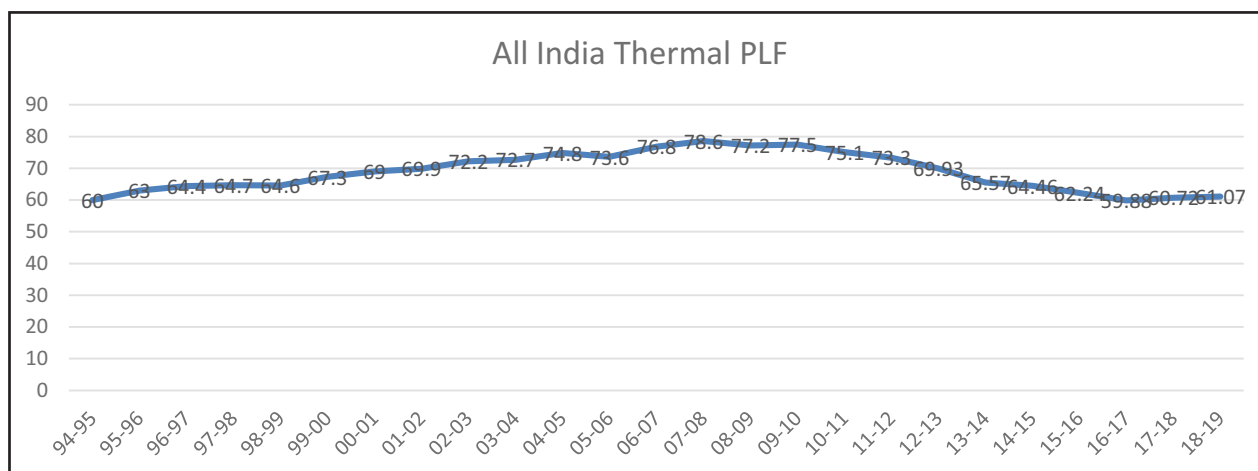
Sl. No.	NAME OF THE STATION	Installed Capacity (MW)	SECTOR	State	PLF (%)
35	NEYVELI ( EXT) TPS	420	CENTRAL	TAMIL NADU	80.17
36	MAITHON RB TPP	1050	PVT	JHARKHAND	79.02
37	ANPARA C TPS	1200	PVT	UTTAR PRADESH	78.36
38	BHILAI TPS	500	CENTRAL	CHHATTISGARH	78.22
39	BAKRESWAR TPS	1050	STATE	WEST BENGAL	78.09
40	RAMAGUNDEM - B TPS	62.5	STATE	TELANGANA	77.27
41	MUNDRA UMTTP	4000	PVT	GUJARAT	76.6
42	JSW RATNAGIRI TPP	1200	PVT	MAHARASHTRA	76.29
43	TIRORA TPS	3300	PVT	MAHARASHTRA	74.95
44	RAJPURA TPP	1400	PVT	PUNJAB	74.39
45	GMR WARORA TPS	600	PVT	MAHARASHTRA	74.11
46	SANJAY GANDHI TPS	1340	STATE	MADHYA PRADESH	73.95
47	MARWA TPS	1000	STATE	CHHATTISGARH	73.24
48	KOTA TPS	1240	STATE	RAJASTHAN	72.92
49	KAMALANGA TPS	1050	PVT	ORISSA	72.73
50	PAINAMPURAM TPP	1320	PVT	ANDHRA PRADESH	72.38
51	JOJOBERA TPS	240	PVT	JHARKHAND	72.25
52	DURGAPUR STEEL TPS	1000	CENTRAL	WEST BENGAL	71.84
53	KODARMA TPP	1000	CENTRAL	JHARKHAND	71.68
54	UNCHAHAH TPS	1550	CENTRAL	UTTAR PRADESH	71.52
55	UKAI TPS	1110	STATE	GUJARAT	71.34
56	SIMHADRI	2000	CENTRAL	ANDHRA PRADESH	71.06
57	METTUR TPS	1440	STATE	TAMIL NADU	71.03
58	JALIPA KAPURDI TPP	1080	PVT	RAJASTHAN	70.82



Sl. No.	NAME OF THE STATION	Installed Capacity (MW)	SECTOR	State	PLF (%)
59	Dr. N.TATA RAO TPS	1760	STATE	ANDHRA PRADESH	70.61
60	TUTICORIN TPS	1050	STATE	TAMIL NADU	68.56
61	GANDHI NAGAR TPS	630	STATE	GUJARAT	67.12
62	NORTH CHENNAI TPS	1830	STATE	TAMIL NADU	66.82
63	BOKARO TPS 'A' EXP	500	CENTRAL	JHARKHAND	66.68
64	DADRI (NCTPP)	1820	CENTRAL	UTTAR PRADESH	66.07
65	KAWAI TPS	1320	PVT	RAJASTHAN	65.72
66	WANAKBORI TPS	1470	STATE	GUJARAT	64.79
67	CHANDRAPURA(DVC) TPS	1120	CENTRAL	JHARKHAND	64.52
68	BONGAIGAON TPP	750	CENTRAL	ASSAM	64.44
69	SATPURA TPS	1642.5	STATE	MADHYA PRADESH	64.14
70	BARADARHA TPS	1200	PVT	CHHATTISGARH	64.02
71	KHAPARKHEDA TPS	1340	STATE	MAHARASHTRA	63.65
72	ANUPPUR TPP	1200	PVT	MADHYA PRADESH	63.64
73	NIGRI TPP	1320	PVT	MADHYA PRADESH	63.39
74	YAMUNA NAGAR TPS	600	STATE	HARYANA	63.2
75	KORBA-III	240	STATE	CHHATTISGARH	62.66
76	TUTICORIN (JV) TPP	1000	CENTRAL	TAMIL NADU	62.63
77	SIKKA REP. TPS	500	STATE	GUJARAT	62.24
78	BHUSAWAL TPS	1470	STATE	MAHARASHTRA	62.23
79	MEJIA TPS	2340	CENTRAL	WEST BENGAL	62.17
80	BARSINGSAR LIGNITE	250	CENTRAL	RAJASTHAN	61.97
81	CHANDRAPUR(MAHARASHTRA) STPS	3340	STATE	MAHARASHTRA	61.97
82	TANDA TPS	440	CENTRAL	UTTAR PRADESH	61.53

83	DHARIWAL TPP	600	PVT	MAHARASHTRA	61.43
84	TALWANDI SABO TPP	1980	PVT	PUNJAB	61.34

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 2018-19 is at the **Annexure-10A**.

### 10.3 Generating Capacity Addition

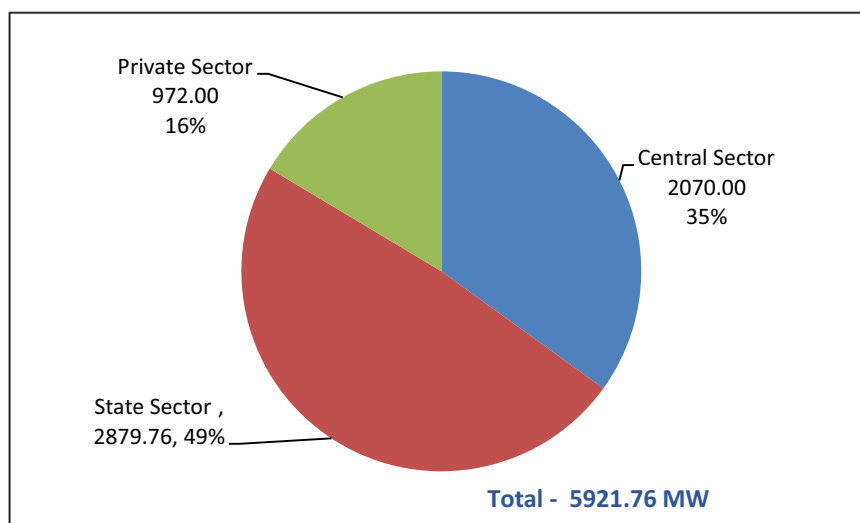
During the year, a total of 5921.76 MW generation capacity was added (excluding

Renewable Energy Sources). The capacity addition during the last 12 years are given below:

#### Capacity addition during the last 12 years - Sector wise

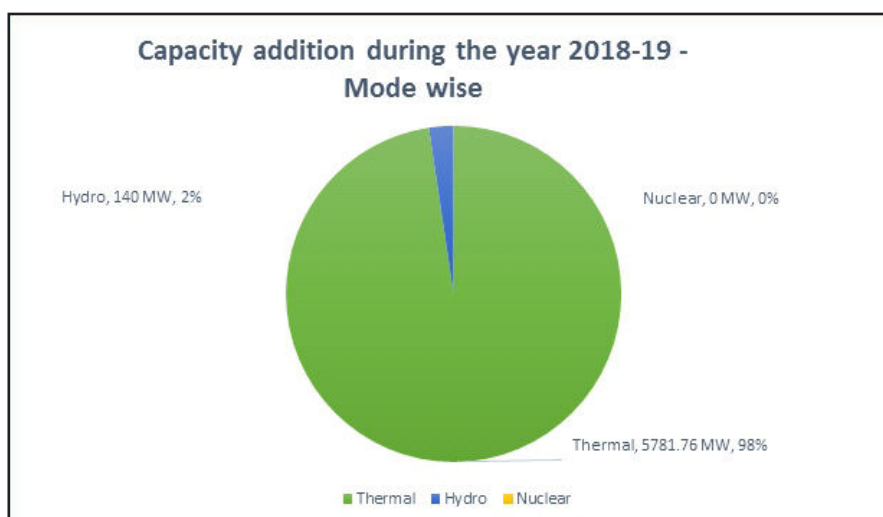
(All Fig. in MW)

Year	Central Sector	State Sector	Private Sector	Total
2007-08	3240.00	5273.00	750.00	9263.00
2008-09	750.00	1821.20	882.50	3453.70
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	2879.76	972.00	5921.76

**GENERATION CAPACITY ADDITION DURING 2018-19 SECTOR-WISE****Capacity addition during the last 12 years - Mode wise**

(All Fig. in MW)

Year	Thermal	Hydro	Nuclear	Total
2007-08	6620.00	2423.00	220	<b>9263.00</b>
2008-09	2484.70	969.00	0.00	<b>3453.70</b>
2009-10	9106.00	39.00	440.00	<b>9585.00</b>
2010-11	11250.50	690.00	220.00	<b>12160.50</b>
2011-12	19079.00	1423.00	0.00	<b>20502.00</b>
2012-13	20121.8	510.00	0.00	<b>20631.80</b>
2013-14	16767.00	1058.01	0.00	<b>17825.01</b>
2014-15	20830.30	736.00	1000.00	<b>22566.31</b>
2015-16	22460.60	1516.00	0.00	<b>23976.60</b>
2016-17	11550.80	1659.00	1000.00	<b>14209.80</b>
2017-18	8710.00	795.00	0.00	<b>9505.00</b>
2018-19	5781.76	140.00	0.00	<b>5921.76</b>

**Capacity addition during the year 2018-19 - Mode wise**

#### 10.4 Installed Electricity Generating Capacity

Total All India Installed Electricity Generating Capacity as on 31.03.2019 is

356100.19 MW comprising of Thermal 226279.34 MW, Hydro 45399.22 MW, Nuclear 6780.00 MW and 77641.63 MW from Renewable Energy Sources (RES). The details are shown in the Tables given below:

##### All India Installed Electricity Generating Capacity- Sector wise

Type	Central Sector (MW)	State Sector (MW)	Private Sector (MW)	Total (MW)
THERMAL	66057.91	72849.13	87372.30	226279.34
HYDRO	12126.42	29878.80	3394.00	45399.22
NUCLEAR	6780.00	0.00	0.00	6780.00
RES	1632.30	2347.93	73661.40	77641.63
<b>Total</b>	<b>86596.63</b>	<b>105075.86</b>	<b>164427.70</b>	<b>356100.19</b>

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

Year	Thermal	Nuclear	Hydro	RES*	Total
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

\*Renewable Energy Sources (RES) includes Wind, Small Hydro Project, Biomass Gasifier, Biomass Power, Urban & Industrial Waste Power & solar power.

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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, 1427 MW

(above 25 MW capacity) have been harnessed so far while projects amounting to 2600 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	50328	50064	515	2600
Mizoram	2196	2131	60	0
<b>Total(NER):</b>	<b>58971</b>	<b>58356</b>	<b>1427</b>	<b>2600</b>

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 yet to be allotted for development (MW)
Meghalaya	270	85	210	210	620	581
Tripura	0	0	0	0	0	0
Manipur	66	0	0	0	0	1590
Assam	120	0	60	0	0	120
Nagaland	186	0	0	0	0	1191
Ar. Pradesh	16952	0	6329	3609	9082	10977
Mizoram	0	0	0	0	0	2071
<b>Total (NER)</b>	<b>17594</b>	<b>85</b>	<b>6599</b>	<b>3819</b>	<b>9702</b>	<b>16530</b>

## 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	Basin	Agency	State	Present Status
1	Demwe Lower (1750 MW)	Lohit	Athena Energy Venture (P) Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 20.11.2009.
2	Dibbin (120 MW)	Kameng	KSK Dibbin Hydro Power Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 04.12.2009.
3	Lower Siang (2700 MW)	Dihang/ Dibang	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 16.02.2010.
4	Nafra (120 MW)	Kameng	Sew Nafra Power Corporation Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 11.02.11.
5	Nyamjang Chhu (780 MW)	Tawang	Nyamjang chhu Hydro Power Limited	Arunachal Pradesh	Concurrence accorded by CEA on 24.03.2011.
6	Tawang-I (600 MW)	Tawang	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.10.2011.
7	Tawang-II (800 MW)	Tawang	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 22.09.2011.

S. No.	Name of Project	Basin	Agency	State	Present Status
8	Hirong (500 MW)	Dihang/ Dibang	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.04.2013.
9	Etalin (3097 MW)	Dihang/ Dibang	Etalin H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 12.07.2013.
10	Talong Londa (225 MW)	Kameng	GMR	Arunachal Pradesh	Concurrence accorded by CEA on 16.08.2013.
11	Naying (1000 MW)	Dihang/ Dibang	D.S. Construction Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 11.09.2013.
12	Siyom (Middle) (1000 MW)	Dihang/ Dibang	Siyota Hydro power Pvt. Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 17.12.13.
13	Dikhu (186 MW)	Upper Brahmaputra	Naga Manu Power Private Ltd.	Nagaland	Concurrence accorded by CEA on 31.03.14.
14	Kalai-II (1200 MW)	Lohit	Kalai Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 27.03.2015.
15	Kynshi – I (270 MW)	Barak	Athena Kynshi power Pvt.Ltd.	Meghalaya	Concurrence accorded by CEA on 31.3.2015.
16	Heo (240 MW)	Dihang/ Dibang	Heo Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.07.15.
17	Tato-I (186 MW)	Dihang/ Dibang	Siyota Hydro Power Pvt. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 28.10.15.
18	Lower Kopili (120 MW)	Kalang (Kopoli)	Assam Power Generation Corporation Ltd.	Assam	Concurrence accorded by CEA on 24.05.2016.

S. No.	Name of Project	Basin	Agency	State	Present Status
19	Loktak Downstream (66 MW)	Barak	Loktak Downstream Hydroelectric Corporation Ltd.	Manipur	Concurrence accorded by CEA on 05.05.2017.
20	Dibang (2880MW)	Dihang/ Dibang	NHPC Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 18.09.2017.
21	Attunli (680 MW)	Dihang/ Dibang	Attunli H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 15.03.2018.
22	Wah-Umiam Stage-III (85 MW)	Barak	NEEPCO	Meghalaya	DPR is under examination in CEA.
23	Ranganadi St-II 130MW)	Subansiri	NEEPCO	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
24	Karbi Langpi (U. Borpani) (60 MW)	Kalang (Kopoli)	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)	Dihang/ Dibang	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)	Dihang/ Dibang	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)	Dihang/ Dibang	Soma Sissiri Hydro Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
28	Gimliang	Lohit	SKI Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-

S. No.	Name of Project	Basin	Agency	State	Present Status
	(80 MW)				submission after tying-up of requisite inputs.
29	Raigam (141 MW)	Lohit	SKI Pvt. Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
30	Kangtang Shiri (80 MW)	Dihang/ Dibang	Kangtang Shiri Hydro Project Pvt. Ltd	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
31	Nyukcharang Chu (96 MW)	Tawang	Sew Energy Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
32	Umngot (210 MW)	Barak	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)	Tawang	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)	Subansiri	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



S. No.	Name of Project	Basin	Agency	State	Present Status
					pending with various appraising groups.
35	Hutong- II (1200 MW)	Lohit	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)	Lohit	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)	Lohit	Athena Energy Venture (P) Ltd.	Arunachal Pradesh	DPR was returned to developer for re-submission after tying-up of requisite inputs.
38	Oju (1878 MW)	Subansiri	Navayuga Engg. Co. Ltd.	Arunachal Pradesh	Under S&I.
39	Subansiri Upper (1800 MW)	Subansiri	KSK Energy Ventures Pvt. Ltd.	Arunachal Pradesh	S&I held up.
40	Bhareli-II (Kameng-II) (600 MW)	Kameng	Mountain Falls Ltd.	Arunachal Pradesh	S&I held up.
41	Kameng Dam(420MW)	Kameng	KSK Energy Ventures Ltd.	Arunachal Pradesh	S&I held up.
42	Naba (1000 MW)	Subansiri	Abir Infrastructure Pvt. Ltd.	Arunachal Pradesh	S&I held up.
43	Niare (800 MW)	Subansiri	Coastal Infrastructure Pvt. Ltd.	Arunachal Pradesh	S&I held up.
44	Dengser (552 MW)	Subansiri	Coastal Infrastructure Pvt. Ltd.	Arunachal Pradesh	S&I held up.

S. No.	Name of Project	Basin	Agency	State	Present Status
45	Nalo (635 MW)	Subansiri	Indus Hydro Power Pvt. Ltd.	Arunachal Pradesh	S&I held up.
46	Siang Upper St.I (6000 MW)	Siang	JV of NHPC & NEEPCO	Arunachal Pradesh	S&I held up.
47	Siang Upper St.II (3750 MW)	Siang	NEEPCO	Arunachal Pradesh	S&I held up.
48	Emini (500 MW)	Dibang	Emini Hydro Power Pvt. Ltd. (Reliance Energy Ltd.)	Arunachal Pradesh	S&I held up.
49	Kimi (535 MW)	Kameng		Arunachal Pradesh	Yet to be allotted.
50	Siyom (Siang Middle) (1000 MW)	Siang	SIYOM Hydro Power Pvt. Ltd. (Reliance Energy Ltd.)	Arunachal Pradesh	IC of the project will revise due to change in e-flows recommended in BSR and hence fresh DPR to be prepared by developer.
51	Tato-II (700 MW)	Siang	Tato Hydro Power Pvt. Ltd. (Reliance Energy Ltd.)	Arunachal Pradesh	IC of the project will revise due to change in e-flows recommended in BSR and hence fresh DPR to be prepared by developer.

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

##### 11.4.1 Central Sector Projects

##### (A) 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 project is presently scheduled for commissioning in year 2019-20.

## **(B) 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 respectively 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, presume shaft, Power House etc. were in progress. Work stopped since 16.12.11 due to agitation launched by various activists against construction of Subansiri Lower HE Project.

### **Issues:**

Resumption of works:- Work stopped since 16.12.11 due to agitation launched by various activists against construction of Subansiri Lower HE Project. In this regard, as decided in the tripartite meeting dated 06.12.13, discussions between Expert Group formed at the request of AASU (All Assam Students Union) and Experts of Govt. of India & NHPC was held on 23.12.13. Last meeting between Expert Group of Assam and Experts of Govt. of India was held on 02.06.14 at Guwahati. Thereafter, meetings with Expert Group of Assam on 10.12.2014 and with various Stakeholders of Subansiri Lower Project on 11.12.2014 were held to discuss the issues. The meetings were Co-chaired by Hon'ble MOS (I/C) for Power, Coal and New & Renewable Energy and Hon'ble MOS (I/C) for Skill Development, Entrepreneurship, Youth Affairs & Sports. As decided in stakeholders meeting on 11.12.2014, a Project oversight Committee (POC) has been constituted vide MoP's OM dated 13.01.2015. 12 meetings of the POC have been held. Due to difference in opinion on some issues mainly seismic issues, the Expert Group of Assam has submitted the final report to MoP & members of POC from Government of India have also submitted a separate report to MoP in Feb.'16.

### **National Green Tribunal (NGT) Issue:-**

In the NGT matter, **judgment has been pronounced by NGT Kolkata on 16.10.2017.**

“In this judgement, NGT has directed MOEF&CC to constitute a committee of three expert members from the field of Seismology, Geology and Hydrology and one of these members shall be from Northeast to examine the entire matter and reports of various committees constituted. The Terms of Reference (TOR) of the committee will be same as made to POC as contained in OM no. 2/5/2002-NHPC dated 13.01.2015. The MOEF&CC shall constitute the Committee within one month and the committee shall give its report in three months from the constitution of the committee to MOEF&CC which will be placed before Expert Appraisal Committee (EAC) for appraisal under Environment Impact Assessment (EIA) Notification 2006. EAC shall complete the appraisal within 60 days and place it before the competent authority for final decision.”

Subsequent to order of Hon'ble NGT, Principal Bench, dated 19.11.2018, 3rd meeting of Expert Committee held on 12.12.2018 at MoEF & CC, New Delhi. Meeting with the members of POC-Assam also took place. Applicants (Sh. Aabhijeet Sharma and Sh. Tularam Gogoi) did not attend the meeting. Expert Committee visited Subansiri Lower HE Project and Pare HE Project in 2<sup>nd</sup> week of January, 2019. **The Expert Committee Report has been submitted to EAC 26.03.19. EAC to complete appraisal within 60 days and put up it before competent authority for final decision .**

Meanwhile, Tularam Gogoi has challenged NGT order dated 14.12.2018 before Hon'ble Supreme Court of India, praying for setting aside the said order. The matter was heard on 11.03.2019, wherein Hon'ble Supreme Court has decided that the order dated 19.11.2018 passed in Abhijeet Sharma verses Union of India and order dated 14.12.2018 passed in Tularam Gogoi v/s Union of India be set aside and reverted to NGT for passing a reasoned order. However, the Hon'ble Supreme Court has allowed the MoEF&CC to continue with the work of Expert Committee constituted in pursuance of NGT order dated 16<sup>th</sup> Oct, 2017. **Next hearing of NGT is on 25.7.19.**

#### Signing of MOA with Govt. of Assam:-

Signing of MOA with State of Assam is pending yet. NHPC had sent the draft MOA, approved by MOP, to the States of Assam and Arunachal Pradesh in April-03 for their consent / signing of Agreement. The MOA with Arunachal Pradesh Government has already been signed on 27.1.2010.

The project is now scheduled for commission in year 2002-23 (subject to re-start of works).

### **11.5 Status of Various Hydro Power Projects in North-Eastern Region Appraised by CEA**

#### **11.5.1 DPR appraisal/ Concurrence**

##### **(i) Attunli HE Project (4x170 = 680MW) in 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 Rs.6111.28 crores.

#### **11.5.2 Revised Cost Estimate**

##### **(i) Tuirial HEP ( 2x30=60 MW), Mizoram, NEEPCO**

The project was cleared by CEA in July, 1998 at an estimated cost of Rs.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 Rs.687.80 crores (including IDC of Rs. 40.05 crores and financing charges Rs. 0.16 crores). The first year tariff at this cost being Rs. 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 Rs. 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 Rs.913.63 crores including IDC of Rs.36.57 crores at March, 2010 Price Level. The financial pattern of Rs.913.63 crores comprises of (i) Equity of Rs. 137.04 Crs. (ii) Loan from financial institutions amounting to Rs. 184.63 crores (iii) Subordinate loan from Govt. of India amounting to Rs. 291.96 crores and (iv) Grant from DoNER amounting to Rs.300 crores.

Cost estimates at completion level, submitted by NEEPCO, was vetted by CEA amounting to Rs.1353.10 crores (Hard Cost) vide CEA letter dated 18.09.2018.

**(i) Pare HEP (2x55=110 MW), Arunachal Pradesh, NEEPCO**

Pare HEP was accorded concurrence by CEA on 24th Sept. 2007 for an estimated cost of Rs.553.25 crores including IDC & FC of Rs.49.26 crores at June 2007 Price Level.

CCEA approval was accorded to the project on 04.12.2008 for Rs.573.99 crores including IDC of Rs.67.66 crores and FC of Rs.0.40

crores at June, 2007 Price Level. The completion cost considering 44 months as construction period is estimated as Rs.674.45 crores including IDC as Rs.76.52 crores and FC as Rs.0.47 crores. The project is currently under execution.

Cost estimates at completion level, submitted by NEEPCO, was vetted by CEA amounting to Rs.1402.27 crores (Hard Cost) vide CEA letter dated 18.01.2019.

**(ii) 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 Rs. 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 Rs.6285.33 Crores including IDC and FC of Rs. 670.92 Crores at December, 2002 price level.

Memorandum of Changes (MoC) has been approved by CEA on dated 15.03.2018. Revised cost estimates at April, 2017 price level, submitted by NEEPCO, was vetted by CEA amounting to Rs.19496.34 crores (Hard Cost) vide CEA letter dated 26.11.2018.

**11.5.3 CEA concurred Projects, yet to be taken under construction.**

**(A) Sanctioned 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.



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 Rs. 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 Rs.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 Rs. 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 Rs.25732.79crores (July, 2016 price level) including Power Component of Rs.17510.84 crores, Flood Moderation component Rs.4627.8 crores.

**(B) State Sector Projects**

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

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

Environment clearance and Forest clearance are yet to be obtained.

**(C) Private Sector Projects**

**(i) Demwe Lower HE Project (5x342 + 1x40=1750 MW), Arunachal Pradesh by M/sADPL**

Demwe Lower HE Project was accorded concurrence by CEA on 20.11.2009 for an estimated cost of Rs. 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 Rs. 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 Rs.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 7<sup>th</sup> 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 11<sup>th</sup> February, 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 Rs. 6268.26 Crores (without Mega Power Project status) and Rs. 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 22<sup>nd</sup> May, 2012 at an Estimated completed cost of Rs.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) Hiron H.E Project (4x125=500MW) in Arunachal Pradesh By M/s JAPL**

Hiron H.E. Project was accorded concurrence by CEA on 10<sup>th</sup> April, 2013 at an estimated completed cost of Rs. 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 H E Project (10x307+1x9.6+1x7.4 = 3097MW)in Arunachal Pradesh By M/s EHEPCL**

Etalin H.E. Project was accorded concurrence by CEA on 12<sup>th</sup> July, 2013 at an Estimated completed cost of Rs. 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 16<sup>th</sup> Aug, 2013 at an estimated completed cost of Rs.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 11<sup>th</sup> Sept, 2013 at an estimated completed cost of Rs. 9301.11 Crores.

Environment clearance and Forest clearance are yet to be obtained. EC is

linked with Siang Basin Study Report.

**xi) Siyom HE Project (6x166.67 = 1000MW)in Arunachal Pradesh By SHPPL**

Siyom H.E. Project was accorded concurrence by CEA on 17<sup>th</sup> Dec, 2013 at an estimated completed cost of Rs. 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 27<sup>th</sup> March, 2015 at an estimated completed cost of Rs.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 Meghalaya by M/sAKPPL**

Kynshi-I H.E. Project was accorded concurrence by CEA on 31st March, 2015 at an estimated completed cost of Rs.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 Rs.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 Rs. 1493.55 Crores.

Environmental Clearance accorded on 10.11.15. Forest clearance stage-I accorded on 27.10.15. Forest clearance stage-I 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 Rs. 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 Rs.1994.74 Crores.

Environmental Clearance and Forest clearance are yet to be obtained.

**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:

Wah Umiam Stage-III HEP (Erstwhile Mawphu HEP, Stage-II (85 MW) in Meghalaya by NEEPCO Ltd.

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

- (i) Detailed Project Report (DPR) of “Enhancement of Intra State Transmission System of Assam”

**11.6.3 Grant of prior approval of Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2018-19.**

- To M/s POWER GRID for Construction of 400kV D/C line section from Surjamaninagar (ISTS) S/s to a suitable point on the existing Surjamaninagar(TSECL)-North Comilla line near Surjamaninagar (TSECL) 132kV S/s”.

**11.6.4 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2018-19.**

- To M/s NER-II Transmission Ltd., for “Transmission System for North Eastern Region Strengthening Scheme (NERSS-II & V)”

**11.7 Hydro Power Generation Performance**

Hydro Power generation during the year 2018-19 in the North Eastern Region was 5025 MU against a target of 6435 MU, which is about 22 % less.

### 11.8 R&M Schemes (Hydro) of North Eastern Region

Thirteen (13) existing hydro schemes of North Eastern Region with an aggregate installed capacity of 649 MW have been identified for R&M works to accrue a benefit of 342 MW. The R&M activities of eight (8) schemes have already been completed at an actual expenditure of about Rs. 259 Crores and have

accrued a benefit of 121 MW. The remaining five (5) schemes having an aggregate installed capacity of 290 MW are under various stages of implementation and are likely to accrue a benefit of 221 MW. The scheme-wise status of the R&M works of the hydro schemes of North Eastern Region **as on 31.03.2019** is given here under:

#### 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	4x9	84.21	36 (LE)	RM&LE works completed in 2002-03
5.	Loktak, NHPC, Manipur	3x30 (Derated)	17.88	15(Res.)	R&M works completed in 2011-12
6.	Umium St.II, MePGCL, Meghalaya	2x9	55.67	18(LE) + 2 (U)	R&M works completed in 2011-12
7.	Kopili, NEEPCO, Assam	2x50	50.92	-	R&M works completed in 2014-15
8.	Khandong, NEEPCO, Assam	1x25	29.18	25(LE)	R&M works completed in 2014-15
	<b>Sub Total(A)</b>	<b>359</b>	<b>259.33</b>	<b>121</b>	



**B. Ongoing – Under Implementation**

S. No.	Name of Scheme, Agency, State	Installed Cap. (MW)	Est. cost (Rs. Crs.)	Benefits (MW)	Status
1.	Khandong Power Station, NEEPCO, Meghalaya	2x25	196.7	50(LE)	DPR for life extension is under preparation. R&M works planned for completion in 2021-22
2.	Kyrdemkulai (Umium St.III), MePGCL, Meghalaya	2x30	408	60(LE) + 6(U)	DPR has been prepared and under Tendering. R&M works planned for completion in 2021-22
3.	Gumti, TPGL, Tripura	3x5	17.50*	-	DPR for life extension is under preparation. R&M works planned for completion in 2021-22
4.	Loktak, NHPC, Manipur	3x35	236.07	105 (LE)	Final order of CERC is awaited. R&M works planned for completion in 2022-23.
5.	Umiam-Umtru Stage-IV, MePGCL, Meghalaya	2x30	-	-	RLA studies to be taken up in due course. R&M works planned for completion in 2022-27.
	<b>Sub Total(B)</b>	<b>290</b>	<b>858.27</b>	<b>221</b>	
	<b>Total(A+B)</b>	<b>649</b>	<b>1,117.6</b>	<b>342</b>	

\*Tentative

**Abbreviations: MW – Mega Watt; Res. – Restoration; U – Up-rating; 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	1427.00
Thermal	2581.83
RES	324.28
Nuclear	-
<b>Total</b>	<b>4333.11</b>

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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 to bring about attitudinal changes. HRD Division has also been making efforts to keep stock of the infrastructure available for the development of human resources in the Power Sector. To fulfill its statutory duty under Central Electricity Authority (measures relating to safety and electric Supply) Regulations 2010, CEA has been assessing the Power Sector training institutes for their evaluation in terms of infrastructure, utilization and quality of training programmes and facilitate CEA's accreditation for them in line with the CEA Guidelines for Recognition for Training Institutes for Power Sector. CEA has been advising /recommending various measures to the training institutes/Power Sector organizations for improvement in the training infrastructure and methodologies for enhancing the skills and productivity of the personnel.

### 12.2 Training Policy for Central Power Engineering Service (CPES) officers of CEA

Training Policy for technical Group A & B officers of CEA has been prepared and approved by CEA. This policy broadly covers the various training needs for officers of all levels in CEA. The broad objectives of the Training Policy are as under :-

- To enable CPES officers of CEA to discharge their functions effectively.
- To provide practical exposure to the CPES officers in the area of construction and

Operation & Maintenance (O&M) of various types of Power Plants as well as Transmission & Distribution facilities, Grid Operation, Tariff related issues, Power Market etc. which would enhance their technical competencies.

- To enable the officers to draw plans, advise and monitor Power Sector projects with the strong background knowledge/experience of the sector.
- To familiarize the officers with the best practices in the application of advanced technologies in Power Sector.
- To develop and enhance the capabilities in the CPES officers to deal with rapid developments and challenges encountered by the Power Sector from time to time.
- To enhance the managerial competencies of the officers to enable them to play a leading role in the Power Sector so that the management can channelize the expertise of CEA officers in an effective manner.

### 12.3 Induction Training programme

Induction Training programme is being organized for newly recruited Assistant Directors of the CEA. Induction Training of 2<sup>nd</sup> Batch of Assistant Directors of CEA was concluded in August 2018 and the Induction Training of 3<sup>rd</sup> Batch comprising of 33 nos. of Assistant Directors of CEA for a duration of 34 weeks started from 1<sup>st</sup> October 2018. Under this training programme the officers have undergone classroom training at National Power Training Institute (Faridabad), Plant visits and On-Job Training at various generation, transmission and distribution facilities in Power Sector. This training is intended to give the officers an immense theoretical and practical exposure to the latest technology and trends in the Power Sector.

## 12.4 Refresher Training Programmes in India

Various refresher training programmes for CEA officers were conducted at professional institutes of national and international repute like CBIP, ISTM, CIGRE, ESCI, DPC, NPC, NPTI, CRPI, IIT Kanpur 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 2018-19 are 580.

## 12.5 In-house Presentations

During the year 2018-19, the following 17 technical presentations were arranged from various industries/ organizations in CEA to keep CEA officers abreast of the latest technologies:-

S.no	Topic of presentation	Organization
1	Nitrogen Injection Fire Prevention and Extinguishing Systems(NIFPES)	M/s CTR Manufacturing Industries Pvt. Ltd
2	Fire Protection of Transformer as per NFPA 850	M/s SERGI Transformers Prevention Technologies Pvt. Ltd
3	Flue Gas De Sulphurisation (FGD)	M/s GE Power India Limited
4	Online Insulation Monitoring and Fault Location System in Electrical Distribution System	M/s Bender India Pvt. Ltd
5	Fibre Glass Reinforced Plastic (FRP) stacks	M/s Chemical Process Piping Private Limited
6	New Technologies on Plug in type bushing, surge arrester, GIS Termination & Cable Joints	Mr. Deepal Shah, Country Delegate-India Chair-CIGRE NSC B1 India
7	Transportation of Coal by Long Belt/ Pipe Conveyer	M/s Kali-FL Consulting Engineers (P) Ltd, Chennai
8	Energy Portfolio Management	M/s 50 Hertz Limited
9	Statcom Technology	M/s Siemens
10	External Insulation Solution Series	M/s Jiangsu Shemar Electric Co.Ltd
11	Economical, Clean, & Optimum Technology of Ash Disposal (ECOTAD)	Shri A.K.Dutta, Innovator
12	HVDC and FACTs for Ultra Mega Solar PV and Renewable Projects	M/s ABB Ltd.
13	Common Activities to Advance Sustainable Hydropower Development in India	Mr. GregoyTracz
14	Disadvantages of Lead Sheath Power Cable and need for adaptation of Greener and cost efficient alternatives	M/s Sterlite Power
15	Battery Storage Technology	M/s Innolith Technology
16	SPC Technology for Sox Emission control	M/s Gore & Associates Inc, USA
17	Digital Profile Mapping	M/s SIXD Engineering Solutions Pvt. Ltd.

## 12.6 Foreign Visits/Training programmes for CEA Officers

The CEA officers were deputed to the Foreign visits/ training programmes to give them exposure to technological trends in the developed countries. During the period 2018-19, a total of 52 nos. officers of CEA at various levels visited foreign nations under 30 programmes. 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 2018-19, 08nos Graduate Engineer and 01nos Diploma Engineer have undergone training in CEA under the Apprentice Act 1961.

## 12.8 Summer Training/ Winter Training

During the financial year 2018-19, summer and winter training were given to 16 number students from reputed institutes in CEA.

## 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/Centers of various Central/State Utilities as well as Private Sector were visited by CEA officers for their assessment and recognition.

During the period 2018-19, the following 18 nos. training institutes/Centers were visited and assessed for recognition:-

S.No	Name of the Institute
1	Power System Training Institute, Bangalore (Karnataka)
2	Global Power Training Institute (GPTI), Global Education Limited, Nagpur, Maharashtra
3	Essar Power Learning Centre, Gujarat
4	NPTI, Faridabad, Haryana
5	Technical Training Institute, Katni, MP
6	REC Institute of Power Management and Training, Hyderabad, Telangana
7	TPCIL Training Institute, Nellore, Andhra Pradesh
8	Chennai Power and Desalination Training Institute, Chennai, Tamil Nadu
9	Power Management Institute, NTPC, Noida, UP
10	Steag Power Plant Learning Centre, Noida, UP
11	GETRI, Vadodara, Gujarat
12	Power Station Training Centre, Neyveli, Tamil Nadu
13	GMR Energy Development center, Kamalanga Orissa
14	Power Engineers Training and Research center, Idukki, Kerala-Kerala State Electricity
15	Jindal Institute of Power Technology Raigarh, Chattisgarh
16	Power Distribution Training Center, GovindPura, Bhopal
17	Central Power Training Institute, Rourkela steel plant, SAIL, Rourkela
18	Central Training Institute, Jabalpur

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# ANNEXURE

**ANNEXURE 2A**  
 (Item No.2.8.2)

**CUMULATIVE - RECEIPT-CONSUMPTION (APRIL-2018 to MARCH-2019)**

Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
<b>Northern Region</b>										
1	ANPARA C TPS	1200	IPP	4930.3	0.0	0.0	0.0	0.0	4930.3	4926.6
2	ANPARA TPS	2630	STATE	12544.5	0.0	0.0	0.0	0.0	12544.5	12653.8
3	BADARPUR TPS	705	CENTRAL	824.0	0.0	0.0	0.0	0.0	824.0	916.0
4	BARKHERA TPS	90	IPP	105.8	0.0	0.0	0.0	0.0	105.8	114.1
5	CHHABRA TPP	2320	STATE	1500.3	5166.9	0.0	0.0	0.0	6667.2	4313.8
6	DADRI (NCTPP)	1820	CENTRAL	7105.0	0.0	0.0	56.0	0.0	7161.0	6612.0
7	GH TPS (LEH.MOH)	920	STATE	1943.9	0.0	0.0	0.0	0.0	1943.9	1639.8
8	GOINDWAL SAHIB TPP	540	IPP	1538.8	0.0	69.5	102.4	0.0	1710.7	1676.1
9	HARDUAG ANJ TPS	605	STATE	1890.1	0.0	0.0	0.0	0.0	1890.1	1942.0
10	INDIRA GANDHI STPP	1500	CENTRAL	5108.4	0.0	0.0	116.4	0.0	5224.8	4530.1
11	KALISINDH TPS	1200	STATE	113.0	3110.0	0.0	0.0	0.0	3223.0	3117.8
12	KAWAI TPS	1320	IPP	3847.0	0.0	114.8	603.7	0.0	4565.5	4328.7
13	KHAMBAR KHERA TPS	90	IPP	105.9	0.0	0.0	0.0	0.0	105.9	109.0
14	KOTA TPS	1240	STATE	4371.8	1183.1	0.0	0.0	0.0	5554.9	5333.6
15	KUNDARKI TPS	90	IPP	157.9	0.0	0.0	0.0	0.0	157.9	152.4
16	LALITPUR TPS	1980	IPP	2509.2	0.0	1461.0	0.0	0.0	3970.2	3405.4
17	MAHATMA GANDHI TPS	1320	IPP	4617.8	0.0	0.0	0.0	0.0	4617.8	4158.4
18	MAQSOOD PUR TPS	90	IPP	92.2	0.0	0.0	0.0	0.0	92.2	106.1
19	MEJA STPP	660	CENTRAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	OBRA TPS	1094	STATE	2261.0	0.0	0.0	0.0	0.0	2261.0	2547.9
21	PANIPAT TPS	920	STATE	2411.5	0.0	0.0	0.0	0.0	2411.5	2207.2
22	PARICHHA TPS	1140	STATE	3399.8	0.0	0.0	0.0	0.3	3400.1	3432.0
23	PRAYAGRA J TPP	1980	IPP	4849.6	0.0	0.0	0.0	0.0	4849.6	4792.0
24	RAJGHAT TPS	135	STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	RAJIV GANDHI TPS	1200	STATE	2950.0	0.0	0.0	0.0	0.0	2950.0	2700.1
26	RAJPURA TPP	1400	IPP	4031.0	0.0	0.0	936.2	0.0	4967.1	4764.9
27	RIHAND STPS	3000	CENTRAL	13356.0	0.0	0.0	0.0	0.0	13356.0	13177.0

Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
28	ROPAR TPS	840	STATE	1475.7	0.0	0.0	0.0	0.0	1475.7	1162.2
29	ROSA TPP Ph-I	1200	IPP	2981.7	0.0	17.6	0.0	0.0	2999.2	2571.4
30	SINGRAULI STPS	2000	CENTRAL	9073.0	0.0	0.0	0.0	0.0	9073.0	9365.0
31	SURATGARH TPS	1500	STATE	2451.0	2067.8	0.0	0.0	8.3	4527.1	4317.8
32	TALWANDI SABO TPP	1980	IPP	5904.6	0.0	0.0	1069.2	0.0	6973.8	6584.6
33	TANDA TPS	440	CENTRAL	1956.0	128.0	0.0	0.0	0.0	2084.0	1618.0
34	UNCHAHAR TPS	1550	CENTRAL	4678.0	70.0	0.0	0.0	0.0	4748.0	4499.0
35	UTRAULA TPS	90	IPP	143.8	0.0	0.0	0.0	0.0	143.8	146.2
36	YAMUNA NAGAR TPS	600	STATE	2009.7	0.0	0.0	0.0	0.0	2009.7	2189.7
Total Northern Region		41389		117238.3	11725.8	1662.9	2884.0	8.6	133519.6	126110.8
Western Region										
37	AKALTARA TPS	1800	IPP	4181.7	0.0	616.2	263.9	0.0	5061.8	5012.2
38	AMARAVATI TPS	1350	IPP	2941.5	0.0	0.0	87.9	0.0	3029.4	2404.7
39	AMARKANTAK EXT TPS	210	STATE	828.6	0.0	0.0	0.0	0.0	828.6	880.3
40	ANUPPUR TPP	1200	IPP	3291.0	0.0	697.0	0.0	0.0	3988.0	4000.0
41	AVANTHA BHANDAR	600	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	BALCO TPS	600	IPP	1207.9	0.0	315.1	218.7	37.6	1779.3	1775.2
43	BANDAKHAR TPP	300	IPP	807.8	0.0	85.3	0.0	459.5	1352.6	1589.3
44	BARADARHA TPS	1200	IPP	1861.5	0.0	3109.0	0.0	0.0	4970.4	4704.4
45	BELA TPS	270	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	BHILAI TPS	500	CENTRAL	2302.1	0.0	30.9	0.0	0.0	2332.9	2269.8
47	BHUSAWAL TPS	1210	STATE	5053.2	0.0	0.0	85.9	0.0	5139.1	4981.1
48	BINA TPS	500	IPP	1484.6	0.0	150.3	0.0	36.5	1671.5	1675.5
49	BINJKOTE TPP	600	IPP	570.5	0.0	469.3	0.0	0.0	1039.8	1150.5
50	BUTIBORI TPP	600	IPP	844.0	0.0	510.3	76.8	0.0	1431.0	1438.0
51	CHANDRAPUR(MAHARASHTRA) STPS	2920	STATE	11754.6	0.0	0.0	71.4	0.0	11826.0	11579.8
52	DAHANU TPS	500	IPP	1896.0	0.0	0.0	335.4	0.0	2231.4	2166.6
53	DHARIWAL TPP	600	IPP	1004.3	0.0	432.1	95.5	0.0	1532.0	1368.5
54	DSPM TPS	500	STATE	2529.8	0.0	0.0	0.0	0.0	2529.8	2464.2
55	GANDHINAGAR TPS	630	STATE	2240.6	0.0	0.0	381.4	0.0	2622.0	2342.1

Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
56	GMR WARORA TPS	600	IPP	1907.2	0.0	538.1	52.9	0.0	2498.3	2514.3
57	JSW RATNAGIR I TPP	1200	IPP	0.0	0.0	0.0	3369.1	0.0	3369.1	3377.1
58	KHAPARK HEDA TPS	1340	STATE	6428.1	0.0	0.0	0.0	0.0	6428.1	6469.9
59	KORADI TPS	2400	STATE	6377.6	0.0	0.0	199.4	0.0	6577.0	6567.9
60	KORBA-II	440	STATE	1521.8	0.0	0.0	0.0	0.0	1521.8	1509.7
61	KORBA STPS	2600	CENTRAL	13784.0	0.0	0.0	0.0	0.0	13784.0	13681.0
62	KORBA-WEST TPS	1340	STATE	6973.2	0.0	0.0	0.0	0.0	6973.2	6662.7
63	LARA TPP	800	CENTRAL	0.0	0.0	0.0	0.0	0.0	0.0	49.7
64	MAHAN TPP	1200	IPP	0.0	0.0	2376.4	0.0	0.0	2376.4	2093.9
65	MARWA TPS	1000	STATE	4206.9	0.0	0.0	0.0	0.0	4206.9	4201.1
66	MAUDA TPS	2320	CENTRAL	6886.0	393.0	915.0	42.0	32.0	8268.0	8010.0
67	MIHAN TPS	246	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	MUNDRA TPS	4620	IPP	0.0	0.0	0.0	13365.3	0.0	13365.3	13251.5
69	MUNDRA UMTTP	4000	IPP	0.0	0.0	0.0	11071.6	0.0	11071.6	11273.7
70	NASIK TPS	630	STATE	1890.4	0.0	0.0	0.0	0.0	1890.4	1864.8
71	NASIK (P) TPS	1350	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
72	NAWAPAR A TPP	600	IPP	1376.5	0.0	445.5	0.0	636.3	2458.3	2446.8
73	NIGRI TPP	1320	IPP	0.0	2827.7	1328.9	0.0	0.0	4156.7	4059.4
74	OP JINDAL TPS	1000	IPP	85.4	0.0	1795.2	122.2	658.3	2661.1	2488.6
75	PARAS TPS	500	STATE	2004.9	0.0	0.0	0.0	0.0	2004.9	1931.7
76	PARLI TPS	1170	STATE	2384.6	0.0	0.0	0.0	0.0	2384.6	2069.2
77	PATHADI TPP	600	IPP	2251.2	0.0	388.4	0.0	114.0	2753.6	2885.6
78	RAIKHEDA TPP	1370	IPP	1385.2	2.0	255.4	7.2	0.0	1649.9	1670.8
79	SABARMATI (C STATION)	422	IPP	1088.4	0.0	0.0	471.3	0.0	1559.7	1520.6
80	SALAYA TPP	1200	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
81	SALORA TPP	135	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82	SANJAY GANDHI TPS	1340	STATE	5675.0	0.0	0.0	0.0	0.0	5675.0	5692.5
83	SASAN UMTTP	3960	IPP	0.0	17999.9	0.0	0.0	0.0	17999.9	18083.7
84	SATPURA TPS	1330	STATE	5173.9	0.0	0.0	0.0	0.0	5173.9	5697.5
85	SEIONI TPP	600	IPP	1354.4	0.0	468.8	0.0	0.0	1823.2	1820.1
86	SHIRPUR TPP	150	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87	SHREE SINGAJI TPP	2520	STATE	5705.6	0.0	0.0	32.3	0.0	5737.9	5773.6
88	SIKKA REP. TPS	500	STATE	0.3	0.0	0.0	1415.1	0.0	1415.4	1353.1
89	SIPAT STPS	2980	CENTRAL	14541.0	0.0	0.0	0.0	0.0	14541.0	14265.0
90	SOLAPUR	1320	CENTRAL	1031.0	116.0	397.0	18.0	8.0	1570.0	1265.0
91	TAMNAR TPP	2400	IPP	3327.2	0.0	1903.3	53.7	65.4	5349.6	5305.9
92	TIRORA TPS	3300	IPP	13476.3	0.0	306.3	482.2	0.0	14264.8	13691.4
93	TROMBAY TPS	1250	IPP	0.0	0.0	0.0	2318.9	0.0	2318.9	2293.9
94	UCHPINDA TPP	1440	IPP	1271.4	0.0	87.4	0.0	0.0	1358.8	1412.8
95	UKAI TPS	1110	STATE	3719.9	0.0	0.0	738.0	0.0	4457.9	4167.6
96	VINDHYACHAL STPS	4760	CENTRAL	24233.0	0.0	0.0	0.0	0.0	24233.0	24774.0
97	WANAKBORI TPS	1470	STATE	4760.0	0.0	0.0	1056.9	0.0	5816.9	5221.5
98	WARDHA WARORA TPP	540	IPP	778.2	0.0	21.8	0.0	0.0	800.0	769.7
<b>Total Western Region</b>		<b>81463</b>		190398.4	21338.6	17643.1	36433.0	2047.5	267860.6	263989.4
<b>Southern Region</b>										
99	BELLARY TPS	1700	STATE	2604.6	0.0	0.0	0.0	0.0	2604.6	2619.5
100	DAMODARAM SANJEEVAIAH TPS	1600	STATE	3608.8	0.0	0.0	829.6	0.0	4438.4	4440.4
101	Dr. N.TATA RAO TPS	1760	STATE	9131.8	0.0	0.0	0.0	0.0	9131.8	8936.1
102	ITPCL TPP	1200	IPP	0.0	0.0	0.0	3007.5	0.0	3007.5	3105.1



Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
103	KAKATIYA TPS	1100	STATE	4324.6	0.0	0.0	0.0	0.0	4324.6	4288.6
104	KOTHAGU DEM TPS	420	STATE	3988.9	0.0	0.0	0.0	0.0	3988.9	3670.6
105	KOTHAGU DEM TPS (NEW)	1000	STATE	5500.0	0.0	0.0	0.0	0.0	5500.0	5488.5
106	KOTHAGU DEM TPS (STAGE-7)	800	STATE	710.2	0.0	0.0	0.0	0.0	710.2	928.9
107	KUDGI STPP	2400	CENTRAL	2755.0	1020.0	0.0	166.0	26.0	3967.0	4307.0
108	METTUR TPS	840	STATE	3250.6	0.0	0.0	870.7	0.0	4121.3	4068.1
109	METTUR TPS - II	600	STATE	1585.6	0.0	0.0	591.3	0.0	2176.9	2165.2
110	MUTHIARA TPP	1200	IPP	0.0	0.0	0.0	2150.2	0.0	2150.2	2011.6
111	NORTH CHENNAI TPS	1830	STATE	6641.0	0.0	0.0	1132.3	0.0	7773.3	7797.2
112	PAINAMPU RAM TPP	1320	IPP	2428.7	0.0	0.0	2234.1	0.0	4662.8	4897.3
113	RAICHUR TPS	1720	STATE	6928.2	0.0	0.0	0.0	0.0	6928.2	6208.3
114	RAMAGUN DEM - B TPS	63	STATE	298.3	0.0	0.0	0.0	0.0	298.3	288.9
115	RAMAGUN DEM STPS	2600	CENTRAL	11816.0	0.0	0.0	0.0	0.0	11816.0	11582.0
116	RAYALASE EMA TPS	1650	STATE	4980.9	0.0	0.0	0.0	0.0	4980.9	4826.9
117	SGPL TPP	1320	IPP	0.0	0.0	0.0	4820.3	0.0	4820.3	4890.8
118	SIMHADRI	2000	CENTRAL	8934.0	0.0	0.0	143.0	102.0	9179.0	8904.0
119	SIMHAPUR I TPS	600	IPP	0.0	0.0	0.0	0.0	0.0	0.0	63.0
120	SINGARENI TPP	1200	CENTRAL	5095.6	0.0	0.0	0.0	0.0	5095.6	5194.9
121	THAMMIN APATNAM TPS	300	IPP	0.0	0.0	0.0	14.8	0.0	14.8	50.9
122	TORANGAL LU TPS(SBU-I)	260	IPP	0.0	0.0	0.0	372.3	0.0	372.3	372.3
123	TORANGAL LU TPS(SBU-II)	600	IPP	125.9	0.0	0.0	1003.4	0.0	1129.3	1154.2
124	TUTICORIN (JV) TPP	1000	CENTRAL	2716.3	0.0	0.0	548.1	0.0	3264.4	3424.9
125	TUTICORIN TPS	1050	STATE	3754.4	0.0	0.0	962.1	0.0	4716.5	4549.2
126	TUTICORIN (P) TPS	300	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
127	UDUPI TPP	1200	IPP	0.0	0.0	0.0	2198.4	0.0	2198.4	2219.9
128	VALLUR TPP	1500	CENTRAL	5060.0	0.0	0.0	0.0	0.0	5060.0	5624.1
129	VIZAG TPP	1040	IPP	113.5	0.0	177.2	182.2	0.0	472.9	604.7
130	YERMARUS TPP	1600	STATE	445.1	0.0	0.0	0.0	0.0	445.1	474.4
<b>Total SR</b>		<b>37773</b>		<b>96798.0</b>	<b>1020.0</b>	<b>177.2</b>	<b>21226.2</b>	<b>128.0</b>	<b>119349.4</b>	<b>119157.1</b>
<b>Eastern</b>										
131	BAKRESWAR TPS	1050	STATE	3578.4	39.6	275.5	0.0	198.5	4092.0	4147.9
132	BANDEL TPS	330	STATE	777.3	0.0	276.1	0.0	110.6	1164.0	1149.6
133	BARAUNI TPS	710	STATE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
134	BARH II	1320	CENTRAL	2250.0	4059.0	0.0	52.0	0.0	6361.0	5800.0
135	BOKARO 'B' TPS	710	CENTRAL	2181.7	0.0	0.0	0.0	0.0	2181.7	2085.4
136	BUDGE BUDGE TPS	750	IPP	1230.2	1545.3	850.0	0.0	0.0	3625.6	3558.6
137	CHANDRAPURA(DVC) TPS	630	CENTRAL	2392.0	0.0	0.0	0.0	0.0	2392.0	1996.7
138	DERANG TPP	1200	IPP	1784.9	0.0	1652.1	0.0	0.0	3437.0	3409.1
139	D.P.L. TPS	660	STATE	1557.0	0.0	0.0	0.0	50.7	1607.6	1620.2
140	DURGAPUR STEEL TPS	1000	CENTRAL	4267.4	0.0	0.0	0.0	0.0	4267.4	3937.7
141	DURGAPUR TPS	210	CENTRAL	889.7	0.0	0.0	0.0	0.0	889.7	725.5
142	FARAKKA STPS	2100	CENTRAL	9618.0	0.0	0.0	114.0	0.0	9732.0	9737.0
143	HALDIA TPP	600	IPP	2457.7	0.0	537.3	105.2	0.0	3100.2	3102.0
144	HIRANMAYE TPP	300	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145	IB VALLEY TPS	420	STATE	2612.9	0.0	0.0	0.0	0.0	2612.9	2564.3
146	JOJOBBERA TPS	240	IPP	0.0	0.0	333.9	88.2	700.3	1122.4	1040.8
147	KAHALGAON TPS	2340	CENTRAL	13147.0	0.0	0.0	0.0	0.0	13147.0	12589.0
148	KAMALANGA TPS	1050	IPP	3651.4	0.0	925.6	158.9	348.7	5084.6	4801.7
149	KODARMA TPP	1000	CENTRAL	3697.1	0.0	0.0	0.0	0.0	3697.1	3592.8

Region	Name of the Plant	Capacity (MW)	SECTOR	CIL/SCCL	Captive	E-Auction	Import	Others	Total Receipt	Total Consumption
150	KOLAGHAT TPS	1260	STATE	3565.9	0.0	357.2	0.0	156.1	4079.3	3848.7
151	MAHADEV PRASAD STPP	540	IPP	273.2	0.0	1624.2	7.7	0.0	1905.2	1997.6
152	MAITHON RB TPP	1050	IPP	3674.0	0.0	651.8	149.5	7.6	4482.9	4283.9
153	MEJIA TPS	2340	CENTRAL	8521.8	0.0	0.0	0.0	0.0	8521.8	8268.8
154	MUZAFFARPUR TPS	610	CENTRAL	2202.8	0.0	0.0	0.0	0.0	2202.8	2095.7
155	NABI NAGAR TPP	750	CENTRAL	1640.5	0.0	0.0	0.0	0.0	1640.5	1570.9
156	RAGHUNATHPUR TPP	1200	CENTRAL	1995.1	0.0	0.0	0.0	0.0	1995.1	1898.1
157	SAGARDIGHI TPS	1600	STATE	1821.2	70.2	1259.4	3.3	626.0	3780.1	3604.1
158	SANTALDIH TPS	500	STATE	2237.8	0.0	120.2	3.3	76.2	2437.5	2377.5
159	SOUTHERN REPL. TPS	135	IPP	159.9	0.0	7.6	0.0	0.0	167.5	198.7
160	STERLITE TPP	1200	IPP	6.4	0.0	338.9	65.2	0.0	410.5	612.2
161	TALCHER (OLD) TPS	460	CENTRAL	2992.0	0.0	0.0	0.0	0.0	2992.0	2948.0
162	TALCHER STPS	3000	CENTRAL	16690.0	0.0	0.0	369.0	0.0	17059.0	17300.0
163	TENUGHAT TPS	420	STATE	1078.4	0.0	0.0	0.0	0.0	1078.4	1232.4
164	TITAGARH TPS	240	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
165	UTKAL TPP (IND BARATH)	350	IPP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total ER		32275		102951.4	5714.2	9210.0	1116.3	2274.8	121266.6	118094.7
North Eastern										
166	BONGAIGAN TPP	750	CENTRAL	1336.0	305.0	0.0	0.0	105.0	1746.0	1587.0
Total of North Eastern Region		750		1336.0	305.0	0.0	0.0	105.0	1746.0	1587.0
Total All INDIA		193650		508722.1	40103.6	28693.2	61659.4	4563.9	643742.2	628939.0

ANNEXURE-3A  
(Item no. 3.2)**DETAILS OF THE INTER-REGIONAL TRANSMISSION LINES AS ON 31.03.2019**

Detail of the inter regional Transmission Lines	Transmission capacity in MW (as on 31.03.2019)
<b>EAST-NORTH</b>	
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 – Patna- Balia 400kV D/c (Quad)	1,600
Gaya - Balia 765kV S/c	2,100
Sasaram-Allahabad/Varanasi 400kV D/C line (Sasaram HVDC back to back has been bypassed)	1,000
Sasaram - Fatehpur 765kV2x S/c	4,200
Barh-II-Gorakhpur 400kV D/c (Quad) line	1,600
Gaya-Varanasi 765 kV S/c line	2,100
LILO of Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi -pole at new pooling station in Alipurduar and addition of second 3000 MW module	3,000
Biharsharif-Varanasi 400kV D/c line (Quad)	1,600
<b>Sub-total</b>	<b>22,530</b>
<b>EAST-WEST</b>	
Budhipadar-Korba 220 kV 3 ckts.	390
Rourkela-Raipur 400 kV D/c with series comp.+TCSC	1,400
Ranchi –Sipat 400 kV D/c with series comp.	1,200
Rourkela-Raipur 400 kV D/c (2 <sup>nd</sup> ) with series comp.	1,400
Ranchi - Dharamjayagarh - WR Pooling Station 765kV S/c line	2,100
Ranchi - Dharamjayagarh 765kV 2nd S/c	2,100
Jharsuguda-Dharamjayagarh 765kV D/c line	4,200
Jharsuguda-Dharamjayagarh 765kV2nd D/c line	4,200
Jharsuguda - Raipur Pool 765kV D/c line	4,200
<b>Sub-total</b>	<b>21,190</b>
<b>WEST- NORTH</b>	
Auriya-Malanpur 220 kV D/c	260
Kota - Ujjain 220 kV D/c	260
Vindhyachal HVDC back-to-back	500
Gwalior-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
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

Detail of the inter regional Transmission Lines	Transmission capacity in MW (as on 31.03.2019)
<b>Sub-total</b>	<b>29,520</b>
<b>EAST- SOUTH</b>	
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
<b>Sub-total</b>	<b>7,830</b>
<b>WEST- SOUTH</b>	
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	4,200
<b>Sub-total</b>	<b>12,120</b>
<b>EAST- NORTH EAST</b>	
Birpara-Salakati 220kV D/c	260
Malda - Bongaigaon 400 kV D/c	1,000
Siliguri - Bongaigaon 400 kV D/c (Quad) line	1,600
<b>Sub-total</b>	<b>2,860</b>
<b>NORTH EAST-NORTH</b>	
Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi -pole	3000
<b>Sub-total</b>	<b>3,000</b>
<b>TOTAL</b>	<b>99,050</b>



**ANNEXURE-3B**

(Item no. 3.3.2)

**ISSUES PERTAINING TO TRANSMISSION SYSTEM PLANNING  
TAKEN UP DURING 2018-19**

- A. 40<sup>th</sup> Standing Committee Meeting on Power System Planning in Northern Region.
1. Constitution of the "Northern Region Standing Committee on Transmission" (NRSCT) for planning of Transmission System in the Region.
  2. Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer Rajasthan
  3. Issues related to transmission system for evacuation of power for Bajoli Holi HEP (180MW) of M/s GMR Energy Ltd. in Himachal Pradesh.
  4. Connectivity of Railways' Traction Sub Stations (TSSs) with ISTS Network for Ludhiana-Delhi-Sonnagar route.
  5. Inter connection of connectivity of Railway Traction GSS to 220 kV POWERGRID substation
  6. Conversion of fixed line reactors to switchable reactors at Bassi(PG), Kankroli(PG) and Zerda(GETCO) substations.
  7. LILO of both circuits of Madanpur-Kunihar 220 kV D/c line at 220kV Pinjore (HVPNL) Substation
  8. Connectivity to Luhri Hydro Electric Power Project Stage-I (210 MW) of SJVN Ltd. in Himachal Pradesh
  9. Connectivity to M/s HMEL (JV of HPCL - Mittal Energy Ltd) for load of 200MW at 400kV level through LILO of 400kV Talwandi Sabo Moga-Nakodar line – PSTCL proposal
  10. Connectivity and Long Term Access (LTA) to HPPCL 450 MW from Shongtong Karcham HEP
  11. Power Evacuation of the projects in Chenab Basin and establishment of 400/132kV Substation at Kishtwar.
  12. Intra State Green Energy Corridor-I planned for evacuation of Renewable energy addition in Rajasthan:
  13. UPPTCL's proposal for connectivity of various under construction/planned 220 kV & 132 kV substations with ISTS/ other state substations
  14. Modification in approved evacuation network of 2x660MW Jawaharpur Thermal Power Plant.
  15. Agenda for issues related to Rihand, Anpara, Singrauli Generation project:
  16. Evacuation plan for 4000 MW power from Solar plants in Bundelkhand region of Uttar Pradesh under Green Energy Corridor (GEC-II) (in Phased manner in four years(2020-23)
  17. HVPNL proposal for creation of 400kV Nain Substation near Madlauda area (district Panipat).
  18. Transmission system for evacuation of power from Khurja STPP (2x660 MW) of THDC:
  19. Construction of 400/220kV 2x500, 2x200 MVA Basti substation.
  20. Revision in evacuation system of 2x660 MW Tanda Extn. Thermal Power Project of NTPC.
  21. Additional 220 kV line bays at Sohawal (400kV) (PG) substation and Strengthening of 220 kV system around Gonda, Behraich & Devipatan area.
  22. Downstream network of Gorakhpur (400kV) (PG) substation.
  23. Utilization of 220kV bays at 400kV Shahjahanpur (PG) and 765kV Mataur (PG) S/S.
  24. Modification in the scheme of upgradation of existing 220/132kV Sahupuri (Chandauli) Substation to 400/220kV, 2x500 MVA (GIS).

25. Augmentation of transformation capacity of 400/220kV UPPTCL Sub-stations.
26. DTL agenda regarding Reactive Power Compensation in Delhi.
27. Proposal for conversion of 400kV D/c Bamnoli- Ballabgharh O/H line into cable in Global City Project Gurugram (a JV of Centre & State Govt.) by DMICDC
28. Construction of 220/33kV GIS Baramwari (Rudrapur) and its associated 220kV D/C line from proposed 220/33 kV substation Baramwari (Rudrapur) to LILO point of Singoli Bhatwari HEPP (L&T) under Intra State Strengthening Scheme.
29. Issue related to signing of Transmission Agreement/LTA Agreements for implementation of UITP Scheme (deemed ISTS) by PTCUL for evacuation of power from various Generators.
30. Construction of 2 No. 400 kV bays at 400/220 kV Chamera Pooling Station of PGCIL under Northern Region System Strengthening scheme.
31. Transmission System for evacuation of power from Nakhtan (4x115 MW) HEP.
32. Evacuation arrangement for Solar Park (1000 MW) in Spiti Valley.
33. Additional 1x500 MVA, 400/220kV ICT at Saharanpur (PG) 400/220kV substation.
34. Implementation status of 500MVar Thyristor Controlled Reactor (TCR) at Kurukshetra 400kV bus and commissioning of 80 MVar Bus Reactor at Kurukshetra.
35. Ownership of 4x105 MVA ICT & 2x63 MVar Bus Reactor along with GIS bay at Dehar (BBMB) S/s.
36. Charging of 63 MVar line reactor of Lucknow-Sohawal 400kV line as bus reactor.
37. Revocation of 850 MW Connectivity granted to M/s GVK Ratle Hydro Electric Project Pvt. Ltd (GVKRHEPPL)
38. Downstream network by State Utilities from ISTS Stations
39. Transmission elements under construction by RRVPNL.
40. Various LTA/ Connectivity applications discussed in 12<sup>th</sup> Connectivity/Long-Term Access meeting of Northern Region held along with 40<sup>th</sup> SCM of NR.

**B. 1<sup>st</sup> Meeting of Northern Region Standing Committee on Transmission**

1. Approval of 400 kV transmission lines and reactor of RRVPN
2. Connectivity of Railways' Traction Sub Stations (TSSs) with ISTS Network for Ludhiana-Delhi-Sonagar route.
3. DTL Agenda for Enhancement of transformation capacity at 400/220kV Maharani Bagh S/Stn.
4. Strengthening of Intra-state and Inter-State Transmission system of Punjab.
5. Oscillations observed in the grid due to tripping of one of the evacuation line from 220kV Dhauliganga HEP.
6. UPPTCL's proposal regarding augmentation of transformation capacity at 400/220kV Sarojini Nagar, Lucknow and Moradabad sub-stations.
7. UPPTCL proposal regarding modification in connectivity lines of 400kV Basti (UPPTCL).
8. Downstream 220 kV network from Shahjahanpur 400/220kV PGCIL Substation.
9. Additional 1x500 MVA, 400/220kV ICT at Bhadla Pooling Station.
10. 50 MVar line reactor (New) for Allahabad-Singrauli 400kV line at Allahabad.
11. Various Connectivity / LTA Applications received from Renewable energy based generation projects.
12. Downstream network by State Utilities from ISTS Stations.
13. Establishment of new 400/220kV substations in Northern Region.
14. Review of Evacuation arrangement for Shongtong Karcham (450 MW) in Satluj Basin
15. Two number of 220kV Bays at Jatwal 400/220kV, 3x315 MVA S/s by JKPDD.
16. Renaming of Srinagar-Kashipur 400kV D/c (Quad) line.

17. Issue related to signing of Transmission Agreement/LTA Agreements for implementation of UITP Scheme (deemed ISTS) by PTCUL for evacuation of power from various Generators.
18. Common facilities at 765/400 kV Bhadla Substation for Connectivity of Solar Power plants under Stage-II Connectivity.
19. Various LTA/ Connectivity applications discussed in 15<sup>th</sup> Connectivity/Long-Term Access meeting of Northern Region held along with 1<sup>st</sup> NRSCT.

**C. 2<sup>nd</sup> Meeting of Northern Region Standing Committee on Transmission.**

1. Evolution of transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones and Transmission Schemes for Solar Energy Zones (SEZs) in Rajasthan.
2. Replacement of conductors of 220kV Ludhiana –Lalton Kalan line (3 circuits) and Verpal - Mall Mandi 132kV line with HTLS conductor.
3. Issue related to signing of Transmission Agreement/LTA Agreements for implementation of UITP Scheme (deemed ISTS) by PTCUL for evacuation of power from various Generators.
4. Energization of 220/33 kV substation Pirankaliyar and LILO of 220 kV Roorkee (Puhana PGCIL) - Roshnabad line in District Haridwar, Uttarakhand.
5. Power Evacuation of the projects in Chenab Basin and establishment of 400/132kV substation at Kishtwar.
6. Rajasthan proposal for establishment of 400kV/220kV GSS at Sangod (New GSS) or creation of 220 kV level at Anta (existing 765/400 kV GSS) with 220kV GSS at Sangod and associated interconnections for removing evacuation constraint in Kalisind-Chhabra-Kawai Generation Complex.
7. Grant of LTA to M/s NTPC Ltd. for Tanda TPS Stage-II (2x660 MW) for transfer of 356.78 MW power to NRBeneficiaries.
8. Augmentation of 1x1500MVA, 765/400kV ICT (3<sup>rd</sup>) at Moga S/s and Provision of 125MVAR bus reactors each at Jalandhar & Patiala
9. Connectivity to Luhri St-I, II and Sunni Dam HEPs.
10. Downstream network by State Utilities from ISTS Stations
11. Renaming of Srinagar-Kashipur 400kV D/c (Quad) line
12. LTA/Connectivity for hydro projects in Uttarakhand.
13. Connectivity and LTA to Phata Byung Hydro project (76 MW) of M/s Lanco Mandakini Hydro Energy Pvt. Ltd. in Uttarakhand.
14. Connectivity and LTA to Singoli Bhatwari HEP (99MW) of M/s L&T Uttaranchal Hydropower Ltd. in Uttarakhand.
15. Connectivity and LTA to Tapovan Vishnugarh HEP (520 MW) of NTPC Ltd.
16. Connectivity to Vishnugarh Pipalkoti HEP (444 MW) of THDCLtd.
17. Finalization of switching scheme for GIS substation.
18. Change in the connectivity of 765/400/220 kV Sub-station Moradabad.

**D. 43<sup>rd</sup> Meeting of Standing Committee on Power System Planning in Western Region.**

1. Reviewing the Progress of Earlier Agreed Transmission Schemes.
2. Two no. of 220 kV feeder bays at Itarsi (PG) 400 kV S/s for interconnection of proposed 220 kV Budhni S/s of MPPTCL.
3. Two no. of 220 kV feeder bays at Morena (TBCB) 400 kV S/s for interconnection of proposed 220 kV Bhind S/s of MPPTCL
4. LILO of Badod–Kota 220 kV line at Bhanupura S/s.
5. Transmission System plan for potential wind energy zones (WEZs) in Western Region – Bhuj, Bhachau, Dwarka (in Gujarat) and Osmanabad (in Maharashtra)
6. Interconnection of MSETCL lines with ISTS.

7. LILO of Tarapur – Padghe 400 kV D/C line at Kudus (MSETCL) 400 kV substation
8. LILO of 2<sup>nd</sup> Ckt of South Solapur – Kolhapur D/c at Alkud 400 kVS/s
9. LILO of both Ckts of Parli (PG)–Pune (PG) 400 kV D/C at LonikhandII.
10. LILO of Talegaon–Kalwa 400 kV S/C line at Vikhroli 400/220 kVS/s
11. Conversion of 400kV Line Reactors at Itarsi & Indore (MPPTCL) as switchable linereactor.
12. Implementation modalities on provision of 400/220 kV, 315 MVA or 500 MVA ICT along with one no. of 400 kV ICT bay and one no. of 220 kV ICT bay at M/s CGPL Switchyard
13. LILO of Balaghat – Dhamdha – Dongargarh 132 kV DCDS at Kirnapur 400/132 kVS/s.
14. Constitution of Western Region Committee on Transmission (WRSCT)
15. Operational feedback of NLDC for Jan'2018 – Mar'2018.
16. Connectivity application of 250 MW as Bulk Consumer for BALCO
17. Proposal for extension of 220 kV main bus bars for replacement of old 220/33 kV, 25 MVA transformers at 220 kV switchyard of TAPS – 1&2 – Agenda by BARC.

**E. 1<sup>st</sup> meeting of Western Region Standing Committee on Transmission (WRSCT).**

1. Evolution of transmission scheme for integration of envisaged RE generation capacity in Solar & Wind Energy Zones and Transmission System plan for potential wind energy zones (WEZs) in Western Region.
2. Injection from 4000MW RE projects under SECI bids (Tranche I to IV) at Bhuj PS (by April 2020):
3. Transmission System strengthening for relieving over loadings observed in Gujarat Intra-statesystem
4. Transmission System Plan for RE generations at Potential wind energy zones in Gujarat [Bhuj-II (2000MW), Lakadia (2000MW) & Dwarka (2000MW)]:
5. Transmission system for injection of power from 4000MW RE projects under SECI bids (Tranche I to IV) at Bhuj PS
6. Transmission System strengthening for relieving over loadings observed in Gujarat Intra-statesystem.
7. Transmission System associated with RE generations from potential wind energy zones in Gujarat [Bhuj-II (2000MW), Lakadia (2000MW) & Dwarka (1500MW).
8. High loading on Ranchhodpura – Dehgam 400kV D/c line.
9. Transmission system associated with RE generations from potential wind energy zones in Osmanabad area of Maharashtra.
10. Transmission system associated with RE generations from potential wind energy zones in Osmanabad area of Maharashtra
11. Overloading of 400 kV Chandrapur-I – Chandrapur-II D/c line during less/nil generation at Chandrapur-I complex.
12. Creation of 400/220 kV intra-state S/s at Guna (Distt-Guna) through TBCB process.
13. Establishment of 132/33 kV Sironcha Substation, Tal. – Sironcha, District – Gadchiroli.
14. Installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard.
15. Connectivity application of 250 MW as Bulk Consumer for BALCO TPS (4x300+4x67.5+4x135MW)

**F. 1<sup>st</sup> meeting of Eastern Region Standing Committee on Transmission (ERSCT).**

1. Modifications in the scope of works under the on-going ERSS-XVIII scheme
2. Termination of 400kV lines at Jeerat (WBSETCL) S/s under the ERSS-XV and ERSS-XVIII schemes
3. Modifications in the scope of works under the on-going ERSS-XII and ERSS-XVII (Part-B) schemes



4. LILO of Teesta-III HEP – Kishanganj 400kV D/c (Quad) line at Rangpo
5. Perspective transmission plan of JUSNL up to 2021-22
6. System strengthening in southern Odisha
7. Evacuation system for Kamakhyanagar (4x800MW) generation project
8. Proposal for installation of 125 MVAR, 420 kV Bus Reactors each at Gokarna, Kharagpur, New Chanditala, New PPSP and Durgapur 400 kV sub-stations of WBSETCL for proper reactive power management of the grid
9. Establishment of one 220/132/33kV sub-station near Falakata in Jalpaiguri/Coochbehar by LILO of Birpara - Alipurduar 220kV D/C line of POWERGRID
10. Replacement of existing Single Main & Transfer (SMT) scheme with Double Main (DM) scheme at 132kV level at Malda (POWERGRID) substation using GIS
11. Construction of 2 nos. 132 kV feeder bays at Malda 400 kV substation of POWERGRID for evacuation of power
12. Evacuation of 280MW Solar Power in Odisha

**G. 42<sup>nd</sup> Meeting of the Standing Committee on Power System Planning in Southern Region**

1. Reactive power compensation for Uppur TPS (2x 800 MW)
2. 1x125 MVAR bus reactor at Kadaladi Ultra Mega Solar PV Power Project (500 MW)
3. Establishment of Arni 400/230-110kV substation in Villupuram region by upgrading the existing 230 kV Arni SS.
4. Enhancement of 400/230 kV transformation capacity by erecting additional 1x500 MVA ICT at Thiruvalem 400/230 kV SS
5. Introduction of 230 kV level at Ariyalur 765/400 kV substation
6. Modification for the already approved Transmission System associated with NCTPS Stage –III (1x800MW) and ETPS Replacement (1x660 MW)
7. Evacuation of 12 x 80 MW (960 MW) power from Polavaram Hydro Electric Project (HEP) of APGENCO in East Godavari district
8. Addition of 400/220KV, 3 x 500 MVA transformers and 1x125 MVAR, 400 kV Bus reactor at Uravakonda S/S with isolation of 220 kV bus from existing bus
9. Erection of 220kV S/C line on D/C tower (with ACSR Single Moose) from 400/220 kV Oglapur (PGCIL) SS to proposed 220/ 132kV Venkatapur SS (42 KM) in Jayashanker Bhupalapally District
10. Grant of Connectivity to NLC India Limited (TPS-II 2nd Expn – 2x660 MW) in Cuddalore, Tamil Nadu and to control high short circuit fault level in Neyveli Generation complex
11. Transmission System for extending the Power supply to CRDA area.
12. Augmentation of 1x500 MVA transformer (3rd) at Tuticorin-II GIS (Tirunelveli PS) for evacuation of 1000 MW generation at Tuticorin-II GIS (Tirunelveli PS) under ISTS.
13. 1x330 MVAR bus reactor at Srikakulam and 2x240 MVAR switchable line reactors each at Srikakulam and Angul for Angul - Srikakulam 765 kV D/c line

**H. 1<sup>st</sup> Meeting of the Southern Region Standing Committee on Transmission (SRST)**

1. Establishment of 2x100 MVA, 220/110 kV sub-station at Ron (New), Gadag District alongwith 220kV and 110kV systems.
2. Establishment of 2x100 MVA, 220/110 kV sub-station at Savalgi, Bagalkot District alongwith 220 kV and 110 kV systems.
3. Establishment of 2x100 MVA, 220/66 kV sub-station at Hanagal (New), Chitradurga District alongwith 220 kV and 66 kV systems.
4. Establishment of 2x100 MVA, 220/66 kV sub-station at PD Kote (New), Chitradurga District alongwith 220 kV and 66 kV systems.



- 5 LILO of 2nd circuit of the existing Mahalingpura - Kudachi 220 kV D/C line at Athani.
- 6 Conversion of existing Bidnal-Saundatti 220 kV S/C line and Saundatti -Mahalingpura 220 kV S/C to 220 kV D/C line
- 7 Strengthening of Lingapura-Ittagi 220kV S/C line, Ittagi –Neelagunda 220kV S/C, Neelagunda –Guttur 220 kV S/C line by replacing line with 220 kV D/C line (Twin Drake conductor).
- 8 Establishment of 1x500 MVA, 400/220 kV Substation at Arasapadavu
- 9 Modification in the 400/230-110 kV substation at Sholingur
- 10 Revision of Scheme for power evacuation scheme proposed for Udangudi TPP stage -1 (2x660 MW).
- 11 Enhancement of 400/230 kV ICT capacity from 3 x 315 MVA to 3 x 500 MVA at the existing Sriperumbudur 400/230-110 kV S/S.
- 12 Provision of 400 kV power evacuation scheme – Contingency arrangement for power evacuation of NCTPS Stage - III (1 x 800 MW).
- 13 Establishment of 400 kV Substation at Cuddalore instead of at Neyveli.
- 14 Erection of 220/33 kV Substation at Chinturu.
- 15 Revival of abandoned Lower Sileru – Bommuru 220 kV D/C line.
- 16 Creation of 220 kV level in the 400 kV GVK Power Plant and creation of 220 kV level at 400 kV Polavaram HEP in East Godavari district to extend power supply to the proposed 220/132/33 kV Ramachandrapuram S/S.
- 17 Augmentation of ICT capacity from 2 x 315 MVA to 2 x 315 MVA + 1 x 500 MVA ICTs at Maradam (Garividi) 400/230 kV S/S.
- 18 Construction of 400/220/132 kV Substation at KTPP switchyard

#### **I. 7<sup>th</sup> Meeting of Standing Committee on Power System Planning of North Eastern Region.**

1. Establishment of Roing – Chapakhowa 132kV D/c and Tinsukia – Namsai 220kV D/c lines
2. Implementation of 132kV line bay at Palatana generation switchyard
3. Reviewing of “Transmission system for Phase-1 generation projects in Arunachal Pradesh” Scheme:
4. Strengthening of transmission system in Assam including formation of second 400kV node in ER-NER corridor
5. Installation of 80MVAR Bus reactor at Ranganadi
6. 500MW HVDC back-to-back station at North Comilla (Bangladesh) for transfer of power through Surjamaninagar – North Comilla link
7. Implementation of Additional 132 kV transmission system proposed by Arunachal Pradesh under Comprehensive Scheme of Arunachal Pradesh
8. North East - Northern / Western Interconnector-I Project
9. Modifications in the NERSS-II (Part B) and NERSS-V schemes

#### **J. 1<sup>st</sup> meeting of North Eastern Region Standing Committee on Transmission (NERST)**

1. Reviewing of Establishment of Roing – Chapakhowa 132kV D/c and Tinsukia – Namsai 220kV D/c lines
2. Reconductoring of Siliguri-Bongaigaon 400kV D/c Twin Moose line with Twin HTLS conductor
3. LILO of Kahilipara – Umtru 132kV D/c line at Killing (Byrnihat) S/s of Meghalaya
4. Proposal of connection of Dikshi HEP (24MW) in West Kameng, Arunachal Pradesh
5. Interconnection of 132kV substation at Surajmani Nagar (TSECL) & 400kV Surajmani Nagar (ISTS) and 132kV substation at P.K. Bari (TSECL) & P.K. Bari (ISTS)
6. Utilization of spare 132kV bays available at 400/132kV Silchar Substation
7. Enhancement of transformers capacity to 2x500 MVA instead of 2x315 MVA at the upcoming 400/220kV S/s at Sonapur S/s
8. Intra-state transmission system strengthening at various voltage levels in Assam
9. Installation of 15MVAR (4x5MVAR single phase) bus reactor at 132kV level at Melriat (POWERGRID) substation under Palatana and Bongaigaon transmission system.
10. Modification in installation scheme of 100MVAR (4x25MVAR three phase) reactor at 33kV level at Misa (POWERGRID) S/s
11. 400/220kV, 500MVA spare ICT and 420kV, 125MVAR spare bus reactor in NER

**ANNEXURE – 3C**

(Item 3.4.2)

**DETAILS OF THE SCHEMES NOTIFIED THROUGH TARIFF BASED COMPETITIVE BIDDING (TBCB)****(a) Schemes already commissioned / ready for commissioning by Transmission Service Providers:**

1. Transmission system for Strengthening in SR for Import of Power from ER.
2. ATS of Unchahar TPS
3. Northern Region System Strengthening Scheme, NRSS-XXXI (Part-A)
4. Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC Part-A
5. Transmission system associated with Gadarwara STPS (2x800 MW) of NTPC (Part – B)
6. Transmission System Strengthening associated with Vindhyachal - V
7. System strengthening for WR
8. System strengthening common for WR and NR
9. Scheme for enabling import of NER/ER surplus by NR
10. Part ATS for RAPP U-7&8 in Rajasthan
11. Eastern Region System Strengthening Scheme-VII
12. Northern Region System Strengthening Scheme, NRSS-XXIX
13. Connectivity Lines for Maheshwaram (Hyderabad) 765/400 kV Pooling S/s
14. Eastern Region Strengthening Scheme – VI (ERSS-VI)
15. Northern Region System Strengthening Scheme, NRSS-XXXI (Part-B)
16. Transmission System required for evacuation of power from Kudgi TPS (3x800 MW in Phase-I) of NTPC Ltd.
17. Transmission System for Patran 400kV S/S
18. Transmission System Associated with Krishnapattanam UMPP- Synchronous interconnection between SR and WR (Part-B)
19. Common Transmission System for Phase-II Generation Projects in Odisha (Orissa) and Immediate Evacuation System for OPGC (1320 MW) Project in Odisha
20. Additional System Strengthening for Sipat STPS
21. Transmission system associated with IPPs of Nagapattinam / Cuddalore Area – Package - A
22. Additional System Strengthening Scheme for Chhattisgarh IPPs – Part B

**b) Schemes under implementation by the Transmission Service Providers**

1. North Eastern Region System Strengthening Scheme – VI (NERSS – VI)
2. Transmission System Strengthening in India System for transfer of power from new HEPs in Bhutan
3. Strengthening of Transmission System beyond Vemagiri
4. System Strengthening Scheme in Northern Region (NRSS-XXXVI)” along with LILO of Sikar-Neemrana 400kV D/C line at Babai (RRVNL)
5. System strengthening for IPPs in Chhattisgarh and other generation projects in Western Region
6. Additional inter-Regional AC link for import into Southern Region i.e. Warora – Warangal and Chilakaluripeta - Hyderabad - Kurnool 765kV link
7. Creation of new 400kV GIS Substations in Gurgaon and Palwal area as a part of ISTS
8. Transmission system for NERSS-II Part B and NERSS-V
9. Transmission System Strengthening in WR associated with Khargone TPP (1320 MW)
10. 765 kV System Strengthening Scheme in Eastern Region (ERSS-XVIII)
11. Additional 400 kV feed to Goa (ii) Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool
12. New WR- NR 765 kV Inter-regional corridor

13. Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer Rajasthan
14. Eastern Region Strengthening Scheme –XXI (ERSS-XXI)
15. Immediate evacuation for North Karanpura (3X660 MW) generation project of NTPC B. Creation of 400/220 kV sub-station at Dhanbad-Proposal of JUSNL (ERSS-XIX) B

**c) Schemes under bidding process by Bid Process Coordinators:**

1. Connectivity System for Lanco Vidarbha Thermal Power Pvt. Ltd. (LVTPPL) and Inter State Transmission system strengthening in Chhatarpur area in Madhya Pradesh
2. Western Region Strengthening Scheme- XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme- IX (NERSS-IX)
3. 400 kV Udipi (UPCL) – Kasargode D/C line
4. WRSS -21 Part-A (TBCB) - Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS
5. WRSS -21 Part-B- Transmission System strengthening for relieving over loadings observed in Gujarat Intra-state system due to RE injections in Bhuj PS
6. Transmission system associated with RE generations at Bhuj –II, Dwarka & Lakadia
7. Transmission System for providing connectivity to RE projects at Bhuj-II (2000MW) in Gujarat
8. Jam Khambaliya Pooling Station and Interconnection of Jam Khambaliya Pooling Station for providing connectivity to RE projects (1500 MW) in Dwarka (Gujarat) & Installation of 400/220 kV ICT along with associated bays at M/s CGPL Switchyard
9. Transmission system associated with LTA applications from Rajasthan SEZ Part-B
10. Transmission system associated with LTA applications from Rajasthan SEZ Part-C
11. Transmission system associated with LTA applications from Rajasthan SEZ Part-D
12. Construction of Ajmer (PG)-Phagi 765 kV D/c line along with associated bays for Rajasthan SEZ

**ANNEXURE – 3D**

(Item 3.4.3)

**Issues Pertaining to Transmission System Planning taken up in National Committee on Transmission during 2018-19****1<sup>st</sup> Meeting of National Committee on Transmission held on 27<sup>th</sup> July, 2018**

1. Confirmation of the minutes of 37th meeting of Empowered Committee (EC) on Transmission
2. Constitution of the "National Committee on Transmission" (NCT) in accordance with the Guidelines for Encouraging Competition in Development of Transmission Projects
3. Notification / approval of transmission schemes approved in 37th meeting of Empowered Committee on Transmission by MoP
4. Review / Modification of transmission schemes (recommended by Empowered Committee)
5. Status of transmission schemes under bidding process - briefing by BPCs
6. New Inter-State Transmission Schemes

**2<sup>nd</sup> Meeting of National Committee on Transmission held on 4<sup>th</sup> December, 2018**

1. Confirmation of the minutes of the 1<sup>st</sup> meeting of National Committee on Transmission
2. Notification / approval of transmission schemes approved in 1st meeting of National Committee on Transmission by MoP
3. Review Status of transmission schemes under bidding process - briefing by BPCs
4. Inter-State Transmission Schemes for RE projects
5. New ISTS Transmission Schemes in Western Region
6. New ISTS Transmission Schemes in Northern Region
7. New ISTS Transmission Schemes in Southern Region
8. New ISTS Transmission Schemes in Northern Eastern Region

**3<sup>rd</sup> Meeting of National Committee on Transmission held on 1<sup>st</sup> March, 2019**

1. Confirmation of the minutes of 2nd meeting of National Committee on Transmission (NCT)
2. Implementation of associated transmission schemes for the projects identified as potential RE projects and issues related to LTA
3. Cost estimates for the transmission projects to be implemented through tariff based competitive bidding (TBCB)
4. Indian portion of Arun-III(Nepal)-Muzzaffarpur 400kV D/c line
5. Constitution of the Bid Evaluation Committees (BEC's) for the new transmission schemes

**ANNEXURE-3E**

(Item No. 3.4.4)

**The Cost Committee Constituted for this purpose has met  
on 14.03.2019 and Estimated the cost of the Following  
Transmission Schemes:**

Sl. No.	Independent Transmission Projects	Estimated Cost of the Project as per Cost Committee (including RoW compensation)  (in Rs. Crore)
1.	Western Region Strengthening Scheme –XIX (WRSS-XIX) and North Eastern Region Strengthening Scheme – IX (NERSS-IX) – PFCCL (BPC)	1223.24



**ANNEXURE – 3F**  
(Item 3.11.1)

**Progress under Green Energy Corridor during 2018-19**

**A. Status of Inter State Schemes under Green Energy Corridor - I (upto March 2019)**

	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)		Completed and ready for Commissioning.
3	GEC- Part C ( KfW Tranche-III)	2247 (16 Packages)		Part scheme Commissioned  Balance scheme completed and ready for Commissioning.
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	Commissioning progressively from April' 2019
	<b>Aggregate</b>	<b>15455 (revised)</b>		

**B. Status of Intra state Schemes under Green Energy Corridor-I (upto March 2019)**

	Name of the State	Estimated Cost (Rs. Crore)	Current Estimated Cost (Rs. Crore)	NIT Status	Award Status	Target comm. Schedule
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	September 2019
2	Rajasthan (for tranche –I) (Package 5-11 revised)	1018.30	793.96 <sup>+</sup>	NIT published for 9 packages (Rs 706.27 Cr.)	Done for 9 packages. DPR Cost: Rs. 706.27 Cr Award Cost: Rs. 590.25 Cr.	March 2020
3	Andhra Pradesh	1289	1147.58 <sup>#</sup>	NIT for 8 packages published out of 8 packages (Rs 1147.58 Cr)	Done for 6 packages. DPR Cost: Rs. 1018.57 Cr. Award Cost: Rs. 708.11 Cr.	December 2019
4	Himachal Pradesh	910.52	909.86	Done for all 17 packages (Rs 909.86)	Done for 6 packages. (HPPTCL) and sub-packages of 3 packages by HPSEBL. DPR Cost: Rs. 434.89 Cr. Award Cost: Rs. 330.8 Cr.	April 2020
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.	June 2020
6	Karnataka	906	906	NIT for 6 packages	Done for 6 packages	March 2020

	Name of the State	Estimated Cost (Rs. Crore)	Current Estimated Cost (Rs. Crore)	NIT Status	Award Status	Target comm. Schedule
				done out of 7 packages (Rs. 611.43 Cr.)	DPR Cost: Rs. 611.43 Cr. Award Cost: Rs 724.71 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.	February 2020
8	Maharashtra	361.61	264	NIT for 17 Packages done (Rs, 240.13 Cr.)	Done for 17 packages DPR Cost : Rs. 240.13Cr. Award Cost: 148.83	May 2019
	Total	<b>10140.55</b>	<b>9698.01</b>	<b>9211.39</b>	<b>DPR*: 8607.41</b> <b>Awarded* : 7423.5</b>	

# One of the package (09<sup>th</sup> no.) has been dropped.

+ DPR cost of 11 packages was Rs 1018.30 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.

^ 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. 7423.5Cr. The corresponding DPR cost was Rs 8607.41 Cr.

**ANNEXURE-3G**  
**Item no. 3.15 (a)**

**Details of failure of EHV transmission lines(220 kV and above) reported to CEA by various utilities (PGCIL, DTL, Sterlite Power, Adani(ATL), L&T and DMTCL):**

Sl. No.	Name of Transmission line	Date of occurrence of failure	Name of utility
1.	400 kV D/C Dadri -Panipat transmission line	26.02.2017	PGCIL
2	400 kV D/C Silchar-Purba Kanchan Bari transmission line	2.04.2017	PGCIL
3.	765 kV D/C Wardha – Nizamabad transmission line	6.04.2017	PGCIL
4	400 kV D/C Koderma- Bokaro transmission line	13.5.2017	PGCIL
5.	400 kV D/C Farakka -Kahalgaoon I & II transmission line	15.5.2017	PGCIL
6.	765 kV S/C Gaya- Varanasi - I transmission line	17.05.2017	PGCIL
7.	765 kV S/C Bina - Gwalior transmission line	5.06.2017	PGCIL
8.	765 kV S/C Bina- Indore transmission line	14.06.2017	PGCIL
9.	765 kV S/C Agra- Jaitikara transmission line	14.06.2017	PGCIL
10.	400 kV S/C Singrauli- Lucknow transmission line	16.06.2017	PGCIL
11.	765 kV S/C Bhiwani- Jhatikra transmission line	19.06.2017	PGCIL
12.	400 kV D/C Tikrikalan- Bawana transmission line	14.05.2017	DTL
13.	765 kV S/C Jabalpur- Bina transmission line	5.06.2017	Sterlite Power
14.	+ - 500 HVDC Mundra - Mohindergarh transmission line	24.07.2017	ATL
15	(i) 400kV D/C Barh -Motihari Transmission Line (ii) 400kV D/C Motihari-Gorakhpur Transmission line	14.08.2017	DMTCL
16	765KV D/C Narendra (New) – Madhugiri (Tumkur) Transmission Line (Hexa Zebra)	24.05.2018	L & T

**ANNEXURE-3H**

Item no. 3.15(b)

**Details of failure of EHV substations (220 kV and above) reported to CEA by various utilities (PGCIL, DTL, PPCL, KPTCL, MPPTCL, OPTCL):****S.No. FAILURE REPORT**

1. Failure of 315 MVA, 400 kV ICT-II at Raigarh Substation of PGCIL
2. Failure of 315 MVA, 400 kV ICT-I at Jalandhar Station of PGCIL
3. Failure of 100 MVA, 220/66-33/11 kV Power Transformer at 220 kV Naraina s/s of DTL
4. Failure of 220/132kV, 100MVA Auto Transformer-3 of Bhadrak Substation of OPTCL
5. Failure of 50 MVA 220/110/11 kV Auto-transformer at Sirsi s/s of KPTCL
6. Failure of 100 MVA, 220/33/11 kV Power Transformer at 220kV Lodhi Road Substation of Delhi Transco Ltd.
7. Failure of 100 MVA, 220/33 kV, Power Transformer at Okhla Substation of DTL
8. Failure of 100 MVA Power Transformer at Bidnal Substation of KPTCL
9. Failure of 80 MVAR, 400 kV Reactor at Vizag Substation of PGCIL
10. Failure of 16.67 MVAR, 400kV Bhiwadi-I R-ph Line Reactor at Agra S/s of PGCIL
11. 80 MVAR, 765 kV Bina-II R-ph Line Reactor at Satna substation of PGCIL
12. Failure of 100 MVA 220/33/11 kV transformer at Preet Vihar of DTL
13. Failure of 160 MVA 220/66/11 kV Transformer at Pappankala-III of DTL
14. Failure of 167 MVA, 400 kV Transformer at Kolar s/s of PGCIL
15. Failure of 80 MVAR, 420 kV Line Reactor at Kishenganj s/s of PGCIL
16. Failure of 80 MVAR, 765 kV B-Phase Line Reactor at Varanasi s/s of PGCIL
17. Failure of 500 MVA, 420 kV ICT at Bidadi s/s of PGCIL
18. Failure of 220/132 kV, 200 MVA ICT-I 220 kV at Kalmeshwar S/s of PGCIL
19. Failure of 220/66 kV, 50 MVA Transformer -2 at Wardha S/s of PGCIL
20. Failure of 292.4 MVA 16.5/420 kV GT of steam turbine-2 at PPS-III, Bawana S/s of PPCL
21. Failure of 315 MVA 400/220/33 kV transformer at 400 kV Bina s/s of MPPTCL
22. Failure of 315 MVA, 400/220/33 kV, 3-Ph ICT at 400 kV S/s Bina s/s of MPPTCL
23. Failure of 160 MVA 220/132/33 kV Auto transformer-2 at New Bolangir s/s of OPTCL



**ANNEXURE-3I**

(Item 3.28)

**Transmission Lines Completed During FY - 2018-19****As on 31-Mar-2019**

Voltage Level (kV)	Name of Transmission Lines	Circuit Type	Executing Agency	Line Length (cKM)	Month of Completion
1.	2.	3.	4.	5.	6.
<b>765 kV</b>					
<b>CENTRAL SECTOR</b>					
1	Parli - Solapur (PPTL - TBCB)	D/C	PGCIL	236	APR-18
2	Gadarwara - Warora PS (PWTl-TBCB)	D/C	PGCIL	627	JUN-18
3	Warora PS - Parli (PPTL-TBCB)	D/C	PGCIL	694	JUN-18
4	Jharsuguda - Dharamjaygarh line	D/C	PGCIL	296	OCT-18
5	LILO of Kurnool - Thirvualam line at Cuddapah	D/C	PGCIL	190	OCT-18
6	Salem PS - Madhugiri PS line	S/C	PGCIL	243	OCT-18
7	Angul - Jharsauguda	D/C	PGCIL	590	NOV-18
8	Vindhyachal PS - Jabalpur PS (PJTL - TBCB)	D/C	PGCIL	749	DEC-18
9	Salem - Madhugiri (PNMTL-TBCB)	S/C	PGCIL	219	JAN-19
10	Banaskanta - Chittorgarh line	D/C	PGCIL	604	FEB-19
11	Bhuj Pool - Banaskanta line	D/C	PGCIL	578	FEB-19
<b>Total of CENTRAL SECTOR</b>				<b>5026</b>	
<b>PRIVATE SECTOR</b>					
12	Sasan UMPP - Vindhyachal PS (Q) (C-WRTL- TBCB)	S/C	APL	6	APR-18
13	Champa (Pool) - Dharamiaygarh (Quad) (C-WRTL - TBCB)	S/C	APL	51	JUL-18
14	Raigarh (Kotra) - Champa (Pool) (Quad) (C-WRTL-TBCB)	S/C	APL	97	AUG-18
15	Sipat STPS - Bilaspur (Quad) (STL-TBCB)	S/C	APL	24	AUG-18
16	Jharsuguda (Sundargarh) - Raipur (OGP-IITL - TBCB)	D/C	SGL	610	DEC-18

17	Bilaspur - Rajnandgaon (hexa) (STL-TBCB)	D/C	APL	324	MAR-19
18	Raipur Pool - Rajnandgaon (hexa) (RRWTL-TBCB)	D/C	APL	80	MAR-19
19	Rajnandgaon - New Pooling Station Warora (RRWTL - TBCB)	D/C	APL	532	MAR-19
<b>Total of PRIVATE SECTOR</b>				<b>1724</b>	
<b>Total of 765 kV</b>				<b>6750</b>	
<b>400 kV</b>					
<b>CENTRAL SECTOR</b>					
20	Parli (New) - Parli (PG) (Q) (PPTL -TBCB)	D/C	PGCIL	36	APR-18
21	LILO of Wardha - Parli at Warora PS (PWTl-TBCB)	D/C	PGCIL	196	MAY-18
22	LILO of Exiting Neyveli TS-II - Pondy cherry at NNTPS Gen. Yard	D/C	PGCIL	7	JUN-18
23	LILO of Farakka - Jeerat line at Sagahdighi	D/C	PGCIL	38	JUL-18
24	Farakka - Baharampur (Twin HTLS)	D/C	PGCIL	164	AUG-18
25	LILO-In of Cuddapah - Hindupur at N.P. Kunta	D/C	PGCIL	18	AUG-18
26	Srikakulam - Garividi (QM) (PSITL - TBCB)	D/C	PGCIL	288	AUG-18
27	Tumkur (Pavagada) Pool - Hiriyyur	D/C	PGCIL	218	SEP-18
28	Cuddapah - Hindupur line (Q)	D/C	PGCIL	338	OCT-18
29	LILO of Both Ckt of Bamnauli - Samaypur at Tughlakabad	M/C	PGCIL	114	OCT-18
30	LILO-Out of Cuddapah - Hindupur line (Q) (Both Ckts.) at NP Kunta s/s	D/C	PGCIL	19	OCT-18
31	Silchar - Melriat (New)	D/C	PGCIL	287	NOV-18
32	Biharshariff (Ckt. III and IV) - Kahalgaon (NTPC)	D/C	PGCIL	26	JAN-19
33	Banaskanta - Sankhari line	D/C	PGCIL	43	FEB-19
34	Cuddapah - Madhugiri (QM) (PSITL - TBCB)	D/C	PGCIL	486	FEB-19
35	LILO of Farakka - Jeerat line at Baharampur	S/C	PGCIL	3	FEB-19
36	LILO of Subhashgram - Jeerat at Rajarhat	S/C	PGCIL	8	FEB-19
37	Dharmapuri (Salem New) - Somanahalli	D/C	PGCIL	243	MAR-19
38	Kota - Jaipur (South)	D/C	PGCIL	360	MAR-19

39	Mundra UMPP - Bhuj Pool line	D/C	PGCIL	196	MAR-19
<b>Total of CENTRAL SECTOR</b>				<b>3088</b>	
<b>STATE SECTOR</b>					
40	Kalpaka - Maradam line	D/C	APTRANSCO	230	APR-18
41	LILO of 2nd Ckt. VTS-Malkaram to Suryapet	D/C	TSTRANSCO	4	APR-18
42	LILO of one ckt. of Kishanpur - New wanpoh at Baglihar HEP	D/C	JKPDD	8	MAY-18
43	Phagi (Jaipur South) - Ajmer Ckt-II	D/C	RVPNL	106	MAY-18
44	Banda - Orai	D/C	UPPTCL	217	MAY-18
45	LILO of one ckt. Kosamba - Choraina at Sanand-II GIDC	D/C	GETCO	89	JUN-18
46	LILO of 400kV Gajwel - Yeddumallaram (Shankarpally) Ckt.-II at Narsapur S/S	D/C	TSTRANSCO	5	JUN-18
47	Gani/ Panyam - Kurnool (GEC-II)	D/C	APTRANSCO	33	JUL-18
48	Anta-Chhabra TPS	S/C	RVPNL	100	JUL-18
49	Chittorgarh-Bhilwara	D/C	RVPNL	100	JUL-18
50	LILO of Jaipur - Nirmal at Sundilla LI (Ckt.-I)	D/C	TSTRANSCO	28	JUL-18
51	Akal -Jodhpur (New)	D/C	RVPNL	447	AUG-18
52	Anta -Kota (PG) (Extension)	D/C	RVPNL	45	AUG-18
53	LILO of Chabra TPS - Dahra at Anta (Ckt. -II)	D/C	RVPNL	1	AUG-18
54	LILO of Jaipur - Nirmal at Sundilla LI (Ckt.-II)	D/C	TANTRANSCO	28	AUG-18
55	IB - Lapanga	D/C	OPTCL	42	SEP-18
56	Manali - Korattur	D/C	TANTRANSCO	6	SEP-18
57	STPP (Jaipur) - Sundilla LI S/S	D/C	TSTRANSCO	28	SEP-18
58	TMDC Podili - Sattapenalli line	D/C	APTRANSCO	215	OCT-18
59	LILO of Sterlite - Meramundali at Lapanga 400 kV s/s	D/C	OPTCL	14	OCT-18
60	Sterlite - Lapanga line	D/C	OPTCL	37	OCT-18
61	LILO of Uravakonda-Jammalamadugu to the proposed at Talaricheruvu	D/C	APTRANSCO	2	NOV-18
62	LILO of Jodhpur -Merta at Pooling station Badla	D/C	RVPNL	405	NOV-18
63	Hindupur - Uravakonda Quad Moose line	D/C	APTRANSCO	258	JAN-19
64	Jaisalmer -2 -Barmer line	D/C	RVPNL	234	JAN-19

65	Teesta -III - Kishanganj line (Executing Agency -TVPTL)	D/C	SIKKIM	427	JAN-19
66	LILO of one ckt of 400 kV D/C Kosamba - Choriana line at 400 kV Pachchham S/s	D/C	GETCO	46	FEB-19
67	LILO of one ckt. Ukai - Kosamba at Vav S/s	D/C	GETCO	62	FEB-19
68	LILO of both Ckts of Nagda - Rajgarh at Badnawar	D/C	MPPTCL	16	FEB-19
69	Pithampur - Badnawar DCDS (Quad Moose ) line	D/C	MPPTCL	71	FEB-19
70	Shri Singaji TPS - Pithampur DCDS (QM) line	D/C	MPPTCL	281	FEB-19
71	LILO of both Ckt. of Suryapet - Shankarpally(ckt-II) Kethireddypalli (Manikonda) SS	D/C	TSTRANSCO	42	FEB-19
72	LILO of Rewa (Allahabad) - Meja lie at Masauli	D/C	UPPTCL	65	FEB-19
73	LILO of both Ckts. of Mundra-Zerda at Charanka S/S (ACSR Twin Moose Conductor )	D/C	GETCO	26	MAR-19
74	LILO of Bhilai - Seoni at Balaghat / Kirnapur	D/C	MPPTCL	7	MAR-19
75	Gr. Noida (765) - Noida Sec-148 line	D/C	UPPTCL	94	MAR-19
76	LILO of Azamgarh - Sultanpur at Tanda TPS Extn.	D/C	UPPTCL	133	MAR-19
<b>Total of STATE SECTOR</b>				<b>3952</b>	
<b><u>PRIVATE SECTOR</u></b>					
77	Gwalior-Morena (Quad) (C-WRTL-TBCB)	D/C	APL	96	MAY-18
78	Suratgarh TPS- Bikaner	D/C	APL	279	JUL-18
79	Samba - Amargarh line (NRSS-XXIX TL - TBCB)	D/C	SGL	547	AUG-18
80	Mahan -Sipat	D/C	EPTCL	673	SEP-18
81	Neemrana (PG) - Dhanonda (HVPNL) (GPTL - TBCB)	D/C	SGL	93	DEC-18
82	Kishanganj(PG) - Darbhanga (DMTCL) (ATL - TBCB)	D/C	KPTL	418	MAR-19
<b>Total of PRIVATE SECTOR</b>				<b>2106</b>	
<b>Total of 400 kV</b>				<b>9146</b>	
<b>230 kV</b>					

<b>STATE SECTOR</b>					
83	Arasur - Gobi	S/C	TANTRANSCO	48	MAY-18
84	Karaikudy - Sembatty	S/C	TANTRANSCO	136	MAY-18
85	Koyambedu 230kV AIS - Guindy 230 kV GIS	S/C	TANTRANSCO	8	MAY-18
86	Neyveli 230/110 kV s/s - Eachangadu 230kV Feeder	S/C	TANTRANSCO	1	OCT-18
87	NNTPS - Neyveli 230/110kV s/s	D/C	TANTRANSCO	2	OCT-18
88	LILO of Myvady - Pugalur at Kurukathi	D/C	TANTRANSCO	62	JAN-19
89	Kamudhi - Kavanoor Ckt-II	D/C	TANTRANSCO	56	FEB-19
<b>Total of STATE SECTOR</b>				<b>313</b>	
<b>Total of 230 kV</b>				<b>313</b>	
<b>220 kV</b>					
<b>CENTRAL SECTOR</b>					
90	(JandK) Drass - Kargil (Part of Alusteng-Drass-Kargil-Khalsti-Leh)	S/C	PGCONSULTANCY	60	SEP-18
91	(JnK) Alusteng-Drass (Part of Alusteng - Drass -Kargil - Khalsti-Leh)	S/C	PGCONSULTANCY	115	JAN-19
92	LILO of Agra - Bharatpur at Agra line	S/C	PGCIL	111	FEB-19
93	NLC - Karaikal line	D/C	PGCIL	190	FEB-19
<b>Total of CENTRAL SECTOR</b>				<b>476</b>	
<b>STATE SECTOR</b>					
94	LILO of 2nd Ckt. Birsinghpur - Amarkantak line at Shahdol S/s	D/C	MPPTCL	11	APR-18
95	LILO of 2nd Ckt. of Itarsi (MP) - Hoshangabad (PG) at Itarsi (PG) line	D/C	MPPTCL	1	APR-18
96	Ataur - Mandola Vihar line	D/C	UPPTCL	33	APR-18
97	Sarangapur (Allahabad)PG - Phulpur line	S/C	UPPTCL	68	APR-18
98	Sohawal PG - Barabanki line	D/C	UPPTCL	138	APR-18
99	Raipur - Doma	D/C	CSPTCL	118	MAY-18
100	Yelanhanka CCPP - Yelanhanka(KPTCL)	D/C	KPTCL	1	MAY-18
101	Balapur - Malegaon line (Ckt-II)	D/C	MSETCL	36	MAY-18
102	Nanded (Kumbhargaoon) - Jalkot line	D/C	MSETCL	107	MAY-18



103	Nanded (Kumbhargaoon) - Nanded (Waghala) Ckt.-II	D/C	MSETCL	5	MAY-18
104	Fatehpur PG - Sarh	D/C	UPPTCL	150	MAY-18
105	LILO of Amawan PG - Sarojni Nagar at Bachrawan	D/C	UPPTCL	49	MAY-18
106	LILO of Bhauti - Orai at Sikandara	D/C	UPPTCL	62	MAY-18
107	Barauni TPS Exte. - Hazipur	D/C	BSPTCL	214	JUN-18
108	Darbhangha (Essel) - Darbhanga (BSPTCL)	D/C	BSPTCL	5	JUN-18
109	Madhepura - Laukahi(BSPTCL)	D/C	BSPTCL	124	JUN-18
110	LILO of Kasor - Vartej and Karamsad - Vartej at Pachchaam	M/C	GETCO	40	JUN-18
111	LILO of Both ckt Badod -Kota - Modak at Suwasara S/s	D/C	MPPTCL	18	JUN-18
112	Khaperkheda-II - Khaperkheda-I (Reorientation work of one ckt.)	D/C	MSETCL	1	JUN-18
113	Legship - New Malli	D/C	SIKKIM	20	JUN-18
114	Budidampadu (PG) - Budidampadu	S/C	TSTRANSCO	1	JUN-18
115	LILO of Khara (HPS) - Shamli at Saharanpur (PG)	D/C	UPPTCL	8	JUN-18
116	LILO of Sahibabad - Noida Sec-62 at Indirapuram	D/C	UPPTCL	7	JUN-18
117	LILO of Simbhaoli - Shatabdinagar at Hapur (765)	D/C	UPPTCL	23	JUN-18
118	Saharanpur (PG) - Sarsawa	D/C	UPPTCL	22	JUN-18
119	Mungeli - Kawardha	D/C	CSPTCL	77	JUL-18
120	LILO of Amreli - Dhasa line at Botad	D/C	GETCO	100	JUL-18
121	LILO of Narendra-Haveri at Bidnal (GEC-I)	D/C	KPTCL	31	JUL-18
122	LILO of Bhugaon - Warora-I at Warora	M/C	MSETCL	40	JUL-18
123	Guindy - Porur GIS (Cable)	S/C	TANTRANSCO	8	JUL-18
124	Kayathar - Tuticorin	D/C	TANTRANSCO	113	JUL-18
125	LILO of Shoolagiri - Karimanagalam at Uddanapalli	D/C	TANTRANSCO	1	JUL-18
126	Veeranam-Tirunelveli (PG)(GEC-I)	S/C on D/C	TANTRANSCO	31	JUL-18
127	Hapur (765) - Simbhaoli	D/C	UPPTCL	57	JUL-18

128	LILO of Harduaganj - Jahangirabad Ckt.-I at Rukhi	D/C	UPPTCL	69	JUL-18
129	LILO of Loni - Muradnagar line at Ator	D/C	UPPTCL	12	JUL-18
130	Begusarai-Purnea line	D/C	BSPTCL	372	AUG-18
131	Kishanganj (New) - Madhepura	D/C	BSPTCL	284	AUG-18
132	Korba - Vishrampur (2nd Ckt.)	D/C	CSPTCL	155	AUG-18
133	Stringing of 2nd Circuit of LILO of Korba - Vishrampur at Churri	D/C	CSPTCL	17	AUG-18
134	Gavasad - Bhayali (DFCC) line	D/C	GETCO	47	AUG-18
135	Radhanpur - Sankhari line	D/C	GETCO	96	AUG-18
136	Hatkoti - Gumma	D/C	HPPTCL	52	AUG-18
137	Deepalpur - Rai Khewra at RGEK Kundli S/s	M/C	HVPNL	22	AUG-18
138	LILO of 2nd ckt. YTPP - Abdullahpur line at Rampur Kamboyan	D/C	HVPNL	100	AUG-18
139	LILO of Bhanjanagar - Meramundali at Narasinghpur	D/C	OPTCL	10	AUG-18
140	LILO of Rishikesh-Dehradun at Harrawala	D/C	PTCUL	1	AUG-18
141	Jodhpur (New) - Barli (TK)	D/C	RVPNL	90	AUG-18
142	Gorakhpur - Hata	D/C	UPPTCL	53	AUG-18
143	Mohangadda - Sarsawa	D/C	UPPTCL	22	AUG-18
144	Alipurduar - Alipurduar (PG)	D/C	WBSETCL	13	AUG-18
145	LILO of Shivalakha - Nanikhakhar at Kukma	D/C	GETCO	33	SEP-18
146	Construction of 220/220kV MC line for shifting of existing 220kV B1 B2 and B3 B4 lines at proposed HAL premises near Bidarehalldakaval village limits	M/C	KPTCL	12	SEP-18
147	Singanayakanahalli - DG Plant Yelanhanka Station (UG Cable)	D/C	KPTCL	12	SEP-18
148	Karukadom - Kothamangalam	M/C	KSEB	14	SEP-18
149	Morena - Sabalgarh with LILO of one ckt. of line at Morena	D/C	MPPTCL	139	SEP-18
150	Jayanagar (OPTCL) - Jayanagar (PGCIL)	D/C	OPTCL	17	SEP-18
151	Keunjhar - Keunjhar PG	D/C	OPTCL	15	SEP-18
152	Goindwal Sahib - Bottianwala	D/C	PSTCL	129	SEP-18

153	Moga - Mehal Kalan	D/C	PSTCL	105	SEP-18
154	Rajpura - Devigarh	D/C	PSTCL	74	SEP-18
155	LILO of SIDCUL Puhana at Pirankaliya (Imlikhera)	D/C	PTCUL	11	SEP-18
156	LILO of Existing 220 kV Ajmer - KSG at at 400 kV GSS Ajmer	D/C	RVPNL	11	SEP-18
157	LILO of one ckt. of STPS - Ratangarh at Halasar	D/C	RVPNL	7	SEP-18
158	Sikandarabad - Rookhi (Siyana)	D/C	UPPTCL	116	SEP-18
159	Domjur - N. Chanditala	D/C	WBSETCL	17	SEP-18
160	Teesta LDP -III - Teesta LDP-IV	S/C	WBSETCL	21	SEP-18
161	LILO of one Ckt. of Hadala - Sartanpar line at Wankaner on M/C towers	D/C	GETCO	6	OCT-18
162	Khandwa - Chhanera line	D/C	MPPTCL	78	OCT-18
163	LILO of one Ckt. of Vita - Miraj at Alkud s/s	D/C	MSETCL	27	OCT-18
164	Mendhigiri - Alkud s/s	D/C	MSETCL	110	OCT-18
165	Ajmer (400 kV) - Bherunda (TK)	D/C	RVPNL	100	OCT-18
166	Aligarh - Atrauli line	D/C	UPPTCL	77	OCT-18
167	Madhugiri - Pavagada	D/C	KPTCL	120	NOV-18
168	Dhod-Danta Ramgarh	S/C	RVPNL	31	NOV-18
169	Kheralu - Dharewada (DFCC) line	D/C	GETCO	53	DEC-18
170	LILO of one circuit of 220 kV D/C Kadana - Godhara line at 220 kV Zalod S/S	D/C	GETCO	124	DEC-18
171	LILO of one ckt. Daultabad-IMT Manesar line at Gurgaon Sec.- 85	D/C	HVPNL	2	DEC-18
172	Julwaniya - Sendhwa (GEC-I)	D/C	MPPTCL	71	DEC-18
173	LILO of both Ckt. of Indore-II (Jaitpura)- Ujjain line at Indore (PGCIL)765kV S/S	D/C	MPPTCL	24	DEC-18
174	LILO of 220 kV Maath (400) - Meetau (Hathras ) line at Maath (220)	D/C	UPPTCL	3	DEC-18
175	LILO of Gokarna-Sagardighi line at Sagardighi 220kV GIS (ACSR Zebra)	D/C	WBSETCL	11	DEC-18
176	LILO of one ckt. Indravati - Theruvali at Kashipur	D/C	OPTCL	6	JAN-19

177	Gaurichak - Bihta (New) line	D/C	BSPTCL	82	FEB-19
178	LILO of Badarpur TPS - Mehrauli at Tughlakabad	D/C	DTL	3	FEB-19
179	Okhla - Tughlakabad	D/C	DTL	3	FEB-19
180	LILO of both ckts. Sec.-72 - Roj-ka-Meo line on M/C and D/C towers at Gurugram Sec.-69 S/S	D/C	HVPNL	3	FEB-19
181	Inter-connector between Sailana - Ratlam switching (GEC-I)	D/C	MPPTCL	67	FEB-19
182	LILO of one Ckt. Jabalpur - Amarkantak at Gorabazar JBP	D/C	MPPTCL	12	FEB-19
183	Chandrapur-II - Chandrapur MIDC (Tadali)	M/C	MSETCL	80	FEB-19
184	LILO of Parli - Osmanabad line at Parli (PG)	D/C	MSETCL	5	FEB-19
185	Sirohi-Pindwara line	S/C	RVPNL	23	FEB-19
186	Bahraich - Gonda (400) Ckt-II	D/C	UPPTCL	74	FEB-19
187	Rewa Road Allahabad - Pahari Chitrakoot line	D/C	UPPTCL	182	FEB-19
188	Tanda (NTPC) - Tanda (New) line	D/C	UPPTCL	42	FEB-19
189	LILO of Both ckt of Tebhda - Nyara line at Moti Gop S/S (M/C line AL-59)	D/C	GETCO	57	MAR-19
190	LILO of one ckt. Gandhinagar TPS - Chhatral line at Vadavi (AL-59)	D/C	GETCO	25	MAR-19
191	LILO of Single ckt. of Mobha - Mangrol at Amod	D/C	GETCO	16	MAR-19
192	Mokha-Chromeni line	S/C	GETCO	6	MAR-19
193	LILO of Dautabad -Mau line at Hub Gurgaon S/s	D/C	HVPNL	13	MAR-19
194	LILO of Pehowa - Kaul at Bhadson	D/C	HVPNL	74	MAR-19
195	Gowribidnur - Mittermari Line	D/C	KPTCL	93	MAR-19
196	Badnawar - Kanwan line (GEC-I)	D/C	MPPTCL	62	MAR-19
197	LILO of 2nd ckt. Nagda - Neemuch line at Daloda s/s	D/C	MPPTCL	20	MAR-19
198	LILO on Ambazari - Amravati at Karanja s/s	D/C	MSETCL	1	MAR-19
199	LILO on Khadka-Amalner at Kekatnimbhora	D/C	MSETCL	1	MAR-19

200	Nerul-Seawood TSS (U/G Cable Ckt -I)	S/C	MSETCL	1	MAR-19
201	Hata - Deoria line	D/C	UPPTCL	79	MAR-19
202	LILO of one Ckt. Muradnagar - Sahibabad line at Pratap Vihar	D/C	UPPTCL	7	MAR-19
<b>Total of STATE SECTOR</b>				<b>5742</b>	
<b><u>PRIVATE SECTOR</u></b>					
203	LILO of 220 kV S/C KTPS - Modak line	D/C	APL	5	FEB-19
204	LILO of Kota - Badod line at Ranpur GSS	D/C	APL	5	FEB-19
<b>Total of PRIVATE SECTOR</b>				<b>10</b>	
<b>Total of 220 kV</b>				<b>6228</b>	
<b>Grand Total</b>				<b>22437</b>	

**ANNEXURE-3J**

(Item no. 3.28)

**Sub-Stations Completed During FY – 2018-19****As on 31-Mar-2019**

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
<b>765 kV</b>					
<b>CENTRAL SECTOR</b>					
1	Parli (New) S/s (PPTL -TBCB)	765/400	PGCIL	3000	APR-18
2	Orai (ICT-II)	765/400	PGCIL	1000	APR-18
3	Srikakulam S/S	765/400	PGCIL	3000	AUG-18
4	Banaskanta S/S	765/400	PGCIL	3000	FEB-19
5	Extn. at Gaya S/S (1x1500 MVA)	765/400	PGCIL	1500	JAN-19
6	Warora PS (PWTL-TBCB)	765/400	PGCIL	3000	JUN-18
7	Bhuj Pooling Station	765/400	PGCIL	3000	MAR-19
8	Cuddapah S/s	765/400	PGCIL	3000	OCT-18
	<b>TOTAL CENTRAL SECTOR</b>			<b>20500</b>	
	<b>TOTAL 765 kV</b>			<b>20500</b>	
<b>400 kV</b>					
<b>CENTRAL SECTOR</b>					
9	Narendra (ICT-II Repl.) (500-315)	400/220	PGCIL	185	APR-18
10	Imphal S/S (upgradation from 132/33kV to 400/132kV) (ICT-I)	400/132	PGCIL	315	DEC-18
11	Rajarhat (GIS) S/S (2x500 MVA)1st Unit	400/220	PGCIL	500	FEB-19
12	Cuddapah (Extn.)	400/220	PGCIL	500	FEB-19
13	Patna (Replacement of ICT-II) (500-315)	400/220	PGCIL	185	FEB-19
14	Rewa (ICT-III)	400/220	PGCIL	500	FEB-19
15	Extn. at Gaya s/s	400/220	PGCIL	500	JAN-19
16	Up-grading of 132/33 kV Imphal S/S to 400/132 kV (Installation of 7x105 MVA ICT)	400/132	PGCIL	315	JAN-19
17	Parli Switching Station (Extn.)	400/220	PGCIL	1000	JUL-18
18	Silcher ICT-III	400/132	PGCIL	315	JUL-18
19	Tumkur (Pavagada) PS ICT-III	400/220	PGCIL	500	JUL-18
20	Degham (Extn)	400/220	PGCIL	500	JUN-18
21	Tirunelveli Pooling station	400/220	PGCIL	1000	JUN-18
22	Pondicherry (Extn)	400/230	PGCIL	500	JUN-18



Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
23	Khammam (Extn)	400/220	PGCIL	500	JUN-18
24	Warangal (Extn)	400/220	PGCIL	500	JUN-18
25	Gooty (Extn)	400/220	PGCIL	500	JUN-18
26	Dismantling/Removal of 4x105 MVA ICT at 400/220KV Misa s/s and addition of 2x500MVA ICT. (ICT-I com	400/220	PGCIL	500	MAR-19
27	Lucknow (ICT)	400/220	PGCIL	500	MAR-19
28	Hamirpur (ICT)	400/220	PGCIL	315	MAR-19
29	Khandwa (Extn.)	400/220	PGCIL	500	MAY-18
30	Boisar (Extn.)	400/220	PGCIL	500	MAY-18
31	Tughlakabad GIS (4th-ICT)	400/220	PGCIL	500	NOV-18
32	Kala s/s Extn. (3rd ICT)	400/220	PGCIL	500	NOV-18
33	Daltonganj s/s (2nd -ICT)	400/220	PGCIL	315	NOV-18
34	Tughlakabad S/S (GIS)	400/220	PGCIL	1500	OCT-18
35	Extn. at Cuddapah s/s	400/220	PGCIL	500	SEP-18
36	Extn. at NP Kunta S/s	400/220	PGCIL	500	SEP-18
37	Extn. at Indore S/s	400/220	PGCIL	1000	SEP-18
	<b>TOTAL CENTRAL SECTOR</b>			<b>15445</b>	
<b>STATE SECTOR</b>					
38	Banda (New) ICT-II	400/220	UPPTCL	315	APR-18
39	Moradabad (Aug.) (500-315) ICT-II	400/220	UPPTCL	185	APR-18
40	Obra-BTPS (Aug.) (315-240)	400/220	UPPTCL	75	APR-18
41	Lapanga S/S	400/220	OPTCL	315	AUG-18
42	Nirmal ICT-III	400/220	TSTRANSCO	315	AUG-18
43	Garividi (Marala)	400/220	APTRANSCO	630	AUG-18
44	Jagalur (Hiremallanahole) S/S	400/220	KPTCL	1000	DEC-18
45	Basti (Aug) T/F-II (200-160)	400/132	UPPTCL	40	FEB-19
46	Jagdulpur S/s (ICT-II)	400/220	CSPTCL	315	FEB-19
47	Sanand (ICT-II)	400/220	GETCO	1000	FEB-19
48	Chandrapur (ICT-II)	400/220	MSETCL	1000	FEB-19
49	Jaisalmer -2 S/S	400/220	RVPNL	500	FEB-19
50	Masauli (Prayagraj) (New) T/F-I	400/132	UPPTCL	200	FEB-19
51	Azamgarh (Aug) T/F-II (500-315)	400/220	UPPTCL	185	JAN-19
52	Julurupadu S/S	400/220	TSTRANSCO	630	JUL-18
53	Nirmal S/S	400/220	TSTRANSCO	630	JUL-18
54	Bhopal (Sukhi Sewaniya) (Addl.)	400/220	MPPTCL	315	JUN-18
55	Kalikiri	400/220	APTRANSCO	630	JUN-18
56	Daultabad S/s (Aug.)	400/220	HVPNL	315	MAR-19
57	Badnawar (New) s/s	400/220	MPPTCL	315	MAR-19
58	Chandrapur II S/s (Aug.)	400/220	MSETCL	500	MAR-19
59	Sambhal (Aug) T/F- II (160-100)	400/220	UPPTCL	60	MAR-19
60	Badaun (Aug) T/F- II (200-160)	400/220	UPPTCL	40	MAR-19

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
61	Panki Kanpur (Aug) T/F- II (315-240)	400/220	UPPTCL	75	MAR-19
62	Kalwa s/s (Aug.)	400/220	MSETCL	500	MAR-19
63	Sarojininagar Lucknow (Aug) T/F- I (500-315)	400/220	UPPTCL	185	MAR-19
64	Masauli Prayagraj (New) T/F-II	400/132	UPPTCL	200	MAR-19
65	Kirnapur (Balaghat)	400/132	MPPTCL	200	MAR-19
66	Keshod s/s Aug.	400/220	GETCO	160	MAR-19
67	Sattenapalli ICT-III	400/220	APTRANSCO	315	MAY-18
68	Obra -BTPS (Aug.) ICT-II (315-240)	400/220	UPPTCL	75	MAY-18
69	Kethireddypally	400/220/132	TSTRANSCO	630	NOV-18
70	Malkaram (4th -ICT)	400/220	TSTRANSCO	315	NOV-18
71	Doni (Gadag)S/S	400/220	KPTCL	1000	OCT-18
72	Jodhpur s/s (New)	400/220	RVPNL	315	OCT-18
73	Shankarpally	400/220	TSTRANSCO	500	OCT-18
74	Thappagundu s/s	400/110	TANTRANSCO	600	OCT-18
75	Panki Kanpur (Aug.) T/F-I	400/200	UPPTCL	75	OCT-18
76	Hindupur s/s (1st ICT)	400/220	APTRANSCO	315	OCT-18
77	Podili s/s (1st ICT)	400/220	APTRANSCO	315	OCT-18
	<b>TOTAL STATE SECTOR</b>			<b>15285</b>	
	<b>TOTAL 400 kV</b>			<b>30730</b>	
<b>230 kV</b>					
<b>STATE SECTOR</b>					
78	Gummidipoondi (IIIrd Auto)	230/110	TANTRANSCO	100	FEB-19
79	Porur GIS	230/110	TANTRANSCO	100	JUL-18
80	Pudukkottai (Aug) (160-100)	230/110	TANTRANSCO	60	JUL-18
81	Sembatty (Aug)(160-100) (GEC-I)	230/110	TANTRANSCO	60	JUL-18
82	Thiruchuli (II Auto trfo.)	230/110	TANTRANSCO	100	MAR-19
83	Thiruchuli (III Auto trafo.)	230/110	TANTRANSCO	100	MAR-19
84	Thiruvannamalai (Enhancement from 100 MVA to 160 MVA)	230/110	TANTRANSCO	60	MAR-19
85	Anuppankulam (Addl. T/F)	230/110	TANTRANSCO	60	OCT-18
86	Neyveli S/S	230/110	TANTRANSCO	480	OCT-18
87	Porur (Addl T/F)	230/110	TANTRANSCO	100	OCT-18
88	Kancheepuram	230/110	TANTRANSCO	100	SEP-18
89	Mondipatty (Addl Auto T/F )	230/110	TANTRANSCO	80	SEP-18
	<b>TOTAL STATE SECTOR</b>			<b>1400</b>	
	<b>TOTAL 230 kV</b>			<b>1400</b>	
<b>220 kV</b>					
<b>STATE SECTOR</b>					
90	Kanpur Road (Lucknow New)	220/33	UPPTCL	120	APR-18
91	Barabanki (New)	220/132	UPPTCL	320	APR-18

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
92	Verpal Repl. (100-50)	220/66	PSTCL	50	APR-18
93	Sarsawa New (Saharanpur) ICT-I	220/132	UPPTCL	160	APR-18
94	Sohawal (Aug.) (160-100) ICT-I	220/132	UPPTCL	60	APR-18
95	Harrawala (Dehradun) IIP (2x50)	220/33	PTCUL	100	AUG-18
96	Central (CMRL) (2x100)	220/110	TANTRANSCO	200	AUG-18
97	Thiruvannamalai (Addl.)	220/110	TANTRANSCO	160	AUG-18
98	Siyana ICT-I	220/132	UPPTCL	160	AUG-18
99	Hapur (New)	220/132/33	UPPTCL	320	AUG-18
100	Bhawanimandi S/S	220/132	RVPNL	160	AUG-18
101	Jalna MIDC (Nagewadi) (ICT) s/s	220/132	MSETCL	100	AUG-18
102	R.K.Puram -II (GIS)	220/33	DTL	200	AUG-18
103	Hinganghat	220/33	MSETCL	100	AUG-18
104	Narasinghpur S/S	220/33	OPTCL	40	AUG-18
105	Morti (New) - ICT-II	220/33	UPPTCL	60	AUG-18
106	New Town AA-III	220/33	WBSETCL	50	AUG-18
107	Kawant S/s	220/66	GETCO	160	AUG-18
108	R.K. Puram - I (GIS)	220/66	DTL	320	AUG-18
109	Mallat (Manvi) S/S	220/66	KPTCL	200	AUG-18
110	Jigani (2x150)	220/66	KPTCL	300	AUG-18
111	Kethireddypalli (2 nos of 220/132MVA PTRs)	220/132	TSTRANSCO	200	DEC-18
112	Jhusi Prayagraj (Aug.) (200-160)	220/132	UPPTCL	40	DEC-18
113	Rampur s/s (Aug. (160-100)	220/132	UPPTCL	60	DEC-18
114	Sarh Dehat (Aug.) (160-100)	220/132	UPPTCL	60	DEC-18
115	Shamli S/S (Aug) Additional T/F	220/132	UPPTCL	100	DEC-18
116	Sendhwa (New) s/s	220/132	MPPTCL	160	DEC-18
117	Bargarh S/S (ICT-II)	220/132	OPTCL	160	DEC-18
118	New Sagardighi S/S	220/132	WBSETCL	320	DEC-18
119	New Town AA-III (Aug.)	220/132	WBSETCL	160	DEC-18
120	Tughlakabad S/S	220/66	DTL	320	FEB-19
121	KB Cross Spare (Aug.)	220/110	KPTCL	100	FEB-19
122	Barhi (GIS) S/S	220/132	HVPNL	100	FEB-19
123	B.Bagewadi (Aug.)	220/110	KPTCL	100	FEB-19
124	Kawant S/S 2nd T/F	220/66	GETCO	160	FEB-19
125	Ghazipur (Aug) T/F-II (160-100)	220/132	UPPTCL	60	FEB-19
126	Hardoi Road (Aug) T/F-II (200-160)	220/132	UPPTCL	40	FEB-19
127	Muradnagar Ghaziabad (Aug) T/F-II (200-160)	220/132	UPPTCL	40	FEB-19
128	Domjur 220kV (Aug) (160-100)	220/132	WBSETCL	60	FEB-19
129	Lalru S/S (Replacement of 100 MVA T/F by 160 MVA)	220/66	PSTCL	60	FEB-19
130	Pahari (Chitrakoot) (New) T/F-I	220/132	UPPTCL	100	FEB-19
131	RGEC Sonipat S/S	220/33	HVPNL	100	FEB-19

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
132	Maath Mathura (New) T/F-I	220/132	UPPTCL	160	JAN-19
133	Bastara (Capacity Addition)	220/132	HVPNL	60	JAN-19
134	Kaithal (Capacity Addition)	220/132	HVPNL	60	JAN-19
135	Nissing (Capacity Addition)	220/132	HVPNL	110	JAN-19
136	Rania (Capacity Addition)	220/132	HVPNL	60	JAN-19
137	Extn. at Imlikhera (Pirankaliyar)	220/132	PTCUL	200	JAN-19
138	Banda (Aug) T/F-I (200-160)	220/132	UPPTCL	40	JAN-19
139	Kanpur Dehat (New) 160 MVA (100 MVA T/F already energized in May - 18).	220/132	UPPTCL	60	JAN-19
140	Saharanpur (Aug) T/F-I (200-160)	220/132	UPPTCL	40	JAN-19
141	Sector-6 Sonapat (Capacity Addition)	220/33	HVPNL	100	JAN-19
142	Tappar (Aug)	220/66	GETCO	160	JUL-18
143	Radhanpur (Aug)	220/66	GETCO	160	JUL-18
144	Jamnagar (Aug)(160-100)	220/66	GETCO	60	JUL-18
145	Bhat (Aug) (2x160-100)	220/66	GETCO	220	JUL-18
146	Parbhani (Addl)	220/33	MSETCL	50	JUL-18
147	Mohana (Aug)	220/132	HVPNL	100	JUL-18
148	Jalkot ICT-II	220/132	MSETCL	100	JUL-18
149	Hoshiarpur	220/66	PSTCL	160	JUL-18
150	Borjhara	220/132	CSPTCL	160	JUL-18
151	Kawardha s/s	220/132	CSPTCL	160	JUL-18
152	Bansi (New) ICT-II	220/132	UPPTCL	100	JUL-18
153	Rukhi (New) ICT-I	220/132	UPPTCL	160	JUL-18
154	Limbdi (Aug) (150-50)	220/132	GETCO	100	JUL-18
155	Mandola Vihar (New ICT-I)	220/33	UPPTCL	60	JUN-18
156	Mund	220/132	HVPNL	100	JUN-18
157	Betul (Addl.)	220/132	MPPTCL	160	JUN-18
158	Suwasara S/S	220/132	MPPTCL	160	JUN-18
159	Jalkot	220/132	MSETCL	100	JUN-18
160	Maur	220/66	PSTCL	100	JUN-18
161	Parbhani S/s (Aug.)	220/33	MSETCL	50	MAR-19
162	Oni S/s (Aug.)	220/33	MSETCL	25	MAR-19
163	Ner s/s	220/33	MSETCL	25	MAR-19
164	Kekatnimbhora s/s (Aug.)	220/33	MSETCL	100	MAR-19
165	Karanja s/s	220/33	MSETCL	25	MAR-19
166	Jeur S/s (Aug.)	220/33	MSETCL	50	MAR-19
167	Agiyol S/s Aug.	220/132	GETCO	100	MAR-19
168	Asoj S/s Aug.	220/132	GETCO	50	MAR-19
169	Godhara S/s Aug.	220/132	GETCO	100	MAR-19
170	Cheeka S/s	220/132	HVPNL	60	MAR-19
171	Sirsa S/s	220/132	HVPNL	100	MAR-19
172	Vasai s/s (Aug.)	220/22	MSETCL	50	MAR-19

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
173	Kanwan New (GEC-I)	220/132	MPPTCL	160	MAR-19
174	Bhenda s/s (Aug.)	220/132	MSETCL	100	MAR-19
175	Unnao (Aug) T/F- II (160-100)	220/132	UPPTCL	60	MAR-19
176	Orai (400) Jalaun (Extension) T/F- I	220/132	UPPTCL	160	MAR-19
177	Mirzapur (Aug) T/F- II (160-100)	220/132	UPPTCL	60	MAR-19
178	Hardoi (Aug) T/F- II (160-100)	220/132	UPPTCL	60	MAR-19
179	Bansi Siddharth nagar (Aug) T/F- II (160-100)	220/132	UPPTCL	60	MAR-19
180	Bah Agra (Aug) T/F- II (160-100)	220/132	UPPTCL	60	MAR-19
181	Yavatmal s/s (Aug.)	220/132	MSETCL	50	MAR-19
182	Viroda s/s	220/132	MSETCL	200	MAR-19
183	Uppalwadi S/S	220/132	MSETCL	200	MAR-19
184	SICOM Chandrapur s/s	220/132	MSETCL	100	MAR-19
185	Narangwadi s/s	220/132	MSETCL	100	MAR-19
186	Malkapur s/s	220/132	MSETCL	100	MAR-19
187	Kekatnimbhora s/s	220/132	MSETCL	200	MAR-19
188	Kaulewada S/s (Aug. by Trafo Replacement(200-100))	220/132	MSETCL	100	MAR-19
189	Jeur S/s (Aug. by Trafo Replacement(200-100))	220/132	MSETCL	100	MAR-19
190	Georai s/s	220/132	MSETCL	150	MAR-19
191	Jalna s/s (Aug.)	220/132	MSETCL	100	MAR-19
192	Chinchwad-II s/s (Aug.)	220/132	MSETCL	200	MAR-19
193	Bhachunda s/s	220/66	GETCO	160	MAR-19
194	Deodar S/s Aug.	220/66	GETCO	160	MAR-19
195	Dhasa S/s Aug.	220/66	GETCO	60	MAR-19
196	Jambuva s/s (Aug.)	220/66	GETCO	160	MAR-19
197	Kangsiyali S/s Aug.	220/66	GETCO	60	MAR-19
198	Kosamba S/s Aug.	220/66	GETCO	60	MAR-19
199	Mehsana S/s Aug.	220/66	GETCO	160	MAR-19
200	Morbi S/s Aug.	220/66	GETCO	160	MAR-19
201	Mota S/s Aug.	220/66	GETCO	60	MAR-19
202	Nakhatrana S/s Aug.	220/66	GETCO	160	MAR-19
203	Popada S/s Aug.	220/66	GETCO	60	MAR-19
204	Thavar S/s Aug.	220/66	GETCO	110	MAR-19
205	Vartej S/s Aug.	220/66	GETCO	60	MAR-19
206	Zagadia S/s Aug.	220/66	GETCO	110	MAR-19
207	Mittemari S/S	220/66	KPTCL	200	MAR-19
208	Sayane S/s (Aug. by Trafo Replacement (50-25))	220/33	MSETCL	25	MAR-19
209	Purti S/S	220/33	MSETCL	25	MAR-19
210	Hindaun (160-50)	220/132	RVPNL	110	MAY-18
211	Gurgaon Sec. -57	220/66	HVPNL	100	MAY-18
212	Barasat GIS	220/132	WBSETCL	320	MAY-18

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
213	Sikandara (Kanpur Dehat New) ICT-I	220/132	UPPTCL	100	MAY-18
214	Sarh (Kanpur Dehat New) ICT-I	220/132	UPPTCL	100	MAY-18
215	Baghpat (Aug.) (160-100)	220/132	UPPTCL	60	MAY-18
216	Bachrawan Raebareli (New) ICT-I	220/132	UPPTCL	160	MAY-18
217	Jalore (160-50)	220/132	RVPNL	110	MAY-18
218	Pavagada S/S	220/66	KPTCL	200	NOV-18
219	Panchgaon s/s (Aug.)	220/66	HVPNL	160	NOV-18
220	Vasai (Addl T/F)	220/22	MSETCL	50	NOV-18
221	Bherunda S/S	220/132	RVPNL	160	NOV-18
222	Jind s/s (Aug.)	220/132	HVPNL	60	NOV-18
223	Kawardha s/s (2nd T/F)	220/132	CSPTCL	160	NOV-18
224	Dharsiwa s/s	220/132	CSPTCL	320	NOV-18
225	Borjhara s/s	220/132	CSPTCL	160	NOV-18
226	Rookhi Bulandshahar (New) T/F-I	220/33	UPPTCL	60	NOV-18
227	Badhni Kalan (New) s/s	220/66	PSTCL	100	NOV-18
228	Therubali (3rd Auto T/F)	220/132	OPTCL	160	OCT-18
229	Narwana (Aug.)	220/132	HVPNL	60	OCT-18
230	I.A. Hisar (Aug.)	220/132	HVPNL	50	OCT-18
231	Bhuna (Aug.)	220/132	HVPNL	100	OCT-18
232	Gomti nagar Lucknow (Aug.) T/F-IV	220/33	UPPTCL	60	OCT-18
233	Hata Kushinagar (New) T/F-I	220/132	UPPTCL	100	OCT-18
234	Bansi Siddharthnagar (Aug) T/F-I	220/132	UPPTCL	60	OCT-18
235	Kanpur Road Lucknow (New) T/F-III	220/33	UPPTCL	60	OCT-18
236	Kangasiyali (Aug.)	220/66	GETCO	60	OCT-18
237	Madanpur (Aug.)	220/66	HVPNL	100	OCT-18
238	Gurgaon Sec.-52A (Aug.)	220/66	HVPNL	160	OCT-18
239	Savarkundla (Aug.)	220/66	GETCO	60	OCT-18
240	Lalpar (Aug.)	220/66	GETCO	60	OCT-18
241	Karmsad (Aug.)	220/66	GETCO	160	OCT-18
242	Mendhasal (2nd power T/F)	220/33	OPTCL	20	OCT-18
243	Asoj (Aug)	220/66	GETCO	150	OCT-18
244	Halasar s/s	220/132	RVPNL	160	OCT-18
245	Keonjhar GIS	220/33	OPTCL	40	SEP-18
246	Simbhaoli Ghaziabad (Aug) T/F-II	220/132	UPPTCL	40	SEP-18
247	Sarh (Kanpur Dehat New) T/F-II	220/132	UPPTCL	160	SEP-18
248	Neebkarori Farrukhabad (New) T/F-II	220/132	UPPTCL	100	SEP-18
249	Pirankaliyar (Imlikhera)	220/132	PTCUL	100	SEP-18
250	Cuttack (One Auto T/F )	220/132	OPTCL	100	SEP-18
251	Shahada Addl ICT	220/132	MSETCL	100	SEP-18
252	Suwasara (2nd Unit)	220/132	MPPTCL	160	SEP-18
253	Chhanera	220/132	MPPTCL	320	SEP-18
254	Gadchandur Addl T/F	220/33	MSETCL	50	SEP-18



Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/MVA)	Month of Completion
1.	2.	3.	4.	5.	6.
255	Wardha Addl. T/F	220/33	MSETCL	50	SEP-18
	<b>TOTAL STATE SECTOR</b>			<b>19235</b>	
	<b>TOTAL 220 kV</b>			<b>19235</b>	
<b>400 kV</b>					
<b><u>PRIVATE SECTOR</u></b>					
256	Amargarh (GIS) S/S (NRSS-XXIX TL - TBCB)	400/220	SGL	630	AUG-18
	<b>TOTAL PRIVATE SECTOR</b>			<b>630</b>	
	<b>TOTAL 400 kV</b>			<b>630</b>	
<b>220 kV</b>					
<b><u>PRIVATE SECTOR</u></b>					
257	GSS Ranpur Kota S/S	220/132/33	APL	210	FEB-19
	<b>TOTAL PRIVATE SECTOR</b>			<b>210</b>	
	<b>TOTAL 220 kV</b>			<b>210</b>	
	<b>GRAND TOTAL</b>			<b>72705</b>	

## ANNEXURE-4A

(Item No. 4.2)

## Power Supply Position for 2018-19

State / System/ Region	Energy				Peak			
	April, 2018 - March,2019				April, 2018 - March,2019			
	Energy Requirement	Energy Supplied	Energy not Supplied		Peak Demand	Peak Met	Demand not Met	
	( MU )	( MU )	( MU )	( % )	( MW )	( MW )	( MW )	( % )
Chandigarh	1,571	1,571	0	0	369	369	0	0
Delhi	32,299	32,282	17	0.1	7,016	7,016	0	0
Haryana	53,665	53,665	0	0	10,270	10,270	0	0
Himachal Pradesh	9,850	9,618	232	2.4	1,700	1,700	0	0
Jammu & Kashmir	18,988	15,616	3,372	17.8	3,080	2,464	616	20
Punjab	55,328	55,315	13	0	12,638	12,638	0	0
Rajasthan	79,815	79,626	189	0.2	13,276	13,276	0	0
Uttar Pradesh	117,133	116,149	984	0.8	20,498	20,062	436	2.1
Uttarakhand	13,845	13,753	92	0.7	2,216	2,216	0	0
<b>Northern Region</b>	<b>382,493</b>	<b>377,595</b>	<b>4,898</b>	<b>1.3</b>	<b>63,166</b>	<b>61,726</b>	<b>1,440</b>	<b>2.3</b>
Chattisgarh	26,471	26,417	54	0.2	4,444	4,270	174	3.9
Gujarat	116,372	116,356	15	0	17,053	16,963	90	0.5
Madhya Pradesh	76,056	76,054	2	0	13,815	13,815	0	0
Maharashtra	158,295	158,157	137	0.1	23,864	23,254	610	2.6
Daman & Diu	2,558	2,558	0	0	357	356	1	0.2
Dadar & Nagar Haveli	6,303	6,302	0	0	816	815	1	0.1
Goa	4,295	4,292	3	0.1	596	596	0	0
<b>Western Region</b>	<b>390,349</b>	<b>390,136</b>	<b>212</b>	<b>0.1</b>	<b>56,675</b>	<b>55,821</b>	<b>853</b>	<b>1.5</b>
Andhra Pradesh	63,861	63,804	58	0.1	9,459	9,453	6	0.1
Telangana	66,489	66,427	62	0.1	10,815	10,815	0	0
Karnataka	71,764	71,695	69	0.1	12,877	12,877	0	0
Kerala	25,016	24,898	118	0.5	4,245	4,228	17	0.4
Tamil Nadu	109,482	109,380	102	0.1	15,483	15,448	35	0.2
Puducherry	2,766	2,756	10	0.3	440	421	19	4.3
Lakshadweep	46	46	0	0	8	8	0	0
<b>Southern Region</b>	<b>339,377</b>	<b>338,960</b>	<b>417</b>	<b>0.1</b>	<b>49,623</b>	<b>49,534</b>	<b>89</b>	<b>0.2</b>
Bihar	30,061	29,825	236	0.8	5,115	5,084	31	0.6
DVC	22,745	22,372	372	1.6	3,100	3,098	2	0.1
Jharkhand	8,737	8,490	247	2.8	1,339	1,291	48	3.6
Odisha	32,145	32,115	30	0.1	5,357	5,357	0	0
West Bengal	51,471	51,287	184	0.4	9,130	9,123	7	0.1
Sikkim	527	527	0	0.1	106	106	0	0
Andaman- Nicobar	346	323	23	7	58	54	4	7
<b>Eastern Region</b>	<b>145,686</b>	<b>144,616</b>	<b>1,070</b>	<b>0.7</b>	<b>23,141</b>	<b>22,733</b>	<b>408</b>	<b>1.8</b>
Arunachal Pradesh	869	859	9	1.1	150	148	2	1.2
Assam	9,566	9,238	328	3.4	1,865	1,809	56	3
Manipur	905	895	10	1.2	219	216	3	1.2
Meghalaya	1,957	1,956	2	0.1	374	372	1	0.4
Mizoram	643	635	8	1.2	121	119	2	1.7
Nagaland	888	795	93	10.5	156	138	18	11.6
Tripura*	1,863	1,841	22	1.2	298	293	5	1.7
<b>North-Eastern Region</b>	<b>16,691</b>	<b>16,219</b>	<b>472</b>	<b>2.8</b>	<b>2,967</b>	<b>2,850</b>	<b>117</b>	<b>3.9</b>
<b>All India</b>	<b>1,274,595</b>	<b>1,267,526</b>	<b>7,070</b>	<b>0.6</b>	<b>177,022</b>	<b>175,528</b>	<b>1,494</b>	<b>0.8</b>
# Lakshadweep and Andaman & Nicobar Islands are stand- alone systems, power supply position of these,does not form part of regional requirement and availability								
* Excludes the supply to Bangladesh.								

## ANNEXURE-4B

(Item No. 4.2)

## Details of Total Share from Central Generating Stations

S.No.	Region / State	Firm power	Unallocated Power					Total MW share from CGS	Total MW share from CGS as % of CGS in the country
		Firm Share from CGS (MW)	Unallocated power from regional pool (MW)	% of the regional pool of unallocated power	% of the national pool of unallocated power	Allocation from other Region / Bhutan (MW)	Total allocation of unallocated power (MW)		
1	Chandigarh	160	96	4.2	1.3	14	110	271	0.33
2	Delhi	4078	0	0	0	30	30	4108	5.01
3	Haryana	2576	0	0	0	15	15	2591	3.16
4	Himachal Pradesh	1467	15	0.7	0.2	0	15	1482	1.81
5	Jammu & Kashmir	1776	645	28.4	8.6	118	763	2539	3.1
6	Punjab	2111	37	1.6	0.5	30	67	2178	2.66
7	Rajasthan	2693	635	27.9	8.5	52	687	3380	4.12
8	Uttar Pradesh	6033	660	29	8.8	100	760	6793	8.28
9	Uttarakhand	907	182	8	2.4	0	182	1089	1.33
10	Railways	0	0	0	0	0	0	0	0
11	PowerGrid	7	4	0.2	0.1	0	4	12	0.01
	<b>Northern Region</b>	<b>21808</b>	<b>2275</b>	<b>100</b>	<b>30.3</b>	<b>359</b>	<b>2634</b>	<b>24442</b>	<b>29.81</b>
12	Chhattisgarh	1501	25	1.4	0.3	0	25	1526	1.86
13	Gujarat	3995	0	0	0	0	0	3995	4.87
14	Madhya Pradesh	4873	404	23	5.4	40	444	5317	6.48
15	Maharashtra	6949	329	18.8	4.4	0	329	7278	8.88
16	Daman & Diu	181	145	8.3	1.9	0	145	326	0.4
17	Dadar Nagar Haveli	255	724	41.3	9.7	0	724	979	1.19
18	Goa	504	99	5.7	1.3	0	99	604	0.74
19	PowerGrid	5.44	3	0.2	0	0	3	8.72	0.01
20	Railways WR	540	0	0	0	0	0	540	0.66
21	HWP of DAE	0	14	0.8	0.2	0	14	14	0.02
22	BARC Facilities	0	10	0.6	0.1	0	10	10	0.01
	<b>Western Region</b>	<b>18805</b>	<b>1754</b>	<b>100</b>	<b>23.4</b>	<b>40</b>	<b>1794</b>	<b>20598</b>	<b>25.12</b>
23	Andhra Pradesh	2002	517	23.1	6.9	75	592	2594	3.16
24	Karnataka	3527	582	26.1	7.8	300	882	4409	5.38
25	Kerala	1865	221	9.9	2.9	0	221	2086	2.54
26	Tamil Nadu	5938	499	22.3	6.7	0	499	6436	7.85
27	Telangana	2105	221	9.9	2.9	200	421	2525	3.08

28	Pondicherry	334	189	8.4	2.5	0	189	523	0.64
29	NLC	100	0	0	0	0	0	100	0.12
30	PowerGrid	0	6	0.3	0.1	0	6	6	0.01
	<b>Southern Region</b>	<b>15871</b>	<b>2234</b>	<b>100</b>	<b>29.8</b>	<b>575</b>	<b>2809</b>	<b>18680</b>	<b>22.78</b>
31	Bihar	3068	629	66.1	8.4	12	641	3709	4.52
32	DVC	6445	8	0.9	0.1	8	16	6461	7.88
33	Jharkhand	596	138	14.5	1.8	5	143	739	0.9
34	Orissa	1635	77	8.1	1	6	83	1718	2.1
35	West Bengal	1765	86	9.1	1.2	18	104	1869	2.28
36	Sikkim	156	12	1.2	0.2	1	13	169	0.21
37	Railway	675	0	0	0	0	0	675	0.82
37	PowerGrid	0	1	0.1	0	0	1	1	0
	<b>Eastern Region</b>	<b>14340</b>	<b>952</b>	<b>100</b>	<b>12.7</b>	<b>50</b>	<b>1002</b>	<b>15342</b>	<b>18.71</b>
38	Arunachal Pradesh	219	4	1.3	0	7	11	230	0.28
39	Assam	1116	124	44.2	1.7	139	263	1379	1.68
40	Manipur	199	28	9.9	0.4	0	28	227	0.28
41	Meghalaya	217	87	31	1.2	0	87	304	0.37
42	Mizoram	160	24	8.5	0.3	5	29	189	0.23
43	Nagaland	129	12	4.3	0.2	15	27	156	0.19
44	Tripura	446	2	0.7	0	0	2	448	0.55
44	PowerGrid	2.5	0	0	0	0	0	2.5	0
	<b>North-Eastern Region</b>	<b>2488</b>	<b>281</b>	<b>100</b>	<b>3.8</b>	<b>166</b>	<b>447</b>	<b>2935</b>	<b>3.58</b>
	<b>Grand Total</b>	<b>73312</b>	<b>7496</b>		<b>100</b>	<b>1190</b>	<b>8686</b>	<b>81997</b>	<b>100</b>
	* Excludes capacity of central sector units which have been commissioned but yet to be declared under commercial operation.								
Note-									
1	Firm share includes capacity of dedicated Central Sector stations, merchant power (75 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. 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 unallocated power 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	1267.38	3.51
3	Amulin	NHPC	3	140	420	132.00	1716.40	3.37
4	Ashupani	NHPC	2	15	30	395.00	126.45	8.75
5	Attunli	NHPC	4	125	500	264.00	2247.32	2.35
6	Badao	NEEPCO	4	30	120	154.50	441.00	2.32
7	Bhareli-I	NEEPCO	8	140	1120	97.00	4112.40	1.85
8	Bhareli-II	NEEPCO	5	120	600	51.00	2345.00	1.67
9	Chanda	NEEPCO	4	27.5	110	175.67	401.91	2.67
10	Demwe	NHPC	12	250	3000	138.00	10823.82	1.97
11	Dengser	NHPC	4	138	552	120.00	2666.71	3.26
12	Dibbin	NEEPCO	2	50	100	151.24	335.72	2.23
13	Duimukh	NHPC	3	50	150	65.00	551.48	8.50
14	Elango	NHPC	3	50	150	363.00	583.14	5.00
15	Emini	NHPC	4	125	500	125.00	1695.45	3.51
16	Emra-II	NHPC	3	130	390	278.00	1648.09	3.02
17	Etabue	NHPC	3	55	165	378.00	683.66	3.43
18	Etalin	NHPC	16	250	4000	385.00	16071.60	1.70
19	Hirong	NHPC	4	125	500	285.00	2535.80	1.62
20	Hutong	WAPCOS	12	250	3000	166.77	9901.00	1.28
21	Kalai	WAPCOS	10	260	2600	193.21	10608.64	1.01
22	Kameng Dam	NEEPCO	5	120	600	65.00	2345.55	2.29
23	Kapakleyak	NEEPCO	4	40	160	245.00	627.95	1.74
24	KurungI&II	NHPC	3	110	330	151.00	1435.40	4.04
25	Mihumdon	NHPC	4	100	400	286.00	1451.75	3.60
26	Mirak	NHPC	3	47	141	136.40	748.44	3.42
27	Naba	NHPC	4	250	1000	221.00	3995.25	2.14
28	Nalo	NHPC	4	90	360	221.00	1733.00	3.27
29	Naying	NHPC	4	250	1000	245.00	5077.15	1.18
30	Niare	NHPC	4	200	800	205.00	3356.62	2.02

31	Oju-I	NHPC	4	175	700	257.00	3291.58	2.08
32	Oju-II	NHPC	4	250	1000	322.00	4629.93	1.46
33	Pakke	NEEPCO	2	55	110	452.50	335.26	3.33
34	Papu	NEEPCO	2	100	200	238.00	505.00	2.94
35	Phanchung	NEEPCO	2	30	60	157.13	174.83	3.24
36	Ringong	NHPC	3	50	150	166.50	659.07	3.61
37	Sebu	NEEPCO	2	40	80	123.00	227.53	3.71
38	Simang	NHPC	3	30	90	125.00	417.82	5.43
39	Talong	NEEPCO	3	100	300	171.67	915.50	2.24
40	Tarangwarang	NEEPCO	2	15	30	185.55	93.81	2.88
41	Tato-II	NHPC	4	175	700	168.00	3465.90	1.48
42	Tenga	NEEPCO	4	150	600	875.00	1046.50	3.52
43	Utung	NEEPCO	3	33.3	100	291.00	359.13	3.10
	<b>Total (Arunachal Pr. ) 42 schemes</b>		<b>182</b>		<b>27293</b>			
<b>Chhattisgarh</b>								
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
	<b>Total (Chhattisgarh ) - 5 schemes</b>		<b>19</b>		<b>848</b>			
<b>Himachal Pradesh</b>								
49	Bajoli Holi	HPSEB	3	60	180	278.00	762.98	2.03
50	Bardang	HPSEB	3	38	114	55.00	438.41	2.91
51	Chamba	HPSEB	3	42	126	110.00	646.82	1.48
52	Chhatru	HPSEB	3	36	108	160.00	455.72	2.89
53	Gharopa	HPSEB	3	38	114	169.00	534.25	2.09
54	Gondhala	HPSEB	3	48	144	134.00	586.08	1.92
55	Jangi Thopan	HPSEB	3	160	480	174.14	1779.45	2.00
56	Khab-I	SJVNL	3	150	450	170.00	1551.00	2.24
57	Khab-II	SJVNL	3	62	186	70.00	640.00	3.04
58	Khoksar	HPSEB	3	30	90	99.00	351.91	2.46
59	Luhri	HPSEB	3	155	465	88.00	1825.13	2.41
60	Thopan Powari	HPSEB	3	160	480	161.14	1786.26	1.81
61	Tidong-I	HPSEB	2	30	60	511.50	211.65	2.71
62	Tidong-II	HPSEB	2	35	70	575.00	256.18	2.02
63	Yangthang	HPSEB	3	87	261	186.45	938.02	2.08
	<b>Total (Himachal Pr. ) 15 schemes</b>		<b>43</b>		<b>3328</b>			
<b>Jammu &amp; Kashmir</b>								
64	Barinium	WAPCOS	2	120	240	117.77	1170.34	2.54



65	Bichlari	WAPCOS	2	17.5	35	462.60	148.29	1.11
66	Dumkhar	NHPC	3	15	45	27.80	219.18	4.66
67	Kanyunche	NHPC	3	15	45	28.76	223.02	4.71
68	Karkit	NHPC	3	10	30	26.90	153.11	5.40
69	Kawar	WAPCOS	4	80	320	74.00	1426.56	1.09
70	Khalsi	NHPC	3	20	60	33.00	272.60	4.10
71	Kiru	WAPCOS	4	108	430	105.33	1935.77	0.77
72	Ratle	WAPCOS	4	140	560	92.33	2483.37	1.40
73	Shamnot	WAPCOS	4	92.5	370	56.33	1650.19	1.69
74	Shuas	WAPCOS	2	115	230	115.70	1117.87	2.94
75	Takmachang	NHPC	3	10	30	18.53	145.52	5.54
76	Ujh	WAPCOS	4	70	280	143.33	465.06	5.06
<b>Total (J &amp; K) - 13 schemes</b>			<b>41</b>		<b>2675</b>			
<b>Karnataka</b>								
77	Agnashini	KPCL	4	150	600	427.00	1431.00	1.07
78	Gangavali	KPCL	2	200	400	378.30	759.00	1.46
79	Gundia	KPCL	2	150	300	600.00	616.00	1.41
80	Kalinadi Stage-III	KPCL	2	150	300	407.67	610.00	1.67
81	Tamankal	KPCL	2	150	300	87.29	401.00	3.32
<b>Total (Karnataka) - 5 schemes</b>			<b>12</b>		<b>1900</b>			
<b>Kerala</b>								
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
<b>Total (Kerala) - 2 schemes</b>			<b>6</b>		<b>126</b>			
<b>Madhya Pradesh</b>								
84	Basania	NHPC	3	30	90	38.00	240.00	17.23
85	Bauras	NHPC	3	18.3	55	17.50	248.43	3.96
86	Hoshangabad	NHPC	3	20	60	16.50	288.21	4.10
<b>Total (Madhya Pradesh) - 3 schemes</b>			<b>9</b>		<b>205</b>			
<b>Maharashtra</b>								
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
<b>Total (Maharashtra) - 9 schemes</b>			<b>27</b>		<b>411</b>			
<b>Manipur</b>								
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
<b>Total (Manipur) - 3 Nos. schemes</b>			<b>6</b>		<b>362</b>			
<b>Meghalaya</b>								
99	Mawblei	WAPCOS	2	70	140	400.33	303.66	4.44
100	Mawhu	WAPCOS	3	40	120	438.15	482.96	1.40
101	Mawput	WAPCOS	3	7	21	93.42	83.95	4.07
102	Nongkolait	WAPCOS	2	60	120	463	332.87	1.97
103	Nongnam	WAPCOS	2	25	50	215.17	212.59	2.44
104	Rangmaw	WAPCOS	2	32.5	65	321.00	229.60	2.32
105	Selim	WAPCOS	2	85	170	433.67	534.68	2.02
106	Sushen	WAPCOS	2	32.5	65	114.58	220.6	3.85
107	Umduna	WAPCOS	3	19	57	253.17	231.24	1.68
108	Umjaut	WAPCOS	3	23	69	375.20	276.70	1.51
109	Umngi	WAPCOS	2	27	54	304.75	89.65	2.86
<b>Total (Meghalaya) - 11 Nos. schemes</b>			<b>26</b>		<b>931</b>			
<b>Mizoram</b>								
110	Boinu	WAPCOS	4	160	640	158.67	1118.93	4.83
111	Lungleng	WAPCOS	5	163	815	219.67	1169.06	4.17
112	Tlawng	WAPCOS	2	22.5	45	123.67	151.67	5.84
<b>Total (Mizoram) - 3 Nos. schemes</b>			<b>11</b>		<b>1500</b>			
<b>Nagaland</b>								
113	Dikhu	NEEPCO	4	35	140	79.44	513.41	2.8
114	Tizu	NEEPCO	3	50	150	64.19	568.41	2.56
115	Yangnyu	NEEPCO	2	20	40	115	176.45	4.48
<b>Total (Nagaland) - 3 Nos. schemes</b>			<b>9</b>		<b>330</b>			

<b>Orissa</b>								
116	Baljori	WAPCOS	2	89	178	165.75	479.8	5.9
117	Lower Kolab	WAPCOS	3	155	465	196.9	845.86	7.1
118	Naraj	WAPCOS	7	41	287	16.14	759.31	4.92
119	Tikarpara	WAPCOS	7	37	259	16.97	828.37	3.69
<b>Total (Orissa) - 4 Nos. schemes</b>			<b>19</b>		<b>1189</b>			
<b>Sikkim</b>								
120	Dikchu	NHPC	3	35	105	352	469	2.15
121	Lachen	NHPC	3	70	210	350	865.94	2.35
122	Lingza	NHPC	3	40	120	736	477.51	2.85
123	Panan	NHPC	4	50	200	312	762	2.15
124	Rangyong	NHPC	3	47	141	723.18	639.52	2.7
125	Ringpi	NHPC	2	35	70	1106.4	317.41	3.17
126	Rongni Storage	NHPC	3	65	195	442	<b>510.35</b>	8.6
127	Rukel	NHPC	3	11	33	537.1	149.41	5.48
128	Talem	NHPC	3	25	75	393.19	305.48	4.34
129	Teesta-I	NHPC	4	80	320	576.85	1298.12	1.8
<b>Total (Sikkim) - 10 Nos. schemes</b>			<b>31</b>		<b>1469</b>			
<b>Uttaranchal</b>								
130	Arakot Tiuni	UJVNL	3	24	72	250.2	382.9	1
131	Badrinath	WAPCOS	2	70	140	459.67	702.7	0.81
132	Bagoli Dam	UJVNL	3	24	72	139.5	340.7	4.1
133	Bhaironghati	WAPCOS	2	32.5	65	108.9	293.18	1.8
134	Bogudiyar - Sirkari Bhyal	WAPCOS	2	85	170	344.47	744	1.99
135	Bokang Baling	WAPCOS	3	110	330	455.2	1124.62	1.68
136	Chhunger - Chal	WAPCOS	2	120	240	292.83	853.28	1.13
137	Deodi	WAPCOS	2	30	60	560.3	296.76	1.37
138	Devsari	WAPCOS	3	100	300	227.5	878.5	2.77
139	Gangotri	WAPCOS	1	55	55	336.33	264.76	1.62
140	Garba Tawaghat	WAPCOS	3	210	630	470.97	2483.11	0.9
141	Gohana Tal	WAPCOS	2	30	60	584.52	269.35	1.64
142	Harsil	WAPCOS	3	70	210	281.33	920.57	1.1
143	Jadh Ganga	WAPCOS	2	25	50	142.6	220.88	2.19
144	Jakhol Sankri	UJVNL	3	11	33	364	<b>144.24</b>	1.71
145	Jelam Tamak	WAPCOS	2	30	60	195.58	268.12	1.71
146	Kalika Dantu	WAPCOS	2	115	230	<b>99.75</b>	1067.3	2.95
147	Karmoli	WAPCOS	2	70	140	<b>419.7</b>	<b>621.31</b>	1.3

148	Khartoi Lumti Talli	WAPCOS	2	27.5	55	56.6	241.51	3
149	Lata Tapovan	UJVNL	4	77.5	310	265	1123	2.21
150	Maleri Jelam	WAPCOS	2	27.5	55	200.33	243.07	1.8
151	Mapang - Bogidiyar	WAPCOS	2	100	200	465.07	882.04	1.3
152	Naitwar-Mori	UJVNL	3	11	33	76	151	1.85
153	Nand Prayag	UJVNL	3	47	141	72	794	2.05
154	Ramganga	UJVNL	3	22	66	100.1	327	3.25
155	Rishi Ganga - I	WAPCOS	2	35	70	536.17	327.3	1.18
156	Rishi Ganga - II	WAPCOS	1	35	35	236.96	164.64	2.22
157	Rupsiabagar Khasiyabara	WAPCOS	2	130	260	449.47	1195.63	1.59
158	Sela Urthing	WAPCOS	2	115	230	255.5	816.73	1.4
159	Sirkari Bhyol Rupsiabagar	WAPCOS	3	70	210	388.97	967.97	1.55
160	Taluka Sankri	UJVNL	2	70	140	564.9	559.47	1.33
161	Tamak Lata	UJVNL	4	70	280	291.4	1040.7	2.3
162	Urthing Sobla	UJVNL	4	70	280	414.96	1360.2	1.49
<b>Total (Uttaranchal) - 33 Nos. schemes</b>			<b>81</b>		<b>5282</b>			
<b>Grand Total - 162 Nos. schemes</b>			<b>525</b>		<b>47930</b>			

**Annex- 5B**

(Item No. 5.3)

**Hydro Capacity addition during 2017-18**

Sl. No.	Particular	Unit Nos.	Cap. (MW)	Commissioning as programmed	Actual(A)/ Anticipated	Remarks
<b>A.</b>	<b>Central Sector</b>					
1	<b>Tuiri</b> NEEPCO, Mizoram 2x30 = 60 MW	Unit # 1 Unit # 2	30 30	Jun.17 Sep.17	<b>25.08.2017 (A)</b> <b>28.11.2017 (A)</b>	<b>Commissioned</b> <b>Commissioned</b>
2	<b>Kishanganga</b> NHPC, J&K 3x110 = 330 MW	Unit #1 Unit # 2 Unit # 3	110 110 110	Jan.18 Feb.18 Mar.18	<b>13.03.2018 (A)</b> <b>21.03.2018 (A)</b> <b>30.03.2018 (A)</b>	<b>Commissioned</b> <b>Commissioned</b> <b>Commissioned</b>
3	<b>Pare</b> NEEPCO, Arunachal Pradesh 2x55=110 MW	Unit # 1 Unit # 2	55 55	Feb.18 Mar.18	Slipped Slipped	Leakage observed in Diversion Tunnel during water filling.
4	<b>Kameng</b> NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit # 1 Unit # 2	150 150	Mar.18 Mar.18	Slipped Slipped	Leakage observed in penstocks during water filling.
	<b>Sub- total (A):</b>		<b>800</b>		<b>390 MW</b>	
<b>B.</b>	<b>State Sector</b>					
1	<b>Sainj</b> HPPCL, H.P. 2x50= 100 MW	Unit # 1 Unit # 2	50 50	May.17 Jun.17	<b>04.09.2017 (A)</b> <b>04.09.2017 (A)</b>	<b>Commissioned</b> <b>Commissioned</b>
2	<b>Uhl - III</b> BVPCL, H.P. 3x33.33=100 MW	Unit #1 Unit # 2 Unit # 3	33.33 33.33 33.33	Jan.18 Feb.18 Mar.18	Slipped Slipped Slipped	Delay in completion of HRT lining.
3	<b>Pulichintala</b> TSGENCO, Telangana 4x30=120 MW	Unit # 2 Unit # 3	30 30	Aug.17 Oct.17	<b>26.10.2017 (A)</b> <b>01.11.2017 (A)</b>	<b>Commissioned</b> <b>Commissioned</b>
4	<b>New Umtru</b> MePGCL, Meghalaya 2x20=40 MW	Unit # 1 Unit # 2	20 20	Apr.17 Jul.17	<b>22.04.2017 (A)</b> <b>30.06.2017 (A)</b>	<b>Commissioned</b> <b>Commissioned</b>
	<b>Sub- total (B):</b>		<b>300</b>		<b>200 MW</b>	
<b>C.</b>	<b>Private Sector</b>					
1	<b>Chanju-I</b> IA Energy, H.P. 3x12 = 36 MW	Unit # 3	12	May.17	<b>26.07.2017 (A)</b>	<b>Commissioned</b>
2	<b>Dikchu</b> Sneha Kinetic Power Projects Pvt. Ltd., Sikkim, 2x48MW= 96	Unit # 1 Unit # 2	48 48	Apr.17 May.17	<b>11.04.2017 (A)</b> <b>12.04.2017 (A)</b>	<b>Commissioned</b> <b>Commissioned</b>
3	<b>Tashiding</b> Shiga Energy Pvt. Ltd. Sikkim 2x48.5= 97 MW	Unit # 1 Unit # 2	48.5 48.5	Jul.17 Aug.17	<b>06.11.2017 (A)</b> <b>06.11.2017 (A)</b>	<b>Commissioned</b> <b>Commissioned</b>
	<b>Sub- total (C):</b>		<b>205</b>		<b>205 MW</b>	
	<b>Total (A+B+C)</b>		<b>1305</b>		<b>795 MW</b>	

**Annex-5C**

(Item No. 5.4.1)

**Hydro Capacity addition Programme during 2018-19**

Sl. No.	Particular	Unit Nos.	Cap. (MW)	Commissioning As programmed	Commissioning Actual(A)/ Anticipated	COD As programmed	COD Actual(A)/ Anticipated
<b>A.</b>	<b>Central Sector</b>						
1	<b>Pare</b> NEEPCO, Arunachal Pradesh 2x55=110 MW	Unit # 1 Unit # 2	55 55	May 18 May 18	<b>24.05.2018</b> <b>16.05.2018</b>	June 18 June 18	<b>28.05.2018</b> <b>21.05.2018</b>
2	<b>Kameng</b> 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 (slipping)	Nov. 18 Nov. 18 Dec. 18 Dec. 18	2019-20 (slipping)
	<b>Sub- total (A):</b>		<b>710 MW</b>		<b>110 MW</b>		<b>110 MW</b>
<b>B.</b>	<b>State Sector</b>						
3	<b>Uhl - III</b> 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 (slipping)	Aug. 18 Aug.18 Sep.18	2019-20 (slipping)
4	<b>Pulichintala</b> TSGENCO, Telangana 4x30=120 MW	Unit # 4	30	Sept. 18	<b>08.09.2018</b>	Sept. 18	<b>08.09.2018</b>
	<b>Sub- total (B):</b>		<b>130</b>		<b>30 MW</b>		<b>30 MW</b>
	<b>Total (A+B)</b>		<b>840 MW</b>		<b>140 MW</b>		<b>140 MW</b>



**Annex-5D**

(Item No. 5.4.2)

**Hydro Capacity addition Programme for 2019-20**

Sl. No.	Particular	Unit Nos.	Cap. (MW)	Commissioning As programmed (Syn. at rated load)	COD As programmed	Remarks
<b>A.</b>	<b>Central Sector</b>					
1	<b>Kameng</b> NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit # 1 Unit # 2 Unit # 3 Unit # 4	150 150 150 150	Jul,19 Jul,19 Oct,19 Oct,19	Aug,19 Aug,19 Nov,19 Nov,19	
	<b>Sub- total (A):</b>		<b>600</b>			
<b>B.</b>	<b>State Sector</b>					
2	<b>Uhl - III</b> BVPCL, H.P. 3x33.33=100 MW	Unit #1 Unit # 2 Unit # 3	33.33 33.33 33.33	Sep,19 Oct,19 Nov,19	Oct,19 Nov,19 Dec,19	
3	<b>Sawra Kuddu</b> HPPCL, H.P. 3x37=111 MW	Unit #1 Unit # 2 Unit # 3	37 37 37	Aug,19 Sep,19 Oct,19	Sep,19 Oct,19 Nov,19	
	<b>Sub- total (B):</b>		<b>211</b>			
<b>C.</b>	<b>Private Sector</b>					
4	<b>Bajoli Holi</b> GMR, H.P. 3x60=180 MW	Unit #1 Unit # 2 Unit # 3	60 60 60	Jan.,20 Feb.,20 Mar.,20	Jan.,20 Feb.,20 Mar.,20	
5	<b>Singoli Bhatwari</b> L&T, Uttarakhand 2x33=99 MW	Unit #1 Unit # 2 Unit # 3	33 33 33	Jan.,20 Feb.,20 Mar.,20	Jan.,20 Feb.,20 Mar.,20	
6	<b>Sorang</b> HSPCL Uttarakhand 2x50=100 MW	Unit #1 Unit # 2	50 50	Nov,19 Dec.,19	Nov,19 Dec.,19	
	<b>Sub- total (C):</b>		<b>379</b>			
	<b>Total (A+B)</b>		<b>1190</b>			

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
		<b>CENTRAL SECTOR</b>						
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	
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	
		<b>Total Central Sector</b>			<b>2760</b>	<b>1300</b>		
		<b>STATE SECTOR</b>						
1	Assam	Namrup CCGT	Feb-09	ST	36.15		Jan-12	
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	
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	
7	Karnataka	Yelahanka CCPP BY KPCL	Nov-15	GT+ST	370		Mar-18	
8	Telangana	Kothagudem TPS St-VII	Jan-15	U-1	800	800	Nov-17	26.12.2018
		<b>Total State Sector</b>			<b>4506.15</b>	<b>2780</b>		
		<b>PRIVATE SECTOR</b>			<b>NIL</b>			
		<b>TOTAL THERMAL CAPACITY ADDITION</b>				<b>4080</b>		
		<b>ADDITIONAL PROJECTS</b>						
		<b>CENTRAL SECTOR</b>						
1	Maharashtra	Solapur STPP	Mar-12	U-2		660		29.03.2019
		<b>Total Central Sector</b>				<b>660</b>		
		<b>STATE SECTOR</b>						
1	Assam	Lakwa Replacement Power Project.	Dec-15	U-1,2,3,4,5,6 &7		69.755		26.04.2018
		<b>Total State Sector</b>				<b>69.755</b>		
		<b>PRIVATE SECTOR</b>						
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
		<b>Total Private Sector</b>				<b>972</b>		
		<b>Total Additional Capacity</b>				<b>1701.755</b>		
		<b>TOTAL GRAND THERMAL CAPACITY ADDITION</b>			<b>7266.15</b>	<b>5781.755</b>		

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	Cap. (MW)	Org. Comm. Sched.	Ant. COD / Trial Run
	CENTRAL SECTOR						
1	Nabi Nagar STPP	Jan-13	U-1	Coal	660	Jan-17	May-19
2	Lara STPP	Dec-12	U-2	Coal	800	May-17	Dec-19
3	Gadarwara STPP	Mar-13	U-2	Coal	800	Sep-17	Dec-19
4	Khargone STPP St-I	Mar-15	U-1	Coal	660	Mar-19	Aug-19
		Mar-15	U-2	Coal	660	Sep-19	Feb-20
5	Darlipalli STPP St-I	Feb-14	U-1	Coal	800	Feb-18	Aug-19
6	Tanda TPP St- II	Sep-14	U-5	Coal	660	Sep-17	Sep-19
7	Neyveli New TPP	Jun-11	U-1	Lignite	500	Mar-18	Apr-19
		Jun-11	U-2	Lignite	500	Sep-18	Oct-19
	Total Central Sector				6040		
	STATE SECTOR						
1	Dr.Narla Tata Rao TPS Stage-V	Dec-15	U-8	Coal	800	Jun-19	Feb-20
2	Namrup CCGT	Feb-09	ST	Gas	36.15	Jan-12	Nov-19
3	Wanakbori TPS Extn.	Oct-14	U-8	Coal	800	Oct-18	Nov-19
4	Yelahanka CCPP	Nov-15	GT+ST	Gas	370	Mar-18	Nov-19
5	Ib valley TPP	Mar-14	U-3	Coal	660	Aug-17	Apr-19
		Mar-14	U-4	Coal	660	Dec-17	Jul-19
6	Suratgarh SCTPP	Mar-13	U-7	Coal	660	Jul-16	Nov-19
7	Bhadradi TPP	Mar-15	U-1	Coal	270	Mar-17	Jan-20
	Total Sector Sector				4256.15		
	PRIVATE SECTOR						
	Total Private Sector				0		
	Grand Total 2019-20				10296.15		

## Annexure-7A

(Item No. 7.15)

## Status of Households(HH) electrification under Saubhagya( as on 31.03.2019)

State	Total Households reported by state under Saubhagya	Electrified Households as on 10th Oct.2017	Balance Unelectrified Households as on 10th Oct, 2017	Total Progress from 10th Oct. 2017 to 31.03.2019	Balance Unelectrified Households	Household Electrification (%)
Uttar Pradesh	28675462	21196195	7479267	7980568		100
Maharashtra	24560406	23304118	1256288	1517922		100
West Bengal	15058530	14326240	732290	732290		100
Bihar	13973122	10714081	3259041	3259041		100
Madhya Pradesh	12621007	10636743	1984264	1984264		100
Rajasthan	12598991	10895915	1703076	1862736		100
Andhra Pradesh	11442705	11281072	161633	181930		100
Gujarat	11414532	11373215	41317	41317		100
Tamil Nadu	10285848	10283678	2170	2170		100
Karnataka	10221324	9909095	312229	356974		100
Kerala	9813032	9813032				100
Odisha	9621296	7219409	2401887	2452444		100
Assam	6966079	5357458	1608621	1745149		100
Jharkhand	6749036	5366642	1382394	1530708		100
Telangana	6536671	6084656	452015	515084		100
Chhattisgarh	5683509	4955648	727861	749397	18734	99.67
Punjab	3693061	3689584	3477	3477		100
Haryana	3469972	3415291	54681	54681		100
Jammu & Kashmir	2451154	2072861	378293	387501		100
Uttarakhand	2076613	1844305	232308	248751		100
Himachal Pradesh	1855669	1842778	12891	12891		100
Tripura	788871	652463	136408	139090		100
Meghalaya	635802	435963	199839	199839		100
Nagaland	523870	391363	132507	132507		100
Manipur	453142	350925	102217	102748		100
Arunachal Pradesh	302361	255272	47089	47089		100
Mizoram	241796	213909	27887	27970		100
Goa	128208	128208				100
Sikkim	98768	83868	14900	14900		100
Puducherry	95616	94704	912	912		100
<b>Total</b>	<b>21,30,36,453</b>	<b>18,81,88,691</b>	<b>2,48,47,762</b>	<b>2,62,84,350</b>	<b>18,734</b>	

## Outstanding Dues (More than 60 days) Of Power Utilities (Principal and Surcharge) Payable to Central Public Sector Undertakings (CPSU)

Based upon the information received from CPSUs upto 31st March, 2019

Sl. No.	STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCL		DVC		NLC		SAIL		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			
1	2	NORTHERN REGION																								15
	HARYANA																									
1	UHBVN																								20.00	
2	DHVN					20.00																			0.00	
	TOTAL (Haryana)	0.00	0.00	0.00	0.00	20.00	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	20.00	
	HIMACHAL																									
3	HPSEB						0.08			5.85	1.38							0.70							8.01	
4	Govt of HP																315.03								315.03	
	TOTAL (Himachal)	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	5.85	1.38			0.00	0.00	0.00	315.03	0.70	0.00	0.00	0.00	0.00	0.00	0.00	323.04	
	DELHI																									
5	DTL																12.38								12.38	
6	TPDDL																								0.00	
7	BYPL/BSES YAMUNA																									
8	BRPL/BSES RAJDHANI																									
	TOTAL (Delhi)	0.00	0.00	47.70	171.40	0.00	0.00	0.00	0.00	191.08	267.58			0.00	0.00	0.00	86.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1165.82	
	JAMMU & KASHMIR																									
9	J&K PDD	444.57				74.00				349.89	19.35						117.71	14.50	6.80		182.23				1209.05	
10	J&K PDC			610.69	96.50																				707.19	
	TOTAL (J&K)	444.57	0.00	610.69	96.50	74.00	0.00	0.00	0.00	349.89	19.35			0.00	0.00	117.71	14.50	6.80	0.00	182.23	0.00	0.00	0.00	0.00	1916.24	
	PUNJAB																									
11	PSEB																								0.28	
12	PSPL			33.61	6.19						0.02															
	TOTAL (Punjab)	0.00	0.00	33.61	6.19	0.00	0.00	0.00	0.00	0.26	0.02	304.91	0.00	0.00	0.00	0.00	3.24	0.00	0.00	0.88	0.00	0.00	0.00	0.00	349.11	
	RAJASTHAN																									
13	RRVNL/RSEB																	167.99							167.99	
14	JVNVL	33.07		0.12	0.02					7.94															152.07	
15	AVNVL	22.90		0.13	0.04					5.56															28.63	
16	JDVNL	25.08		22.88	2.20					28.72	0.18						3.41	0.03		13.97	0.00	0.00	0.00	0.00	96.47	
	TOTAL (Rajasthan)	81.05	0.00	23.13	2.26	0.00	0.00	0.00	0.00	42.22	0.18			110.92	0.00	3.41	0.03	167.99	0.00	13.97	0.00	0.00	0.00	0.00	445.16	
	OTHERS																									
17	HWB (KOTA)																								35.50	
	UTTAR PRADESH																									
18	UPPCL	7.79		573.04	67.70	344.00				347.27	187.00									1141.78	0.00				2827.43	
	TOTAL (Uttar Pradesh)	7.79	0.00	573.04	67.70	344.00	0.00	0.00	0.00	347.27	187.00			0.00	0.00	0.00	158.85	0.00	0.00	1141.78	0.00	0.00	0.00	0.00	2827.43	
	UTTARAKHAND																									
19	UPCL	17.49		0.40	0.30	21.00				12.91							0.01	0.10		20.00					72.21	
	CHANDIGARH																									
20	CPDD			0.05															145.63						145.68	
	OTHERS																									
21	M/s N.F.L. Nangal																	0.01							0.01	
22	B.S.L. Project S/Nagar																	0.20							0.20	
23	Beas Project talwara																	0.03							0.03	
24	Irrigation Wing, Nangal																	0.01							0.01	
	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	0.25		0.00	0.00	0.00	0.00	0.00	0.25	
	TOTAL (Northern Region)	550.90	0.00	1288.62	344.43	459.00	0.00	0.00	0.00	984.98	475.51	304.91	0.00	110.92	0.00	121.12	578.12	321.37	0.00	1760.45	0.00	0.00	0.00	0.00	7300.33	
	WESTERN REGION																									
	GUJARAT																									
	GUVNL									4.58	0.19														4.77	

Sl. No.	STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCIL		DVC		NLC		SJVN		BMBB		THDC		NHDC		NTP		TOTAL
		PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR	PRIN	SUR			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15												
26	GOA																								0.00	
27	MADHYA PRADESH																								0.00	
28	MPPCL / MPPTCL			7.00																					0.00	
29	MPPNCL		0.60	0.47																					7.00	
30	TOTAL (Madhya Pradesh)	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	402.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	1.92	1.92	0.00	0.00	405.56	
31	CHHATTISGARH																								412.57	
32	CSEB/CSPCL																								0.04	
33	TOTAL (CHHATTISGARH)	0.00		0.00		0.00	0.04															0.00			0.04	
34	MAHARASHTRA																								22.39	
35	MSEDCL	2.34								0.35	0.11					8.61	10.98								0.00	
36	DADRA NAGAR & SILVASSA																								0.00	
37	Electricity Department																								0.00	
38	DAMAN & DIU																								0.00	
39	Electricity Department																								2.00	
40	BARC/IGCAR			2.00																					1.76	
41	TOTAL (Western Region)	2.34	0.00	0.60	0.48	9.00	0.00	0.00	0.00	6.53	0.50	402.53	0.00	0.00	0.00	8.61	10.98	0.00	0.00	0.04	1.92	1.92	0.00	0.00	443.53	
42	SOUTHERN REGION																									
43	ANDHRA PRADESH																									
44	APEPCO/APNCL/APTRANSCO			35.00						196.31	19.45				229.41								218.85		699.02	
45	TOTAL (Andhra Pradesh)	0.00		35.00						196.31	19.45				229.41	0.00						218.85	0.00		699.02	
46	KARNATAKA																								0.00	
47	BESCOM									5.74	0.00														404.05	
48	MESCOM									0.40	0.00														234.71	
49	CESCOM	163.92								38.35	9.82														836.60	
50	HESCOM	274.16								301.12	104.38														156.94	
51	GESCOM	124.42								63.56	14.69														240.37	
52	ESCOMS																								0.00	
53	TOTAL (Karnataka)	562.50	0.00	0.00	0.00	409.17	128.89	0.00	0.00	409.17	128.89	78.63	0.00	319.68								217.26	0.00		1716.13	
54	TELANGANA DISCOMS	619.95		114.00		248.74	20.54							263.26								314.33			1580.82	
55	Kerala																									
56	KSEB			3.00		14.40	0.09					2.01		61.06											80.56	
57	TAMIL NADU																								0.00	
58	TNEB/TANGEDCO		24.13	1.14		446.56	344.20							2477.81								301.21			3595.05	
59	Puducherry																								0.00	
60	PEB					18.61	2.12							83.13											103.86	
61	Others																								0.00	
62	BHAVINI					9.70	0.18																		9.88	
63	AUGF																								0.00	
64	TOTAL (Southern Region)	1182.45	0.00	24.13	1.14	152.00	0.00	0.00	0.00	1343.49	515.47	80.64	0.00	3434.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1051.65	0.00		7785.32	
65	EASTERN REGION																									
66	DVC			143.00																					0.00	
67	BIHAR																								143.00	
68	BIHAR (BPDCL/BSEB)		0.19									11.53	0.00												0.00	
69	SIKKIM																								11.72	
70	Electricity Department		0.54	0.01	0.00																				0.55	
71	WEST BENGAL																								0.00	
72	WBSEB		29.55	0.81																					527.31	
73	JHARKHAND (JBVN/JUVNL)				5.00																				3685.86	
74	ORISSA																								0.00	
75	GRIDCO																								19.00	
76	OTHERS																								0.00	
77	MEA (Power to Nepal)																								0.00	
78	PTC (Regulated Power)																								0.00	
79	TOTAL (Others)																								0.00	
80	TOTAL (Eastern Region)	30.28	0.82	143.00	24.00		4189.34	0.00											0.00			0.00			4387.44	
81	NORTH EASTERN REGION																								0.00	
82	ARUNACHAL PRADESH																									
83	Department of Power				22.30	0.59																			22.90	
84	ASSAM (APDCL)																									
85	APDCL		0.00	0.00					0.05	35.05															35.10	
86	MANIPUR																								0.00	
87	Electricity Department		1.93	0.07					9.93	2.61															14.54	



Sl. No.	STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCIL		DVC		NLC		SVNL		BMBB		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	2																									15
58	MEGHALAYA																									0.00
	Mizoram	261.19		10.53	15.97	2.00		338.35	265.35																	893.39
59	Electricity Department																									0.00
	NAGALAND				0.01																					0.01
60	Department of Power																									0.00
	TRIPURA							0.00																		0.00
61	TSECL							4.32	0.09																	4.41
	TOTAL (NE Region)	261.19	0.00	12.46	16.06	2.00	0.00	374.95	303.69	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	970.35
62	Andaman & Nicobar Electricity Deptt		1.41																							1.41
	GRAND-TOTAL	1998.29	0.00	1356.09	362.93	765.00	24.00	374.95	303.69	2335.00	991.48	4977.42	0.00	3545.27	0.00	129.73	589.20	321.37	0.00	1760.49	0.00	1.92	0.00	1051.65	0.00	20888.48

Note : The information as provided by DVC that the dues for WBSEDCL & JBYNL on account of firm sales is considered for more than 15 days.

\* Dues more than 60 Days

#### Utilities

1	APCPDCL	Andhra Pradesh Central Power Distribution Company Ltd.	36	MEA	
2	APEPDCL	Andhra Pradesh Eastern Power Distribution Co. Ltd.	37	MESCOM	Ministry of External Affairs
3	APGCL	Assam Power Generation Corporation Ltd.	38	MPPGCL	Mangalore Electricity Supply Company Ltd.
4	APNPDC	Andhra Pradesh Northern Power Distribution Co. Ltd.	39	MPTTCL	Madhya Pradesh Power Generation Co. Ltd.
5	APSPDCL	Andhra Pradesh Southern Power Distribution Co. Ltd.	40	MPPMCL	Madhya Pradesh Power Transmission company Ltd.
6	APTRANSCO	Andhra Pradesh Transmission Corporation Ltd.	41	MSEDCL	Madhya Pradesh State Electricity company Ltd.
7	AVVNL	Ajmer Vidyut Vitran Nigam Ltd.	42	TPDDL	Maharashtra State Electricity Distribution Co. Ltd.
8	BMBB	Bhakra Beas Management Board	43	NEEPCO	Tata Power Delhi Distribution Limited
10	BESCOM	Bangalore Electricity Supply Company Ltd.	44	NHDC	North Eastern Electric Power Corporation Ltd.
11	BRPL	BSES Rajdhani Power Ltd.	45	NHPC	Narmada Hydro Development Corporation
12	BYPL	BSES Yamuna Power Ltd.	46	NLC	National Hydro Power Corporation
13	CESCOM	Chandrasekhari Electricity Supply Company Ltd.	47	NPCL	Nyveli Lignite Corporation
14	CPDD	Chandigarh Power Development Department.	48	NTPC	Nuclear Power Corporation of India Ltd.
15	DBHVN	Dakshin Haryana Bijli Vitran Nigam	49	PED	National Thermal Power Corporation
16	DPCL	Delhi Power Company Ltd.	50	PGCIL	Pondicherry Electricity Department
17	DTL	Delhi Transco Ltd.	51	PSPCL	Power Grid Corporation of India Ltd.
18	DESU	Delhi Electric Supply Undertaking	52	RRVNL	Punjab State Power Corporation Ltd.
19	DVC	Damodar Valley Corporation	53	RRVNL	Rajasthan Rajya Vidyut Prasaran Nigam Ltd.
20	ESCOMS	Electricity Supply Company (Karnataka)	54	SJVNL	Rajasthan Rajya Vidyut Upadan Nigam Ltd.
21	GESCOM	Gulbarga Electricity Supply Company Ltd.	55	THDC	Safuj Jal Vidyut Nigam Ltd.
22	GOAED	Goa Electricity Department	56	TSECL	Tehri Hydro Development Corporation
23	GUVNL	Gujarat Urja Vikas Nigam Limited	57	UHBV	Tripura State Electricity Corp. Ltd.
24	HESCOM	Hubli Electricity Supply Company Ltd.	58	UPCL	Uttar Haryana Bijli Vitran Nigam
25	HPGCL	Haryana Power Generation Corporation Ltd.	59	UPJVN	Uttarakhand Power Corporation Ltd.
26	HVPNL	Haryana Vidyut Prasaran Nigam Ltd.	60	UPPCL	Uttar Pradesh Jal Vidyut Nigam Ltd.
27	UHBVN	Uttar Haryana Bijli Vitran Nigam	61	UPRVNL	Uttar Pradesh Power Corporation Ltd.
28	HPSEB	Himachal Pradesh State Electricity Board	62	PTC	Uttar Pradesh Rajya Vidyut Upadan Nigam Ltd.
29	HPPC	Heavy Water Board	63	NTPL	Power Trading Corporation
30	HPPC	Haryana Power Purchase Centre			NLC Tamilnadu Power Ltd.
31	HWB	Heavy Water Board (Kota)			
32	J&K PDCL	Jammu & Kashmir Power Development Corporation Ltd.			
33	J&K PDD	Jammu & Kashmir Power Development Department			
34	JDVNL	Jodhpur Vidyut Vitran Nigam Ltd.			
35	JVNL	Jaipur Vidyut Vitran Nigam Ltd.			

CENTRAL ELECTRICITY AUTHORITY  
FINANCIAL STUDIES & ASSISTANCE DIVISION  
STATEMENT SHOWING ESTIMATED AVERAGE RATES OF ELECTRICITY (upto 01.04.2018) (Provisional)

Name of Utility	Tariff effective from	Domestic 1KW (100 KWh/Month)	Domestic 4KW (400 KWh/Month)	Domestic 10KW (1000 KWh/Month)	Commercial 2KW (300 KWh/Month)	Commercial 10KW (1500 KWh/Month)	Commercial 30KW (4500 KWh/Month)	Commercial 50KW (7500 KWh/Month)	Agriculture 2HP (400 KWh/Month)	Agriculture 5HP (1000 KWh/Month)	Agriculture 10HP (2000 KWh/Month)	Small Industry 10KW (1500 KWh/Month)	Medium Industry 50KW (7500 KWh/Month)	Large Industry 1000KW (438000 KWh/Month)	Heavy Industry (11KV) 10000KW 60%L.F. (438000 KWh/Month)	Heavy Industry (33KV) 20000KW 60%L.F. (876000 KWh/Month)	Railway Traction 12500KW (2500000 KWh/Month)
Andhra Pradesh	01.04.2017	208.50	491.63	679.50	903.17	1032.90	1060.97	1066.58	71.88 *	71.88 *	71.88 *	727.00	727.00	786.47	786.47	738.05	861.05
Assam	10.04.2017	605.00	732.50	791.00	830.00	830.00	935.88	935.88	516.19	516.19	681.94	610.67 U	788.12	750.05	749.91	749.90	-
Bihar	01.04.2017	651.90	771.15	842.70	816.20 U	888.60	865.67	867.08	529.00 U	529.00 U	529.00 U	721.82	807.07	737.87	-	727.27	837.99
Chhattisgarh	01.04.2017	419.04	544.86	753.62	774.67	938.93	976.27	983.73	520.00 R	520.00 R	520.00 R	625.46	732.21	807.84	807.84	759.84	837.99
Gujarat	01.04.2017	393.88	506.00 U	566.38 U	585.42	585.42	642.36	712.04	202.50	202.50	202.50	579.33	588.46	550.68	625.98	629.53	600.00
Haryana	01.07.2017	370.00	546.25	685.00	645.00	715.00	776.67	776.67	10.00	10.00	10.00	645.00	756.67	620.91	602.41	602.41	650.87
Himachal Pradesh	01.04.2017	206.00	303.85	390.37	581.40	552.60	554.56	554.56	129.25	117.70	113.85	520.29	665.44	624.95	624.95	619.71	-
Jammu & Kashmir	01.10.2016	191.40	293.98	353.21	401.50	627.73	627.73	627.73	80.85	80.85	80.85	399.67	397.47	422.10	422.10	410.45	-
Jharkhand	01.04.2017	645.00 U	590.25	580.50	700.00 U	644.00 U	634.67 U	632.80 U	512.00	512.00	512.00	797.98	797.98	579.30	579.30	562.07	680.88
Karnataka	01.04.2017	494.49	717.22	789.93	925.73	939.87	942.22	942.69	0.00	0.00	0.00	669.79	816.47	785.91	792.44	792.81	780.87
Kerala	16.08.2014	376.50	745.00	855.00	854.00	1063.00	1103.00	1103.00	222.98	222.98	222.98	671.67	705.00	636.10	636.10	636.10	618.89
Madhya Pradesh	10.04.2017	564.08	872.62	920.13	794.20	799.77	938.62	938.84	462.50	501.50	523.25	893.80	893.80	843.77	843.77	781.28	762.22
Maharashtra	01.04.2017	565.69	976.33	1283.27	1123.45	1251.23	1587.10	1587.10	315.00	315.00	315.00	677.59	977.36	941.83	941.83	860.95	739.89
Meghalaya	01.04.2017	385.00	500.00	551.00	729.33	769.33	776.00	777.33	318.30	318.30	318.30	638.33	638.33	703.89	703.75	653.74	-
Odisha	01.04.2017	374.40	496.60	566.80	637.87	718.29	731.70	734.38	153.00	153.00	153.00	598.50	615.60	669.21	669.20	644.51	665.88
Punjab	01.04.2017	566.13	721.79	796.42	829.42	861.06	865.33	866.18	571.78	571.78	571.78	683.27	755.80	824.61	791.64	824.61	961.76
Rajasthan	02.11.2017	737.50	729.38	751.25	953.33	992.33	1078.19	1081.21	486.50	486.50	486.50	768.09	832.02	841.93	-	818.62	832.78
Tamil Nadu	11.08.2017	85.00	470.00	584.00	840.88	883.58	890.69	892.12	0.00	0.00	0.00	685.13	685.13	759.98	759.98	759.98	801.67
Telangana	01.09.2017	238.50	668.50	821.00	911.00	1011.00	1034.33	1039.00	257.50 #	253.00 #	251.50 #	721.00	731.00	800.11	799.77	747.12	631.65
Uttar Pradesh	09.12.2017	619.50	673.31	738.68	967.50	1157.42	1186.08	1191.82	655.75	655.75	655.75	987.21	1014.08	913.22	913.22	872.39	1150.00
Uttarakhand	01.04.2017	315.00	420.00	490.50	583.33	583.33	671.86	671.86	190.00	220.38	220.38	913.17	938.03	844.72	844.72	1114.71	1114.71
West Bengal	01.04.2017	630.89	843.94	941.92	880.79	1027.09	1044.80	1048.34	487.43	487.43	487.43	758.88	895.17	937.72	937.72	931.97	913.00
Arunachal Pradesh	01.04.2017	400.00	400.00	400.00	500.00	500.00	500.00	500.00	310.00	310.00	310.00	430.00	430.00	385.00	385.00	350.00	913.00
Goa	01.04.2017	1700.00	242.50	325.00	468.33	522.00	534.33	536.60	156.00	156.00	156.00	433.48	444.14	563.42	563.42	563.42	-
Manipur	01.04.2017	390.00	497.50	541.00	606.67	692.00	692.00	-	347.38	347.38	347.38	393.33	524.07	585.37	585.37	-	-
Mizoram	01.04.2017	327.50	468.13	508.25	523.33	603.33	616.67	619.33	213.06	213.06	213.06	498.33	514.33	472.46	472.46	-	-
Nagaland	01.04.2017	439.00	576.63	632.65	768.00	857.60	872.53	875.52	300.00	300.00	300.00	576.67	633.33	698.86	698.86	-	-
Sikkim	01.04.2017	172.00	362.75	440.90	533.50	611.97	627.32	630.39	-	-	-	619.00	492.86	643.73	643.73	-	-

Name of Utility	Tariff effective from	Domestic 1KW (100 KWh/ Month)	Domestic 4KW (400 KWh/ Month)	Domestic 10KW (1000 KWh/ Month)	Commercial 2KW (300 KWh/ Month)	Commercial 10KW (1500 KWh/ Month)	Commercial 30KW (4500 KWh/ Month)	Commercial 50KW (7500 KWh/ Month)	Agriculture 2HP (400 KWh/ Month)	Agriculture 5HP (1000 KWh/ Month)	Agriculture 10HP (2000 KWh/ Month)	Small Industry 10KW (1500 KWh/ Month)	Medium Industry 50KW (7500 KWh/ Month)	Large Industry (11KV) 1000KW (438000 KWh/ (438000 KWh/ Month)	Heavy Industry (11KV) 1000KW 60%L.F. (438000 KWh/ Month)	Heavy Industry (33KV) 2000KW 60%L.F. (876000 KWh/ Month)	Railway Traction 12500KW (2500000 KWh/ Month)
Tripura	01.11.2014	521.50	755.00	755.00	691.50	768.33	768.33	768.33	366.19	366.19	477.38	740.00	764.00	-	-	-	-
A & N Islands	01.04.2017	205.00	476.25	568.50	720.00	894.67	938.22	946.93	160.00	160.00	160.00	916.67	951.33	-	-	-	-
Chandigarh	01.04.2017	274.00	414.63	477.25	587.67	614.00	619.78	620.93	290.00	290.00	290.00	554.33	612.67	598.83	598.83	-	-
Dadra & Nagar Haveli	01.04.2017	150.00	192.50	230.00	308.33	329.67	333.22	333.93	70.00	70.00	70.00	367.34	367.34	403.79	403.79	-	-
Daman & Diu	01.04.2017	135.00	171.25	206.50	296.67	319.33	323.11	323.87	65.00	65.00	65.00	332.34	332.34	441.64	441.64	-	-
(BY PL/BRPL/NDPL)	01.09.2017	441.00	531.56	732.00	1004.50	1004.50	1092.78	1092.78	296.58	296.58	296.58	957.25	1018.89	897.96	897.96	876.38	846.78
Delhi (NDMC)	01.09.2017	441.00	543.38	706.65	1004.50	1004.50	1157.06	1157.06	-	-	-	1045.88	1045.88	1074.31	1074.31	1048.37	911.65 at 33KV
Lakshadweep	01.04.2017	145.00	390.00	534.00	738.33	831.67	847.22	850.33	-	-	-	605.93	605.93	865.37	865.37	-	-
Puducherry	01.04.2017	150.00	283.75	389.50	574.17	614.83	621.61	622.97	-	-	-	515.73	511.15	588.42	-	505.81	-
Torrent Power Ltd. (Ahmedabad)	10.06.2017	437.00	503.13	543.95	620.83	637.50	733.33	733.33	330.00	330.00	330.00	561.00	645.33	578.54	578.54	-	-
Torrent Power Ltd. (Surat)	10.06.2017	422.63	508.16	551.71	602.08	602.08	749.77	749.77	70.00	70.00	70.00	529.83	659.80	623.64	623.64	-	-
CESC Ltd. (Kolkata)	01.04.2017	584.32	820.55	927.94	850.72	1019.47	1041.15	1045.49	-	-	-	750.00	889.17	853.77	853.77	826.17	746.33
DPSC Ltd. (West Bengal)	17.02.2017	550.21	707.63	746.15	726.83	807.22	809.86	809.86	252.95	252.95	252.95	672.29	793.75	738.77	738.77	512.22	790.33
Durgapur Projects Ltd. (W Bengal)	01.04.2016	425.42	530.04	552.36	549.29	599.90	604.17	605.02	179.29	179.29	179.29	533.38	588.72	592.45	592.45	574.05	647.78 at 25KV at 132KV
D.V.C. (A) Jharkhand Area (B) West Bengal Area	01.09.2014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	642.78	642.78 at 132KV
Mumbai (B.E.S.T.)	01.04.2016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	520.13	481.18 at 132KV
Mumbai (Reliance Energy)	01.04.2017	449.88	687.68	977.10	1150.15	1169.51	1272.49	1272.49	-	-	-	1000.45	1075.26	1021.82	1021.82	616.56	645.88 at 132KV
Mumbai (TATAS)	01.04.2017	525.28	868.64	1119.43	1286.88	1193.30	1401.96	1401.96	498.00	498.00	498.00	968.76	1210.80	1158.45	1158.45	-	at 100/33/22/11 /6.6KV
Mumbai	01.04.2017	460.32	777.87	1179.98	1301.40	1207.82	1202.31	1202.31	-	-	-	1052.92	1184.56	1048.05	1048.05	-	846.33 33/22KV

B : Continuous Supply Areas C : Non-Continuous Supply Areas D : Bangalore, Devangere & Other City Municipal Corp. F : Areas under Village Panchayats U : Urban R : Rural O : Other Areas

WS: Without Subsidy # For corporate farmers

\* : With Demand Side Management Measures - for dry land farmers(Connection>3 Nos) and wet land farmers(Holding>2.5 Acres) and Without Demand Side Management Measures - for dry land farmers(Connection<=3 Nos) and wet land farmers(Holding<=2.5 Acres)

^ TOD tariff from 23:00 hrs to 06:00 hrs for DPSC Ltd. & Durgapur Projects Ltd. respectively in West Bengal.

Tariffs notified have varying parameters for various categories of consumers. The above comparison is based on certain assumed loads and electricity consumption levels in a month.

**ANNEXURE - 10A**

(Item 10.2)

**All India Sector wise/Organisation wise Target, Actual Generation & PLF (%) for the year 2018-19**

Fuel, Sector/Organisation	Target (MU)	Actual (MU)	PLF (%)
<b>THERMAL</b>			
<b>CENTRAL SECTOR</b>			
APCPL	7500	7387.28	56.22
BRBCL	3150	2754.75	60.26
DVC	35589	36676.1	59.05
K.B.U.N.L	2600	3039.78	56.89
MUNPL	1000	69.61	*
NEEPCO.	2680	2971.39	**
NLC	20692	20088.5	70.31
NPGCPL	1000	0	0
NSPCL	3746	3426.23	78.22
NTECL	9200	7706.87	58.65
NTPC Ltd.	250260	269373.35	77.18
NTPL	6570	5486.62	62.63
ONGC	4000	4711.38	**
RGPPL	4320	4465.63	**
<b>TOTAL CENTRAL SECTOR</b>	<b>352307</b>	<b>368157.49</b>	<b>72.64</b>
<b>STATE SECTOR</b>			
HPGCL	10200	10552.71	44.29
IPGPCL	630	599.63	**
PRAGATI	4760	5136.08	**
PSPCL	6200	4155.14	22.37
RRVUNL	36610	32038.47	61.43
UPRVUNL	33357	31908.89	66.6
BECL	1300	588.95	*
CSPGCL	20842	21259.45	73.99
GMDCL	1510	1188.45	54.27
GPPCL	200	493.76	**
GSECL	20896	24033.6	65.4
GSEGL	200	376.5	**
MAHAGENCO	54100	48708.41	51.78
MPPGCL	19781	25543.14	67.27
APEPDCL	900	826.31	**
APGENCO	20220	17523.48	58.66
APPDCL	8000	6957.21	49.64
KPCL	15400	12977.04	43.32
KSEB	0	4.07	#
P&ED, Pudu.	223	229.88	#
RPCL	4383	790.93	5.64
SCCL	9000	8698.48	82.75
TNGDCL	27230	27881.46	68.65
TSGENCO	19890	20972.03	77.54
A&N ADM	200	120.73	#
DPL	2400	2442.23	42.24
OPGC	3800	3085.46	83.86
TVNL	2000	1689.05	45.91
WBPDC	24700	22525.09	58.14

APGPCL	1153	1066.92	**
TSECL	535	587.57	**
<b>TOTAL STATE SECTOR</b>	<b>350620</b>	<b>334961.1</b>	<b>57.81</b>
<b>PVT. SEC. UTILITY</b>			
CESC	6218	6295.47	63.88
RIL (DAHANU)	3800	3617.02	82.58
TATA PCL	5905	6429.56	45.83
TOR. POW. (UNOSUGEN)	2653	2785.64	75.35
<b>TOTAL PVT. UTILITY SECTOR</b>	<b>18576</b>	<b>19127.69</b>	<b>61.34</b>
<b>PVT. SEC. IPP</b>			
ABAN POWR	491	647.48	**
ACB	2035	2141.91	81.5
ADHUNIK	3000	2876.22	60.8
APGPCL	390	1114.49	**
APL	58000	53177.19	65.7
BALCO	3000	2768.07	52.66
BELLARY	0	0	#
BEPL	1000	830.94	21.08
BLAPPL	0	77.38	19.63
CEPL	5300	3221.74	30.65
CGPL	26636	26839.3	76.6
CIPL	300	293.98	**
DBPCL	6500	6729.62	64.02
DIPL	2200	3228.9	61.43
EPGL	2000	0	0
ESSARPMPL	3000	3220.09	40.88
GCEL	0	2830.89	46.68
GIPCL	3348	3521.75	80.41
GIPL	700	412.36	**
GMR ENERG	10000	10585.27	73.23
GPGSL (GVK)	2000	2445.49	51.7
HEL	4313	4614.74	87.8
HNPC	6000	949.1	10.42
HYEL	0	80.71	*
IEPL	500	149.37	6.32
ITPCL	6620	5544.59	52.75
JHAPL	2500	2500.55	47.58
JITPL	5000	4213.6	40.08
JPL	12352	10393.84	39.05
JPPVL	11000	9834.07	61.68
JSWEL	10700	11823.84	65.52
JhPL(HR)	5000	6898.35	59.66
KONDAPALI	600	1667.06	**
LANCO	4000	4293.08	81.68
LAPPL	8000	8236.75	78.36
LPGCL	10500	5449.92	31.42
MBPMPL	6000	6689.6	63.64
MCCPL	2200	2137.6	81.34
MEL	600	36.59	1.39
MPL	7400	7267.81	79.02
NPL	10000	9123.71	74.39
PENNA	350	352.86	**

PPGCL (Jaypee)	9000	7759.32	44.74
RKMPPL	4100	1953.26	20.27
RPSCL	7500	4340.9	41.29
RWPL (JSW)	6550	6700.1	70.82
RattanIndia	5000	4074.09	34.45
SCPL	722	799.1	90.61
SEIL	18549	18105.25	78.29
SEL	1000	828.09	7.88
SEPL	0	99.46	1.89
SKS	0	1464.92	27.87
SPGL	450	1142.85	**
SPL	30421	32877.27	94.78
ST-CMSECP	1150	1290.36	58.92
SVPPPL	0	12.44	2.25
SrEPL	1000	841.88	**
TATA PCL	1700	1519.04	72.25
TOR. POW. (SUGEN)	6000	6237.45	**
TOR. POW. (UNOSUGEN)	0	0.7	**
TRNE	4000	3095.17	58.89
TSPL	10800	10639.92	61.34
UPCL	6000	5214.35	49.6
VIP	3600	2212.73	42.1
WPCL	8200	8964.66	43.73
<b>PVT. SEC. IMP</b>	<b>369277</b>	<b>349394.1</b>	<b>54.95</b>
GIPCL	180	202.85	-
ICCL	290	186.59	-
NALCO	250	194.02	-
<b>Total PVT. SEC. IMP</b>	<b>720</b>	<b>583.46</b>	
<b>Total IPP &amp; Import</b>	<b>369997</b>	<b>349977.6</b>	<b>54.95</b>
<b>Total PVT. Sector</b>	<b>388573</b>	<b>369105.3</b>	<b>55.24</b>
<b>THERMAL Total</b>	<b>1091500</b>	<b>1072223.88</b>	<b>61.07</b>
<b>NUCLEAR</b>			
<b>CENTRAL</b>			
DAE (RAJASTHAN)	0	0	0
KAIGA	6148	7216.54	93.61
KAKRAPARA	266	999.93	25.94
KUDANKULAM	11807	6142.61	35.06
MADRAS A.P.S.	2891	1490.93	38.68
NARORA A.P.S.	2845	3161.89	82.03
RAJASTHAN A.P.S.	7031	8034.28	84.92
TARAPUR	7512	10766.42	87.79
<b>CENTRAL Total</b>	<b>38500</b>	<b>37812.6</b>	<b>63.67</b>
<b>NUCLEAR Total</b>	<b>38500</b>	<b>37812.6</b>	<b>63.67</b>
<b>HYDRO</b>			
<b>CENTRAL</b>			
BBMB	9425	10186.02	
DVC.	205	181.15	
NEEPCO..	4603	3120.57	
NHDC	2446	1920.83	
NHPC.	24055	24000.96	
NTPC Ltd..	3000	3013.93	
SJVNL	8490	8335.91	
THDC	3952	4395.92	



<b>CENTRAL Total</b>	<b>56176</b>	<b>55155.29</b>	
<b>STATE</b>			
HPPCL	430	527.05	
HPSEB	1550	1649.29	
JKSPDC	4669	5044.36	
PSPCL	3690	3598.82	
RRVUNL	535	698.4	
UJVNL	4105	4478.77	
UPJVNL	1115	1176.36	
CSPGCL	225	243.08	
GSECL	730	447.97	
MAHAGENCO	3361	3320.63	
MPPGCL	2280	1607.45	
SSNNL	2260	594.84	
APGENCO	2109	1944.31	
KPCL	9590	12015.94	
KSEB	5490	7320.21	
TNGDCL	3570	5281.59	
TSGENCO	3665	2838.67	
JSEB	110	101.19	
OHPC	5140	6183.77	
TUL	4000	4258.4	
WBSedCL	1250	1537.94	
APGPCL	300	372.72	
MeECL	932	929.53	
<b>STATE Total</b>	<b>61106</b>	<b>66171.29</b>	
<b>PVT SEC. UTL</b>			
<b>HYDRO</b>			
BHIRA HPS	825	351.02	
BHIRA PSS HPS	0	558.77	
BHIVPURI HPS	250	315.9	
KHOPOLI HPS	225	342.49	
<b>TOTAL PVT SEC. UTL</b>	<b>1300</b>	<b>1568.18</b>	
<b>PVT SEC. IPP</b>			
<b>HYDRO</b>			
ALLAIN DUHANGAN HPS	650	582.23	
BASPA HPS	1213	1275.58	
BHANDARDHARA HPS ST-	36	56.44	
BUDHIL HPS	250	288.08	
CHANJU-I HPS	125	137.45	
CHUZACHEN HPS	400	417.4	
DIKCHU HPS	300	462.24	
JORETHANG LOOP	390	409.75	
KARCHAM WANGTOO HPS	4130	3968.69	
MAHESHWAR HPS	0	0	
MALANA HPS	344	320.55	
MALANA-II HPS	330	349.39	
SINGOLI BHATWARI HPS	0	0	
SORANG HPS	0	0	
SRINAGAR HPS	1250	1375.31	
TASHIDING HPS	300	423.73	
TIDONG HPS	0	0	
VISHNU PRAYAG HPS	1700	1932.02	

<b>TOTAL PVT SEC. IPP</b>	<b>11418</b>	<b>11998.86</b>	
<b>TOTAL PVT. SEC.</b>	<b>12718</b>	<b>13567.04</b>	
<b>HYDRO Total</b>	<b>130000</b>	<b>134893.61</b>	

- **PLF is calculated for Coal & Lignite based power station only.**
- **\* Unit Not Stabilized**
- **\*\* Gas Based Station**
- **# diesel Based Station**

## Annexure-10B

(Item - 10.4)

### ALL INDIA INSTALLED CAPACITY (IN MW) OF POWER STATIONS LOCATED IN THE REGIONS OF MAIN LAND AND ISLANDS

(As on 31.03.2019)

(UTILITIES)

Region	Ownership/ Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES * (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Northern Region	State	16344.00	250.00	2879.20	0.00	19473.20	0.00	8697.55	699.56	28870.31
	Private	21680.83	1080.00	558.00	0.00	23318.83	0.00	2514.00	13120.46	38953.29
	Central	12335.37	250.00	2344.06	0.00	14929.43	1620.00	8496.22	379.00	25424.65
	<b>Sub Total</b>	<b>50360.20</b>	<b>1580.00</b>	<b>5781.26</b>	<b>0.00</b>	<b>57721.46</b>	<b>1620.00</b>	<b>19707.77</b>	<b>14199.02</b>	<b>93248.25</b>
Western Region	State	21560.00	1040.00	2849.82	0.00	25449.82	0.00	5446.50	547.89	31444.21
	Private	34745.67	500.00	4676.00	0.00	39921.67	0.00	481.00	21864.76	62267.43
	Central	16502.95	0.00	3280.67	0.00	19783.62	1840.00	1620.00	666.30	23909.92
	<b>Sub Total</b>	<b>72808.62</b>	<b>1540.00</b>	<b>10806.49</b>	<b>0.00</b>	<b>85155.11</b>	<b>1840.00</b>	<b>7547.50</b>	<b>23078.94</b>	<b>117621.55</b>
Southern Region	State	19932.50	0.00	791.98	287.88	21012.36	0.00	11774.83	586.88	33374.07
	Private	11874.50	250.00	5322.10	273.70	17720.30	0.00	0.00	37491.40	55211.70
	Central	11235.02	2890.00	359.58	0.00	14484.60	3320.00	0.00	541.90	18346.50
	<b>Sub Total</b>	<b>43042.02</b>	<b>3140.00</b>	<b>6473.66</b>	<b>561.58</b>	<b>53217.26</b>	<b>3320.00</b>	<b>11774.83</b>	<b>38620.18</b>	<b>106932.27</b>
Eastern Region	State	6240.00	0.00	100.00	0.00	6340.00	0.00	3537.92	275.11	10153.03
	Private	6387.00	0.00	0.00	0.00	6387.00	0.00	399.00	1116.37	7902.37
	Central	14836.64	0.00	0.00	0.00	14836.64	0.00	1005.20	10.00	15851.84
	<b>Sub Total</b>	<b>27463.64</b>	<b>0.00</b>	<b>100.00</b>	<b>0.00</b>	<b>27563.64</b>	<b>0.00</b>	<b>4942.12</b>	<b>1401.48</b>	<b>33907.24</b>
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	61.04	85.54
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1005.00	30.00	3058.62
	<b>Sub Total</b>	<b>770.02</b>	<b>0.00</b>	<b>1775.81</b>	<b>36.00</b>	<b>2581.83</b>	<b>0.00</b>	<b>1427.00</b>	<b>324.29</b>	<b>4333.11</b>
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	7.38	7.38
	Central	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	<b>Sub Total</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>40.05</b>	<b>40.05</b>	<b>0.00</b>	<b>0.00</b>	<b>17.73</b>	<b>57.78</b>
ALL INDIA	State	64076.50	1290.00	7118.71	363.93	72849.13	0.00	29878.80	2347.93	105075.86
	Private	74688.00	1830.00	10580.60	273.70	87372.30	0.00	3394.00	73661.40	164427.70
	Central	55680.00	3140.00	7237.91	0.00	66057.91	6780.00	12126.42	1632.30	86596.63
	<b>Total</b>	<b>194444.50</b>	<b>6260.00</b>	<b>24937.22</b>	<b>637.63</b>	<b>226279.34</b>	<b>6780.00</b>	<b>45399.22</b>	<b>77641.63</b>	<b>356100.19</b>

Figures at decimal may not tally due to rounding off

**Abbreviation:-** SHP=Small Hydro Project ( $\leq 25$  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 31.03.2019

(As per latest information available with MNRE)

\*Break up of RES all India as on 31.03.2019 is given below (in MW) :

Small Hydro Power	Wind Power	Bio-Power		Solar Power	Total Capacity
		BM Power/Cogen.	Waste to Energy		
4593.15	35625.97	9103.50	138.30	28180.71	77641.63

<b>A.</b>	<b>Capacity Added during Mar., 2019</b>	<b>3652 MW</b>
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1. Unit 3 (250 MW) of NABI NAGAR TPP has been commissioned and share has been added to the central sector of beneficiary states of ER.
2. Unit 3 (250 MW) of BONGAIGAON TPP has been commissioned and share has been added to the central sector of beneficiary states of NER.
3. Unit 4 (360 MW) of UCHPINDA TPP has been commissioned and added to private sector of Chhattisgarh.
4. Unit 6 (660 MW) of CHHABRA TPP has been commissioned and added to state sector of Rajasthan.
5. Unit 4 (660 MW) of SHREE SINGAJI TPP has been commissioned and added to state sector of Madhya Pradesh.
6. Unit 1 (12 MW) of DISHERGARH TPP has been commissioned and added to private sector of West Bengal.
7. Unit 2 (660 MW) of SOLAPUR STPS has been commissioned and share has been added to the central sector of beneficiary states of WR.
8. Unit 1 (800 MW) of GADARWARA TPP has been commissioned and share has been added to the central sector of beneficiary states of WR.

<b>B.</b>	<b>Capacity Retired during Mar., 2019</b>	<b>300 MW</b>
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1. U-3, U-6 & U-8 of KOTHAGUDEM TPS (60+2\*120=300 MW) has been retired from state sector of Telangana.

<b>C.</b>	<b>Capacity removed due to change from Conventional to RES during Mar., 2019</b>	<b>0 MW</b>
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<b>D.</b>	<b>Net Capacity Added during Mar., 2019</b>	<b>A-B-C</b>	<b>3352 MW</b>
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\* Sector wise breakup of RES capacity as shown is provisional.

Share of installed capacity of BBMB Stations is included in state sector of partner states.

**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 31.03.2019)

State	Ownership/ Sector	Mode wise breakup								Grand Total
		Thermal					Nuclear	Hydro	RES (MNRE)	
		Coal	Lignite	Gas	Diesel	Total				
Delhi	State	135.00	0.00	1800.40	0.00	1935.40	0.00	0.00	0.00	1935.40
	Private	869.22	0.00	108.00	0.00	977.22	0.00	0.00	178.89	1156.11
	Central	3112.72	0.00	207.01	0.00	3319.73	102.83	723.09	0.00	4145.65
	Sub-Total	4116.94	0.00	2115.41	0.00	6232.35	102.83	723.09	178.89	7237.16
Haryana	State	2720.00	0.00	150.00	0.00	2870.00	0.00	1102.82	69.30	4042.12
	Private	4080.78	0.00	0.00	0.00	4080.78	0.00	200.00	345.12	4625.90
	Central	1294.72	0.00	535.61	0.00	1830.34	100.94	663.70181	5.00	2599.98
	Sub-Total	8095.50	0.00	685.61	0.00	8781.12	100.94	1966.52	419.42	11267.99
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	992.00	626.68	1618.68
	Central	183.40	0.00	62.01	0.00	245.41	28.95	1223.88	0.00	1498.24
	Sub-Total	183.40	0.00	62.01	0.00	245.41	28.95	2910.48	883.29	4068.13
Jammu & Kashmir	State	0.00	0.00	175.00	0.00	175.00	0.00	1230.00	129.03	1534.03
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.83	64.83
	Central	506.39	0.00	129.07	0.00	635.47	67.98	1091.88	0.00	1795.33
	Sub-Total	506.39	0.00	304.07	0.00	810.47	67.98	2321.88	193.86	3394.19
Punjab	State	1760.00	0.00	150.00	0.00	1910.00	0.00	2597.70	127.80	4635.50
	Private	5115.50	0.00	0.00	0.00	5115.50	0.00	288.00	1154.62	6558.12
	Central	854.58	0.00	264.01	0.00	1118.59	196.81	923.42	0.00	2238.82
	Sub-Total	7730.08	0.00	414.01	0.00	8144.09	196.81	3809.12	1282.42	13432.44
Rajasthan	State	6260.00	250.00	603.80	0.00	7113.80	0.00	1096.18	23.85	8233.83
	Private	2802.00	1080.00	0.00	0.00	3882.00	0.00	104.00	7301.81	11287.81
	Central	956.25	250.00	221.10	0.00	1427.35	556.74	739.01	344.00	3067.10
	Sub-Total	10018.25	1580.00	824.90	0.00	12423.15	556.74	1939.19	7669.66	22588.74
Uttar Pradesh	State	5469.00	0.00	0.00	0.00	5469.00	0.00	724.10	25.10	6218.20
	Private	8714.33	0.00	0.00	0.00	8714.33	0.00	842.00	2887.60	12443.93
	Central	3796.39	0.00	549.49	0.00	4345.88	289.48	1802.53	30.00	6467.89
	Sub-Total	17979.72	0.00	549.49	0.00	18529.21	289.48	3368.63	2942.70	25130.02
Uttarakhand	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	88.00	526.20	1163.20
	Central	343.24	0.00	69.66	0.00	412.90	31.24	475.54	0.00	919.68
	Sub-Total	442.24	0.00	519.66	0.00	961.90	31.24	1815.69	594.07	3402.90
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	34.71	34.71
	Central	38.15	0.00	15.03	0.00	53.17	8.01	101.71	0.00	162.89
	Sub-Total	38.15	0.00	15.03	0.00	53.17	8.01	101.71	34.71	197.60
Central - Unallocated		1249.53	0.00	291.05	0.00	1540.58	237.03	751.45	0.00	2529.07
Total (Northern Region)	State	16344.00	250.00	2879.20	0.00	19473.20	0.00	8697.55	699.56	28870.31
	Private	21680.83	1080.00	558.00	0.00	23318.83	0.00	2514.00	13120.46	38953.29
	Central	12335.37	250.00	2344.06	0.00	14929.43	1620.00	8496.22	379.00	25424.65
	Grand Total	50360.20	1580.00	5781.26	0.00	57721.46	1620.00	19707.77	14199.02	93248.25

# **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 31.03.2019)

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	3.92	51.92
	Central	469.59	0.00	19.67	0.00	489.26	26.00	0.00	0.00	515.26
	Sub-Total	469.59	0.00	67.67	0.00	537.26	26.00	0.00	3.97	567.23
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	14.47	14.47
	Central	141.41	0.00	43.34	0.00	184.75	7.00	0.00	0.00	191.75
	Sub-Total	141.41	0.00	43.34	0.00	184.75	7.00	0.00	14.47	206.22
Gujarat	State	3710.00	1040.00	2177.82	0.00	6927.82	0.00	772.00	64.70	7764.52
	Private	7265.67	500.00	3960.00	0.00	11725.67	0.00	0.00	8331.80	20057.47
	Central	3242.43	0.00	424.00	0.00	3666.43	559.00	0.00	243.30	4468.73
	Sub-Total	14218.10	1540.00	6561.82	0.00	22319.92	559.00	772.00	8639.80	32290.72
Madhya Pradesh	State	5400.00	0.00	0.00	0.00	5400.00	0.00	1703.66	83.96	7187.62
	Private	6174.00	0.00	100.00	0.00	6274.00	0.00	0.00	4180.40	10454.40
	Central	3342.38	0.00	257.00	0.00	3599.38	273.00	1520.00	300.00	5692.38
	Sub-Total	14916.38	0.00	357.00	0.00	15273.38	273.00	3223.66	4564.36	23334.40
Chhattisgarh	State	2280.00	0.00	0.00	0.00	2280.00	0.00	120.00	11.05	2411.05
	Private	8850.00	0.00	0.00	0.00	8850.00	0.00	0.00	524.30	9374.30
	Central	2110.75	0.00	0.00	0.00	2110.75	48.00	100.00	0.00	2258.75
	Sub-Total	13240.75	0.00	0.00	0.00	13240.75	48.00	220.00	535.35	14044.10
Maharashtra	State	10170.00	0.00	672.00	0.00	10842.00	0.00	2850.84	388.13	14080.97
	Private	12456.00	0.00	568.00	0.00	13024.00	0.00	481.00	8804.41	22309.41
	Central	4667.80	0.00	2272.73	0.00	6940.53	690.00	0.00	123.00	7753.53
	Sub-Total	27293.80	0.00	3512.73	0.00	30806.53	690.00	3331.84	9315.53	44143.90
Dadra & Nagar Naveli	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	5.46	5.46
	Central	195.60	0.00	66.34	0.00	261.94	9.00	0.00	0.00	270.94
	Sub-Total	195.60	0.00	66.34	0.00	261.94	9.00	0.00	5.46	276.40
Central - Unallocated		2333.00	0.00	197.59	0.00	2530.59	228.00	0.00	0.00	2758.59
Total (Western Region)	State	21560.00	1040.00	2849.82	0.00	25449.82	0.00	5446.50	547.89	31444.21
	Private	34745.67	500.00	4676.00	0.00	39921.67	0.00	481.00	21864.76	62267.43
	Central	16502.95	0.00	3280.67	0.00	19783.62	1840.00	1620.00	666.30	23909.92
	Grand Total	72808.62	1540.00	10806.49	0.00	85155.11	1840.00	7547.50	23078.94	117621.55



**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 31.03.2019)

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	281.00	0.00	0.00	0.00	281.00	0.00	0.00	255.45	536.45
	Central	3849.33	0.00	0.00	0.00	3849.33	0.00	110.00	0.00	3959.32
	Sub-Total	4130.33	0.00	0.00	0.00	4130.33	0.00	110.00	326.15	4566.47
Jharkhand	State	420.00	0.00	0.00	0.00	420.00	0.00	130.00	4.05	554.05
	Private	730.00	0.00	0.00	0.00	730.00	0.00	0.00	34.95	764.95
	Central	393.74	0.00	0.00	0.00	393.74	0.00	61.00	0.00	454.74
	Sub-Total	1543.74	0.00	0.00	0.00	1543.74	0.00	191.00	39.00	1773.74
West Bengal	State	5400.00	0.00	100.00	0.00	5500.00	0.00	986.00	121.95	6607.95
	Private	2437.00	0.00	0.00	0.00	2437.00	0.00	0.00	352.50	2789.50
	Central	760.77	0.00	0.00	0.00	760.77	0.00	410.00	0.00	1170.77
	Sub-Total	8597.77	0.00	100.00	0.00	8697.77	0.00	1396.00	474.45	10568.22
DVC	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	6985.04	0.00	0.00	0.00	6985.04	0.00	186.20	0.00	7171.24
	Sub-Total	6985.04	0.00	0.00	0.00	6985.04	0.00	186.20	0.00	7171.24
Odisha	State	420.00	0.00	0.00	0.00	420.00	0.00	2061.92	26.30	2508.22
	Private	2939.00	0.00	0.00	0.00	2939.00	0.00	0.00	473.46	3412.46
	Central	1633.90	0.00	0.00	0.00	1633.90	0.00	89.00	10.00	1732.90
	Sub-Total	4992.90	0.00	0.00	0.00	4992.90	0.00	2150.92	509.76	7653.58
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	399.00	0.01	399.01
	Central	87.03	0.00	0.00	0.00	87.03	0.00	64.00	0.00	151.03
	Sub-Total	87.03	0.00	0.00	0.00	87.03	0.00	823.00	52.12	962.15
Central - Unallocated		1126.83	0.00	0.00	0.00	1126.83	0.00	85.01	0.00	1211.84
Total (Eastern Region)	State	6240.00	0.00	100.00	0.00	6340.00	0.00	3537.92	275.11	10153.03
	Private	6387.00	0.00	0.00	0.00	6387.00	0.00	399.00	1116.37	7902.37
	Central	14836.64	0.00	0.00	0.00	14836.64	0.00	1005.20	10.00	15851.84
	Grand Total	27463.64	0.00	100.00	0.00	27563.64	0.00	4942.12	1401.48	33907.24

# **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 31.03.2019)

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	3813.18	36.80	7723.86	0.00	0.00	7433.42	15157.28
	Central	1546.83	127.73	0.00	0.00	1674.56	127.27	0.00	250.00	2051.83
	Sub-Total	10430.71	127.73	4048.58	36.80	14643.82	127.27	1673.60	7739.60	24184.29
Telangana	State	5582.50	0.00	0.00	0.00	5582.50	0.00	2479.93	41.22	8103.65
	Private	839.45	0.00	831.82	0.00	1671.27	0.00	0.00	3936.44	5607.71
	Central	1806.85	149.27	0.00	0.00	1956.12	148.73	0.00	10.00	2114.85
	Sub-Total	8228.80	149.27	831.82	0.00	9209.89	148.73	2479.93	3987.66	15826.21
Karnataka	State	5020.00	0.00	0.00	127.92	5147.92	0.00	3586.60	193.89	8928.41
	Private	1958.50	0.00	0.00	25.20	1983.70	0.00	0.00	13635.91	15619.61
	Central	2427.80	401.40	0.00	0.00	2829.20	698.00	0.00	0.00	3527.20
	Sub-Total	9406.30	401.40	0.00	153.12	9960.82	698.00	3586.60	13829.79	28075.21
Kerala	State	0.00	0.00	0.00	159.96	159.96	0.00	1856.50	172.90	2189.36
	Private	615.00	0.00	174.00	0.00	789.00	0.00	0.00	190.21	979.21
	Central	861.42	281.80	359.58	0.00	1502.80	362.00	0.00	50.00	1914.80
	Sub-Total	1476.42	281.80	533.58	159.96	2451.76	362.00	1856.50	413.11	5083.37
Tamil Nadu	State	4320.00	0.00	524.08	0.00	4844.08	0.00	2178.20	122.70	7144.98
	Private	4587.67	250.00	503.10	211.70	5552.47	0.00	0.00	12292.28	17844.75
	Central	3025.32	1364.20	0.00	0.00	4389.52	1448.00	0.00	231.90	6069.42
	Sub-Total	11932.99	1614.20	1027.18	211.70	14786.07	1448.00	2178.20	12646.88	31059.15
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	100.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
	Sub-Total	0.00	100.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
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	3.14	3.14
	Central	140.80	107.60	0.00	0.00	248.40	86.00	0.00	0.00	334.40
	Sub-Total	140.80	107.60	32.50	0.00	280.90	86.00	0.00	3.14	370.04
Central - Unallocated		1426.00	358.00	0.00	0.00	1784.00	450.00	0.00	0.00	2234.00
Total (Southern Region)	State	19932.50	0.00	791.98	287.88	21012.36	0.00	11774.83	586.88	33374.07
	Private	11874.50	250.00	5322.10	273.70	17720.30	0.00	0.00	37491.40	55211.70
	Central	11235.02	2890.00	359.58	0.00	14484.60	3320.00	0.00	541.90	18346.50
	Grand Total	43042.02	3140.00	6473.66	561.58	53217.26	3320.00	11774.83	38620.18	106932.27

**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 31.03.2019)

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	26.50	51.00
	Central	408.52	0.00	435.56	0.00	844.08	0.00	357.08	25.00	1226.16
	Sub-Total	408.52	0.00	788.27	0.00	1196.79	0.00	457.08	56.51	1710.38
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	29.39	29.39
	Central	37.05	0.00	46.82	0.00	83.87	0.00	116.55	0.00	200.42
	Sub-Total	37.05	0.00	46.82	0.00	83.87	0.00	116.55	136.50	336.92
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	0.12	0.12
	Central	45.60	0.00	109.69	0.00	155.29	0.00	72.27	0.00	227.56
	Sub-Total	45.60	0.00	109.69	0.00	155.29	0.00	394.27	32.65	582.21
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	0.09	0.09
	Central	56.10	0.00	436.95	0.00	493.05	0.00	68.49	5.00	566.54
	Sub-Total	56.10	0.00	606.45	0.00	662.55	0.00	68.49	21.10	752.14
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	3.44	3.44
	Central	47.10	0.00	71.57	0.00	118.67	0.00	95.34	0.00	214.01
	Sub-Total	47.10	0.00	71.57	36.00	154.67	0.00	95.34	8.89	258.90
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	57.33	0.00	138.36
	Sub-Total	32.10	0.00	48.93	0.00	81.03	0.00	57.33	31.67	170.03
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	0.50	0.50
	Central	31.05	0.00	40.46	0.00	71.51	0.00	97.94	0.00	169.45
	Sub-Total	31.05	0.00	40.46	0.00	71.51	0.00	97.94	36.97	206.42
Central - Unallocated		112.50	0.00	63.62	0.00	176.12	0.00	140.00	0.00	316.12
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	61.04	85.54
	Central	770.02	0.00	1253.60	0.00	2023.62	0.00	1005.00	30.00	3058.62
	Grand Total	770.02	0.00	1775.81	36.00	2581.83	0.00	1427.00	324.29	4333.11

**INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN ISLANDS**

**INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES**

(As on 31.03.2019)

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	6.63	6.63
	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	16.98	57.03
Lakshadweep	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	7.38	7.38
	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	17.73	57.78

**Annexure 12A**

(Item No. 12.6)

**Details of Foreign Tours performed during 2018-19:**

Sl.No.	Purpose of the Visit	Name & Designation of the Officer	Country	Duration of Visit
1.	Actionable points from the review meeting to discuss progress made in identified areas of co-operation under 4th India-China SED Mechanism	1. Shri Nitin Prakash, Deputy Director	China	13 April, 2018 To 15 April, 2018
2.	PACE fellowship program for Renewable Energy Integration into the Grid	1. Shri Ishan Sharan, Director 2. Shri Anzum Parwej, Deputy Director	USA	23 April, 2018 To 05 May, 2018
3.	Pre Bid meeting of MEM # 7A Punatsangchhu-I H.E Project(6*200MW)	1. Shri Pankaj Gupta, Director, HETD 2. Shri Deepak Sharma, Deputy Director, HETD 3. I.K.Mehra, Deputy Director, Office of Secretary ,CEA	Bhutan	09 June 2018 To 12 June 2018
4.	Site visit to Mangdechhu HE Project	1. Shri Shravan Kumar, Director(HPA-I) 2. Ms. Arpita Upadhyay(HPA-I)	Bhutan	21 June 2018 To 23 June 2018
5.	11th World Hindi Conference	1. Shri Naresh Bhandari, Chief Engineer	Mauritius	18 August 2018 To 26 August 2018
6.	Visit of CEA and NTPC team to Thermal Power Plants with emission reduction technology installed by Ljungstrom in USA	1. Shri Narendra Singh, Chief Engineer	USA	09 September 2018 To 12 September, 2018
7.	Capacity Building Program of NERPC for Higher Management Batch on Integration of Renewable Energy Sources in to the Grid	1. Shri P C Kureel, Secretary CEA 2. Shri. P K Mishra Member Secretary,NERPC	Germany	20 August 2018 To 27 August 2018
8.	Inspection and witnessing of Test on 400kV XLPE Cables & 3 kV Bonding Cable at M/s. LS Cable & System Limited	1. Shri Saumen Biswas, Chief Engineer 2. Shri Raj Kumar Jayaswal, Deputy Director	South Korea	19 September 2018 To 23 September 2018
9.	Discussions of Indian delegation with Royal Government of Bhutan regarding 2585 MW Sankosh Reservoir HEP	1. Shri P C Jiloha, Chief Engineer	Bhutan	18 September, 2018 To 20 September, 2018
10.	15th Meetings of Indo-Bangladesh Joint Working Group (JWG) and Joint Steering Committee (JSC) on Co-operation in power Sector	1. Shri Prakash Mhaske, Chairperson 2. Shri D K Srivastava, Director	Bangladesh	24 September 2018 To 25 September 2018
11.	IEA Energy Statistics Course in Paris	1. Shri Prahlad, Chief Engineer 2. Shri K S Babu, Director	France	08 October, 2018 To 12 October, 2018
12.	International Capacity Building (ICB) from Centre for Energy Regulation (CER) on 'Learnings from Regulatory Experiences and Market development in Europe'	1. Shri Ghanshyam Prasad, Chief Engineer 2. Shri Hemant Kumar Pandey, Director	France & UK	14 October, 2018 To 20 October, 2018

Sl.No.	Purpose of the Visit	Name & Designation of the Officer	Country	Duration of Visit
13.	Japanese Commission on Large Dams – Possibility regarding visit of a team of professionals from India to visit different dams in Japan to study latest techniques for modifications of existing structure for sediment management	1. Shri Pradeep Kumar Shukla, Chief Engineer	Japan	01 October, 2018 To 04 October, 2018
14.	Three Day workshop at Bhutan organized by ERPC Secretariat to benefit the power engineers	1. Shri Joydeb Bandyopadhyay, Member Secretary (ERPC) 2. Shri J. Ganeswara Rao, EE 3. Shri Alikpantha De, AEE 4. Shri Dinesh Kumar Bauri, EE	Bhutan	23 October, 2018 To 25 October, 2018
15.	“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 Rajesh Kumar Kohli, Deputy Director 2. Shri Kamal Kishore Chauhan, Deputy Director 3. Shri Mohammad Mannan Nazir, Deputy Director 4. Smt. Rehana Sayeed, Deputy Director	Japan	25 October, 2018 To 31 October, 2018
16.	Inspection of 400kV XLPE Cables for Contract Package #MEM-4 (400 kV XLPE Cables & Accessories) for Punatsangchuu-I HE Project at M/s. Sudkabel	1. Shri Rakesh Kumar, Assistant Director - I	Germany	25 October, 2018 To 26 October, 2018
17.	2nd Meeting of Tender Evaluation Committee of Contract Package MEM#3A – 5T EOT crane for 245kV GIS & MEM#7A – Ventilation and Air conditioning system proposed to be held at Project site	1. Shri Deepak Sharma, Deputy Director 2. Shri Anil Raghuvanshi, Deputy Director	Bhutan	10 October, 2018 To 13 October, 2018
18.	Nomination to attend the PLTEC & ALTEC meeting for Contract Package #EM-6 “Computerized Control System and Protection System along with associated equipment”	1. Shri Pankaj Gupta, Director 2. Shri Sandeep Malik, Deputy Director	Germany	22 October, 2018 To 25 October, 2018
19.	Training in PV for self-consumption	1. Shri Rakesh Goyal, Director	Germany	12 November 2018 To 16 November, 2018
20.	Knowledge Co-Creation Program on “Power Grid Planning and Operation”	1. Shri Uma Maheswara Rao Bhogie, Deputy Director	Japan	14 November, 2018 To 08 December, 2018
21.	‘Renewable Energy & Efficiency Week (REEW)’	1. Shri Saumitra Mazumdar, Director	Germany	19 November, 2018 To 23 November, 2018
22.	Inspection of LCCs of 420kV & 245kV SF6 Gas Insulated Switchgears (GIS) for Punatsangchuu-I HE Project at M/s Hyosung Corporation	1. Shri. Dev Kishan Chouhan, Assistant Director - II	South Korea	26 November, 2018 To 29 November, 2018



Sl.No.	Purpose of the Visit	Name & Designation of the Officer	Country	Duration of Visit
23.	Training programme to Essen, Germany for participation in “Flexpert FC 1 training for flexible operation of coal fired power plants”	1. Shri Pankaj Kumar Verma, Deputy Director 2. Shri Arun Kumar, Deputy Director	Germany	09 December, 2018 To 16 December, 2018
24.	Visit of Indian Delegation for 6 <sup>th</sup> meeting of Joint Working Group and Joint steering Committee on Indo – Nepal Cooperation in Power Sector	1. Shri P S Mahaske Chairman, CEA 2. Shri Pradeep Jindal, Chief Engineer (PSPA-II)	Nepal	23 January 2019 To 24 January 2019
25.	TCC Meeting of Khologchhu Hydro Electric Limited	1. Shri Pankaj Gupta Director	Bhutan	12 February 2019 To 13.February2019
26.	Meeting of Joint Technical Team-Transmission,Joint Technical team – Generation and @nd Working meeting of Jint Working Group	1. Shri Bikas Chandra Mallick Chief Engineer (TR&M) 2. Shri Pradeep Jindal, Chief Engineer (PSPA-II)	Myanmar	18 February 2019 To 19 February 2019
27.	Biomass Utilization of Power generation through co-firing in Pulverised coal Fired Boilers –Visit to Thermal Power Plants	1. Shri Hem Raj Arora Director(TE&TD) 2. Shri Lokendra Singh Tomar, Assistant director-II(TPM-I)	Denmark	25 February 2019 To 01 March 2019
28.	Inspection of Local Control Panels Punatsangchhu-II HE Project	1. Shri V.Sita Rama Raju Deputy Director(HE&RM) 2. Shri Sharad Chandra Bhupesh, Assisstant Director-I(HP&I)	South Korea	04 march 2019 To 08 march 2019
29.	Grid Integration Of Renewable Energy and Flexibility of Power Plants	1. Shri Dinesh Chandra, Chief Engineer(GM) 2. Shri L.D. Papney, Chief Engineer (TETD)	Denmark	11 March 2019 To 15 <sup>th</sup> March 2019
30.	Study Tour Capacity Building Programme on Integration of Renewable Energy Sources into Grid in respect of Middle Management-II	1. Shri. V. K. Mishra, Chief Engineer, CEA 2. Shri. DevroopSinghvi, Dy. Director,CEA 3. Shri. Shiva Suman, Dy. Director,CEA 4. Shri Srijit Mukherjee, AEE,NERPC	Germany & Spain	15 March 2019 To 28 <sup>th</sup> March 2019
31.	Renewable Energy course at Denmark Technical university	1. Shri BhagwanSahayBairwa Director(PSPA-II) 2. Shri Prashant Bhamu, Assisstant Director-II(IRP)	Denmark	18 March 2019 To 29 March 2019
32.	BIMSTEC Expert Group Meeting on Energy	1. Shri Pradeep Jindal, Chief Engineer (PSPA-II)	Mynamar	28 March 2019 To 29 march 2019