सत्यमेव जयते

भारत सरकार
Government of India
विद्युत मंत्रालय
Ministry of Power
केन्द्रीय विद्युत प्राधिकरण
Central Electricity Authority
प्रोटोकॉल इकाई, सचिव का कार्यालय
Protocol Unit, Office of Secretary

विषय:- के.वि.प्रा. की वार्षिक विवरण (Annual Report) 2017-2018 के सम्बन्ध में।

केन्द्रीय विद्युत प्राधिकरण की वार्षिक रिपोर्ट वर्ष 2017-2018 के अंग्रेजी संस्करण की एक प्रति आपके अवलोकनार्थ संलग्न हैं। यह रिपोर्ट विघुत क्षेत्र के कार्य निष्पादन तथा देश के विघुत विकास में के.वि.प्रा.की भूमिका को दर्शाती हैं। इस सन्दर्भ में आप अपने महत्वपूर्ण सुझाव प्रोटोकोल युनिट के ई-मेल **protocol.cea@gov.in** पर प्रेषित कर सकते है।

सलंग्न:- वार्षिक विवरण (Annual Report) 2017-2018 - एक प्रति ।

अजय आर्या
५/१०/१८

(अजय आर्या)
उप निदेशक एवं प्रोटोकॉल अधिकारी
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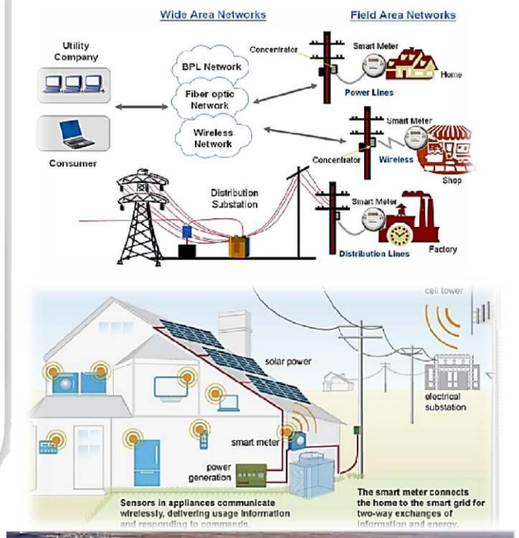
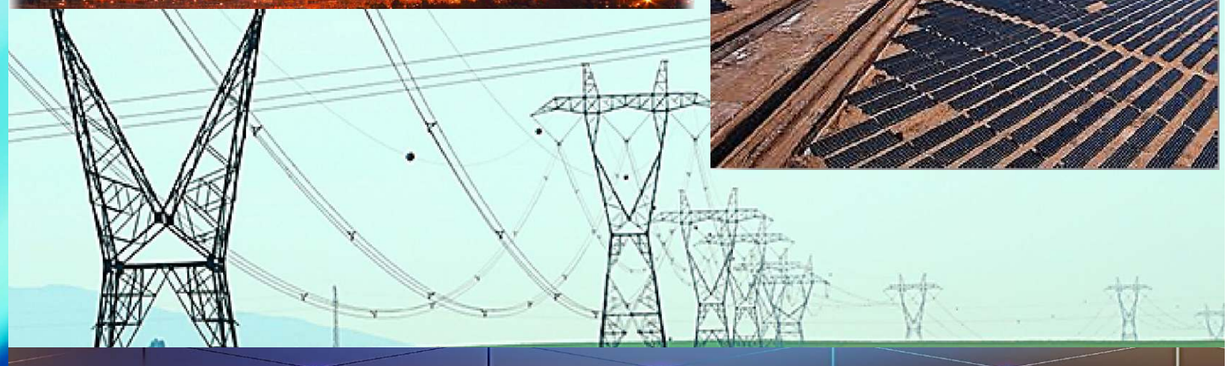
निदेशक (आई टी)- साफ्ट कापी एवं डीवीडी प्रेषित की जा रही है। कृप्या करके इसे के.वि.प्रा.की वेबसाइट पर अपलोड करे ।

पत्र संख्या- के.वि.प्रा/प्रोटोकॉल/2018-19/ 595 **दिनांक : 04.10.2018**

ANNUAL REPORT 2017-2018

ANNUAL REPORT
2017-18





GOVERNMENT OF INDIA
MINISTRY OF POWER
CENTRAL ELECTRICITY AUTHORITY

ANNUAL REPORT 2017-18

सत्यमेव जयते

GOVERNMENT OF INDIA
MINISTRY OF POWER
CENTRAL ELECTRICITY AUTHORITY

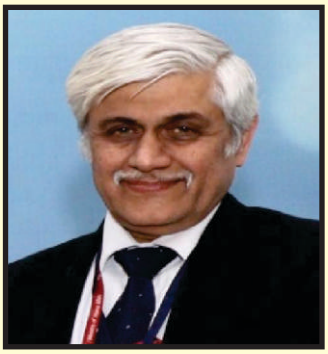
THE AUTHORITY

(As on 31.03.2018)

Sh. Ravindra Kumar Verma
Chairperson and Member (G.O.&D)

Dr. Somit Dasgupta
Member (E&C)

Sh. K.K. Arya
Member (Hydro)

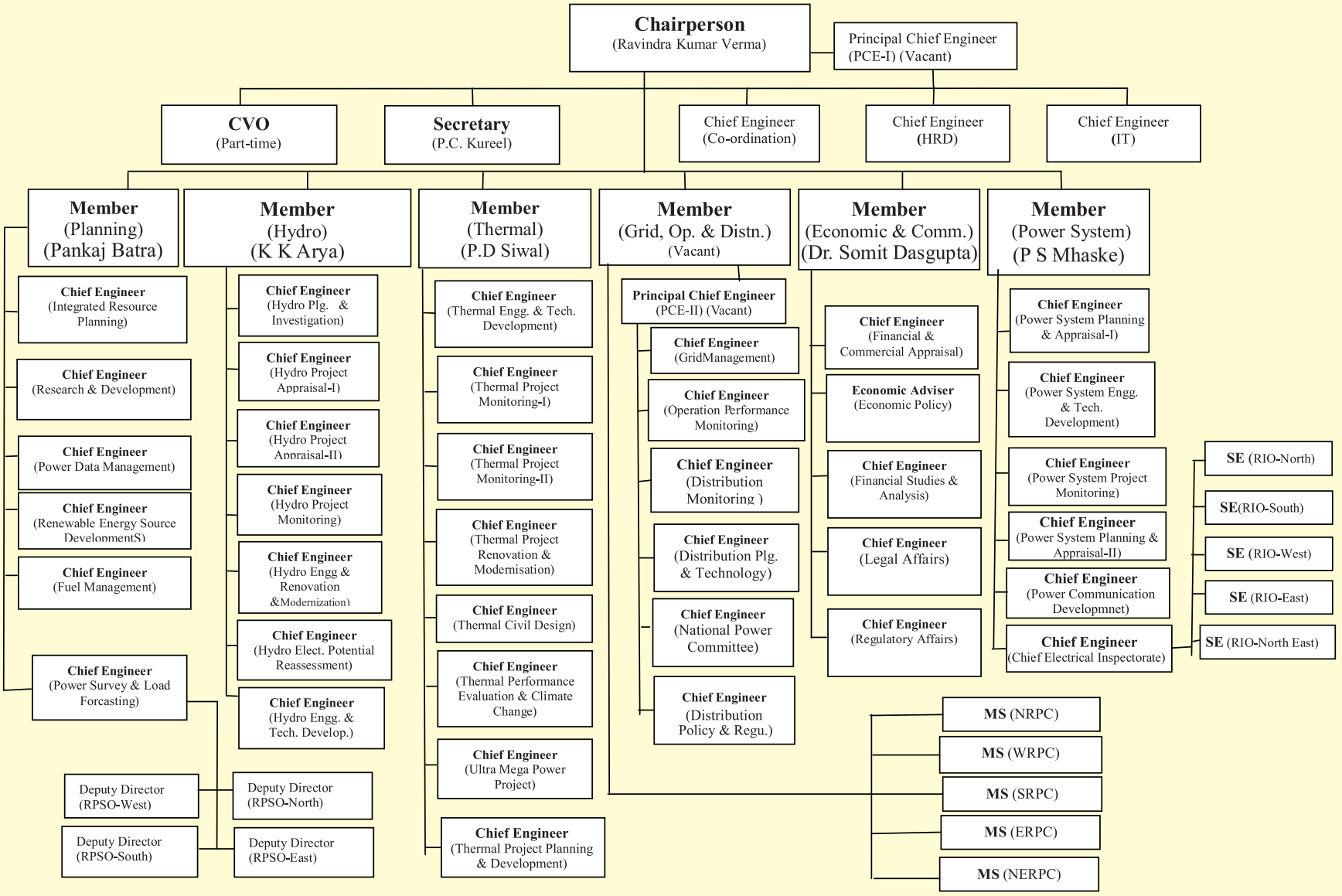


Sh. Pankaj Batra
Member (Planning)

Sh. P.S.Mhaske
Member (Power System)

Sh. P.D. Siwal
Member (Thermal)

Organization Chart of CEA
(As on 31.03.2018)



CENTRAL ELECTRICITY AUTHORITY

Sewa Bhawan, R. K. Puram, New Delhi-110066

CEA Website: 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 , 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)**, West Block II, R. K. Puram, New Delhi-110066
3. **Dy. Director, Regional Power Survey Office (South)**, Letter Box No. 38, 6th Floor, 'F' Wing, Kendriya Sadan,Koramangala, Bengaluru-560034
4. **Dy. Director, Regional Power Survey Office (West)** ,F-3, 5th 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,Tollygunge, 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, 3rd 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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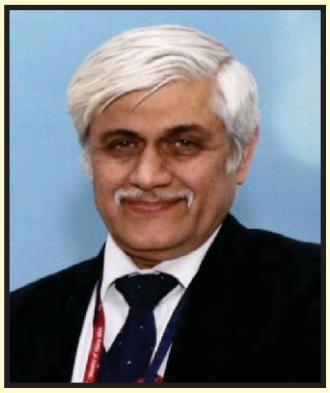
From the Chairperson



Recognizing the emphasis of the Government of India on a sustained growth of the country, initiatives have been taken to increase power generation in the country and to provide reliable and quality power to all. With consistent efforts in this direction, the Power Sector in India has achieved a capacity addition of 9.505 GW in conventional power and 11.778 GW of Renewable power during the year 2017-18 raising the Installed Generation Capacity to around 344 GW as on 31.03.2018 comprising of 223 GW of Thermal, 45 GW of Hydro, 7 GW of Nuclear and 69 GW of Renewables.

While the coal based generation is expected to continue being the main stay of electricity generation, the share of generation from Renewables is on a growth trajectory and it was about 20.06% of total Installed Capacity contributing 7.8% of total energy generation in the country during 2017-18. The total electricity supplied in the country during 2017-18 was of the order of 1205 BU and the peak demand met was 161 GW.

Government of India has launched Pradhan Mantri Sahaj Bijli Har Ghar Yojana–"**Saubhagya**" on 11th October,2017 for providing last mile connectivity and electricity connections to all households in rural and urban areas. During the year 2017-18, 40.46 lacs of households have been electrified. Further, 99.94 % of the inhabited villages in the country have been electrified by end of 2017-18. Smart meters which enable two-way communication between the meter and the central system for efficient accounting and control of electricity, have been introduced in the Indian Distribution sector.

One of the functions of CEA is to accord concurrence to hydroelectric projects. During the year 2017-18, CEA had appraised and accorded concurrence to three (3) hydro generation schemes aggregating to 5531 MW capacity.

Besides the statutory obligations, CEA rendered engineering and consultancy to the utilities in India and in the neighboring countries. During the year 2017-18, CEA rendered design and engineering to about 5110 MW of hydro generating capacity comprising four (4) Hydro Electric Projects which include Punatsangchhu Stage-I (6x200 MW) and Punatsangchhu Stage-II (6x170 MW) Projects in Bhutan. Further, technical advice related to transmission system has been rendered to various power utilities and agencies.

Central Electricity Authority (CEA) promotes and assists in the timely completion of transmission projects for improving and augmenting the power system in the country. During the year 2017-18, 23119 CKm of Transmission lines has been laid down and 86193 MVA of Transformation Capacity has been commissioned. The Inter-regional power transmission capacity has increased

from 75 GW to 86 GW during the year 2017-18. CEA has prepared a Compendium of tested tower designs for EHV transmission lines for the use of various power utilities.

Section 3(4) of the Electricity Act 2003 mandates CEA to prepare the National Electricity Plan (NEP) in accordance with the National Electricity Policy and to notify the Plan once in five years. In fulfillment of above obligation, CEA has prepared the **National Electricity Plan (Volume I)-Generation** and has notified the same on 28th March,2018. The NEP covers review of the capacity addition in 12th Plan (2012-2017) and perspective planning for the 2017-22 & 2022-27 periods. This Plan is based on the demand forecast of the 19th Electric Power Survey(EPS) conducted by CEA. The Revised **National Electricity Plan (Volume II)-Transmission** was prepared and submitted to Ministry of Power for approval.

Large scale integration of renewables is a challenging task and its successful integration requires appropriate solutions. In order to look into various aspects, a Committee of CEA was constituted to study optimal location of various types of balancing energy sources/energy storage devices to facilitate grid integration of Renewable Energy Sources. The Committee submitted Report to Ministry of Power(MoP) on 15.12.2017. The Report covers, among other things, the balancing requirement, Ancillary market development and sharing of cost of the same.

CEA plays a pivotal role in optimal utilization of coal and gas for the power sector. Based on the generation target of coal based plants, CEA estimated total coal requirement of 630 Million Tonnes (MT) for the year 2017-18 with 584 MT for plants designed on domestic coal and remaining 46 MT for plants designed on imported coal. The total coal consumption during 2017-18 was about 608 MT, with the power utilities importing 56.41 MT of coal comprising of 17.04 MT for blending with domestic coal and 39.37 MT for thermal power stations designed on imported coal. The gas allocations committed for power stations were not fulfilled even during 2017-18 with the supply of 30.72 MMSCMD to gas based power plants, as against the requirement of about 114 MMSCMD.

A new transparent coal allocation policy for power sector, 2017 SHAKTI (Scheme for Harnessing and Allocating Koyala Transparently in India) has been issued by Ministry of Coal in May, 2017. This new coal linkage policy would ensure a proper mechanism for sourcing coal by the power plants as per their schedules and would ensure that all projects are supplied coal as per their entitlement.

Coal based generation is likely to fuel and support the targeted GDP growth envisaged by the Government in years to come. Efforts are therefore being focused on improving the efficiency of coal based generation. New Environmental norms have been issued by Ministry of Environment, Forest and Climate Change (MoEF&CC) on 7th December 2015 for Thermal Power Stations making norms for Suspended Particulate Matter (SPM) more stringent than existing norms. Norms for SOx, NOx and Mercury along with norms for water consumption in Thermal Power Stations have been notified for the first time. In respect of complying with norms of SO_2 emission, the thermal power plants are required to be fitted with flue gas desulphurization (FGD) system. In this regard, CEA has prepared a standard technical specification for retrofit of wet limestone based FGD system in a typical 2x500MW power plant. An implementation plan which extends from the year 2018 to 2022 for compliance with above environmental norms has been prepared and submitted to MoEF&CC.

CEA has been playing a proactive role in development of Ultra Mega Power Projects (UMPPs) in respect of selection of sites, preparation of technical documents/studies, tie-up of inputs and the

bidding process. The Standard Bidding Documents (SBDs) for domestic coal & imported coal have been revised and are under approval. The preparation of SBD for coal linkage based UMPP is under process. After the issue of these SBDs by Government, further bidding of UMPPs can be taken up.

On behalf of Ministry of Power (MoP), CEA has been actively monitoring the Fly Ash generation at coal/lignite based thermal power station (TPS) in the country since 1996. The annual Fly ash utilization has remained about 60% of the fly ash generated in recent years and reached to 63.28 % in 2016-17. CEA is actively involved in planning and development of a **web based monitoring system** on which feeding of data by the Thermal Power Stations is under progress. Further, a mobile application **"ASH TRACK",** which is a GIS-based interface between fly ash generators and potential fly ash users, has been developed and launched on 09.02.2018. This mobile application contains useful information regarding quantum of fly ash available at nearby TPS and contact details of nodal officer of the power station concerned for sending requisition of Ash.

As an impetus to Research and Development in Power Sector, CEA identified thrust areas for undertaking research in future, and organized conference / international conclave as promotional measure. CEA has submitted report on ''Technical aspects of Charging Infrastructure for electric vehicle". Further, as part of BIS Committee, CEA has developed safety/performance standards for Energy Storage System for finalization by the BIS Committee.

All out efforts are being made to enhance the usage of Hindi in official work in all the offices of CEA. This year, Hindi correspondence percentage achieved is 92.49% in Region "A", 90.01% in Region "B" and 83.48% in Region "C". In CEA most of the officers and employees are trained in Hindi language. The Hindi Fortnight was organized in CEA from 14.09.2017 to 28.09.2017 and prize distribution ceremony was also held for meritorious services/winners of contests in Hindi on 28.09.2017. During the year, four Hindi workshops were organized in which lectures were delivered by the Guest lecturers on different topics related to official language. CEA was entrusted additional responsibility of monitoring Hindi progress in 66 offices covered in *Nagar Rajbhasha Karvanyan Samiti* (NARAKAS) (South Delhi-II) by Northern Regional Implementation Office-1 (Delhi) of RajbhashaVibhag, MHA.

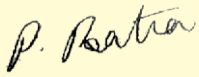
CEA has been at the forefront for development of **National Power Portal (NPP)** which has been launched on 14th November,2017. NPP is a centralized portal for Indian Power Sector which facilitates online data capture/input (daily, monthly, annually) from generation, transmission and distribution utilities in the country and disseminate Power Sector Information (operational, capacity, demand, supply, consumption etc). A detailed framework for registration of all electricity generating units was prepared by CEA and it was approved by the Ministry of Power. In the framework, there is a provision of mandatory registration of all the electricity generating units of 0.5 MW and above capacity by assigning each of them a unique registration number.

With a view to provide timely and necessary human resource development, the officers/officials of CEA were deputed for various service related refresher training programmes, technical courses, workshops, seminars, conferences etc. During the year 2017-18, Induction Training for 26 CPES officers was completed on 29th September,2017 and Induction Training for another 30 CPES officers was started on Ist January,2018. Further, 15 Graduate and 2 Diploma holder apprentices have undergone training in CEA under the Apprentice Act,1961 and Summer vacation internship/training was provided for 36 Engineers from various engineering colleges during the

year 2017-18. Besides, seven training institutes/centers were visited and accorded recognition/renewal of recognition in accordance with CEA(Measures Relating to Safety & Electric Supply) Regulation,2010 during the year 2017-18.

An amount of Rs. 114.79 crores has been utilized by CEA out of the allocated budget of Rs. 117.14 crore during the financial year 2017-18 which translates to utilization of 98% . It is heartening to mention that CEA has revised 1612 out of 1800 cases of pension/family pension on the recommendations of 7th Central Pay Commission during the year 2017-18. E-office Application has been launched in CEA on 1st January, 2018 for achieving the objective of "Less Paper" Office with a simplified, responsive and effective working environment in CEA.

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.



(Pankaj Batra)
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 Inspectorate Offices, four (4) Regional Power Survey Offices and five (5) Regional Power Committees located in various parts of the country.

A) Regional Inspectorate Offices (RIO)

Under Chief Engineer (CEI) in Power System Wing, five (5) Regional Inspectorate Offices (RIO), 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.

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

Section 34 – Grid Standards

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

Section 53 - Provision relating to Safety and Electricity Supply

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

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

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

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

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

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

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

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

Section 55 - Use, etc. of Meters

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

Section 177- Powers of Authority to make Regulations

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

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

(a) the Grid Standards under section 34;

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

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

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

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

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

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

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

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

Chairperson

Chairperson is the Chief Executive of the Authority.

Member (Planning)

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

Member (Thermal)

Overall thermal power development in the country; updating, development and evaluation of thermal technologies; design and engineering of thermal projects; quality assurance standards and plans; preparation of model documents and standards; thermal projects investigation and ash utilization; coal, oil and gas linkages to power projects; energy conservation; energy auditing; environmental aspects of thermal projects; monitoring of construction and stabilization of thermal projects and suggesting remedial measures to problems involved; renovation, modernisation and life extension programmes of thermal generating stations; making operating norms for thermal generating stations, development of Ultra Mega Power Projects (UMPPs) etc.

Member (Hydro)

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

Member (Power System)

Planning and development of transmission system consistent with national power plans; studies for the purpose of appraisal of transmission projects; transmission technology development; design and engineering; standardization and preparation of model document; renovation

and modernization of transmission schemes; construction monitoring of transmission projects; coordination of telecommunication system and power lines; matters related to communication, data acquisition and software support in power sector; inspection of existing electrical installations in Union Territories and Central Government Departments; investigation of accidents on electrical installations and suggesting remedial measures for their minimization and prevention etc.

Member (Grid Operation & Distribution)

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

Member (Economic & Commercial)

Economic evaluation of power policies and projects; appraisal of tariff for Nuclear Power Stations; analysis of financial packages; financial parameters; interest during construction and completed cost; examination of bulk power tariff structure; performance of power sector utilities; scrutiny for import duty exemption; certification of deemed export benefit; co-ordination for externally aided schemes; examination of Power Purchase Agreements, advice on legal matters, amendments in Electricity Act,2003, National Electricity Policy, Tariff Policy and Electricity Rules etc.

Secretary

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

1.4 Personnel and Administration

1.4.1 Staff strength of CEA

The staff strength of CEA as on 31.03.2018 was 773 as against the sanctioned strength of 1462 leaving 689 posts vacant. The summarized position of staff strength is shown in the table below:

Category	Sanctioned Strength			Filled Strength		
	Head-Quarters	Sub-Office	Total	Head-Quarters	Sub-Office	Total Strength
Chairperson/Members	07	-	07	06	-	06
CPES GROUP-A	348	84	432	219	58	277
CPES GROUP-B	90	19	109	61	15	76
Non CPES Group						
Group-A	57	-	57	38	-	38
Group-B	394	39	433	126	14	140
Group-C	143	70	213	65	43	108
Group-C(MTS)	154	57	211	96	32	128
Total	**1193**	**269**	**1462**	**611**	**162**	**773**

1. No vacancies were intimated to UPSC for AD-I (Gr.A) against ESE-2016, hence no AD-I had joined during 2017-18.

2. Out of the 109 sanctioned posts of CPES AD-II (Group-B) in CEA, 76 posts are filled. 61 vacancies were intimated to UPSC for the post of AD-II against ESE-2016, out of which 43 nominations were received. Of these 29 candidates have joined during the recruitments years 2017-18 Gr.B AD-II, 04 (SC), 02 (ST), 08 (OBC), 01 (PH). Four numbers of offer of appointment have been cancelled, 09 candidates are yet to join and 01 candidate has denied to join.

3. Consequent on 3rd Cadre Review of CPES, the Service Rules have been notified vide Gazette Notification dated 14.02.2015. After 3rd Cadre review, 429 posts of the position of CPES Gr.A Service comprise of : 2 – HAG, 42-SAG, 94-JAG, 160-STS and 131- JTS posts. In addition, three posts at SAG level for CPE (Gr.A) officers have also been created one each at Krishna River Management Board, Godavari River Management Board and Polavaram Project Authority at Hyderabad.

4. **Subordinate Offices:**

(i) One vacancy of AD (OL) was filled in Decemeber,2017 on deputation basis.

(ii) One vacancy of LDC was filled in December, 2017 on the basis of CHSL, 2015 Examination held by SSC.

1.4.2 No. of Women Employees in CEA (as on 31.03.2018)

Category	No. of Govt. Employees		No. of Women employees In position	% age
	Sanctioned	Filled		
Chairperson/ Members	07	06	-	-
CPES GROUP-A	432	277	29	10.24%
CPES GROUP-B	109	76	11	14.47%
Non CPES Group				
Group-A	57	38	09	23.68%
Group-B	433	140	65	46.42%
Group-C	213	108	23	21.29%
Group-C(MTS)	211	128	13	10.15%
Total	**1462**	**773**	**150**	**19.40%**

1.4.3 Representation of Scheduled Castes, Scheduled Tribes, OBC & Physically Handicapped Employees (as on 31.03.2018)

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	03	-	-	-
CPES GROUP-A	432	277	54	17	31	04
CPES GROUP-B	109	76	11	06	18	02
Non CPES Group						
Group-A	57	38	02	04	01	-
Group-B	433	140	33	08	11	04
Group-C	213	108	19	06	19	01
Group-C(MTS)	211	128	47	02	07	03
Total	**1462**	**773**	**169**	**43**	**87**	**14**

1.4.4 Representation of Physically Challenged employees (as on 31.03.2018)

Group	Total employees as on 31.03.2018	Physically Challenged Employees				Percentage of Physically Challenged
		VH	HH	OH	Total	
Group A (CPES+NON-CPES)	315	-	01	03	04	1.26%
Group B	216	-	01	04	05	2.31%
Group C	108	01	-	-	01	0.9%
Group –C(MTS)	128	01	-	02	03	2.34%
Total	**767**	**02**	**02**	**09**	**13**	**1.69%**

1.5 Annual Budget

1.5.1 During the year 2017-18, against an allocation of Rs. 18.04 Crores (reduced to Rs. 14.04 Crores in the FE 2017-18) under Plan side, an expenditure of Rs. 13.53 Crores has been booked upto 31.03.2018.

On the Non-Plan side, during the year 2017-18 an expenditure of Rs. 100.77 Crores was incurred against an allocation of Rs. 99.10 Crores (increased to Rs. 102.73 Crores in RE 2017-18) during the year 2017-18

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. During 2017-18, CEA rendered consultancy services worth Rs. 2.50 Crores and amount of Rs. 2.60 Crores was recovered during the year (upto 31.03.2018). It includes pending payments received for consultancy services rendered by CEA.

1.6 Progressive use of Hindi in Official Work of CEA

In Central Electricity Authority the Official Language Implementation Committee (OLIC) meetings are held on regular intervals under the chairmanship of

Chairperson, CEA. Required actions are taken on the decisions taken in these meetings. During 2017-18 four quarterly meetings were held on 27.04.2017, 02.08.2017, 14.11.2017 and 26.02.2018. During the year 2017-18, the percentage of Hindi correspondence was 92.49%, 90.01% and 83.48% in Region Á', 'B'and 'C' respectively.

All possible efforts are being made at every level to promote the use of Hindi in the official functioning of CEA. All incentive schemes recommended by the Department of Official Language are being implemented in the Authority.

Hindi fortnight was organized from 14.9.2017 to 28.9.2017 in the Authority. Prize distribution ceremony was held on 28.09.2017. During the fortnight, four competitions, ie. Essay writing, Hindi Noting and Drafting, General Knowledge and Hindi dictation (for MTS employees only) were organized, in which many officers and employees participated enthusiastically. The winners of these competitions were awarded cash prizes and certificates. The ceremony was concluded with the poem recital by the guest poet Shri Satyendra Satyarthi. During the fortnight, *Chal Vaijayantis* were awarded to the Grid Management (GM) division and Hydro Engineering and Modernization Division (HERM) for achieving first and second places respectively in doing maximum correspondence in Hindi during the year. Under the Dictation Cash Award Scheme, a prize was awarded to an officer. While ten employees were rewarded under Annual Noting / Drafting cash award scheme for working in Hindi throughout the year.

Internal official language inspection of various sections are performed by Official Language Officers from time to time, so that the shortcomings, if any, could be brought to the notice of the Officers-in-charge of these Sections/Divisions. During 2017-18, 14 Sections/ Divisions of CEA were inspected. In addition to it, 5 subordinate offices of CEA were also inspected. Apart from this, Parliamentary Official Language Committee inspected CEA Headquarters, Delhi this year. Check points were prepared for the implementation of the Official Language policies and the same were signed by the Chairperson, CEA, got laminated and distributed to each Division/Section, to place the same at the appropriate place in the office of the Division / Section heads. These check points were also sent to 14 subordinate offices so that the immediate action could be taken on the main points according to the Official Language Policy.

During the year, four Hindi workshops were organized in which lectures were delivered by the Guest lecturers on different topics related to Official Language. The topics and dates of workshops conducted were- On 07.07.2017, "Google Voice Typing and Google Net Hindi Translation"; On 14.09.2017, "Contribution of the poem in the promotion of Hindi"; On 07.12.2017 "Filling up the quarterly progress report online" and on 19.03.2018 "e-office-introduction and Practicer".

In CEA, most of the officers and employees are either proficient in Hindi or having working knowledge of Hindi. Those who do not have knowledge of Hindi, are being trained in Hindi language courses / Shorthand /Typing classes organized by "Kendriya Hindi Prashikshan Sanshthan", Department of Official Language from time to time. During the year, 11 officers were sent to Central Hindi Training Institute for intensive Hindi workshop training and 1 Junior Translator was sent to the Central Translation Bureau for translation training. In addition, 3 staff members were sent to Hindi Shikshan Yojana, R.K. Puram for basic training course on working in Hindi on computers.

During the year, in July, 2017 and

February, 2018 individual Orders were issued by the Chairperson, CEA under the Section 8 (4), to carry out their complete work in Hindi to 31 officers / employees and 162 officials / employees respectively.

The meeting of NARAKAS (Town Official Language Implementation Committee) (South Delhi-2) was organized by the CEA on 26.10.2017 under the Chairmanship of Shri Ravindra Kumar Verma, Chairperson, CEA and Chairman, NARAKAS (South Delhi-2). In this meeting, 39 HODs and 54 representatives from different offices participated. In the meeting, Hindi work in the offices of the members of NARAKAS (South Delhi-II) was reviewed and suggestions for improvement were given. In addition, an introductory meeting of NARAKAS was also held on 21.08.2017, in which all the Heads of departments and 65 office-bearers were invited and various topics were discussed.

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 2017-18.

1.8 Welfare Activities in CEA

1.8.1 Welfare of SC /ST /OBC

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

1.8.2 Activities related to Women employees

Women employees of CEA have been participating in various activities viz. sports, recreation & cultural activities. 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 2017-18, the CEA Sports team participated in various sports events like Cricket, Carrom, Volley ball, Table Tennis, Badminton, Athletic, Chess etc. and CEA's welfare team participated in Inter-Ministry music and dance competition. The achievements have been as under:

1. The Chess players of CEA had participated in the Inter-CPSU Chess Tournament organized by THDC Ltd. in September,2017 at Rishikesh. Shri Lalrinsanga, Director, NERPC, Shillong had won the trophy of 3rd position in the tournament.

2. Athletic team of Men & Women of CEA had participated in the Inter-CPSU Athletic Tournament organized by BBMB on 26-27 February, 2018 at Nangal (Punjab). The women's team had won several awards/medals in the tournament. Smt. Usha Nayal, ASO got medals at 3rd position in 800 mtr. & long jump events, Smt. Jayanthy K.Vasudevan, PA had got medals at 3rd position in Discus Throw & Shot Put events,. Smt. Asha Lata Gautam, PA had won 3rd Position in 200 mtr. event and four women players (Smt. Madhu Sharma, Smt. B.Sandhya, Smt. K.G.Geeta & Smt. Usha Nayal) had won Runners up award in 400 mtr. relay.

3. CEA Jal Tarang team had participated in Inter-Ministry music and dance

competition organized by Central Civil Services Cultural and Sports Board (CCSC&SB). Shri Chandrashekhar, Chief Engineer had won medal at 2nd position in Instrumental event and Smt. Usha Nayal, ASO had won medal at 3rd position in Light Classical event.

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

38 superannuation cases and 2 VRS cases have been settled for Pension during the year 2017-18. In addition, 90 nos. of restoration of one third commuted portion of Pension/Grant of family pension cases were settled. In addition, 2 CAT/Court cases are under process.

1.9 Vigilance Activities / Disciplinary Cases in CEA

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

As part of preventive vigilance, the Vigilance Division facilitates in ensuring job rotation in sensitive posts. The Vigilance Division has also taken steps to ensure that website of CEA plays an important role in increasing transparency in its functions. Vigilance Awareness Week-2017 was observed in Central Electricity Authority and its Subordinate Offices from 30.10.2017 to 04.11.2017. The Vigilance Awareness week was celebrated to highlight the theme "My Vision-Corruption Free India".

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 31.03.2018, two cases of disciplinary action are under process for disciplinary proceedings. Out of these two cases, one case is old and one case has been received during the current year. Thus, at present two cases are pending. 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 2017-18, 239 Nos. of Grievances were received and 19 Nos. were pending as on 01.04.2017. A total of 243 Nos. Grievances were settled/disposed off during the period 01.04.2017 to 31.03.2018 with average disposal time of 27 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. 433 applications were received during the year 2017-18, under the Act and were disposed off by various CPIOs in CEA. Further, 33 applicants filed appeal to the Appellate Authority which were also decided.

1.13 Parliament Questions/Assurances, VIP references

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

1. Parliament Questions
2. Parliamentary Assurances
3. Oral evidence
4. VIP references
5. Consultative Committees
6. Standing Committee on Energy
7. Material for 'Calling Attention Motion'
8. Material for Economic Survey 2017-18
9. Major Achievements in Power Sector
10. Annual Report of the MOP for 2017-18
11. Estimates Committee
12. Monitorable targets for the year 2017-18 and Achievements
13. Power Ministers' Conference
14. Material for various speeches.
15. International Cooperation with various countries
16. Inputs for regional meeting relating to power matters of the regions
17. Action taken reports were prepared based on the inputs received from various divisions.
18. PMO/VIP/MOP references
19. Power Minister's briefing to the press
20. Material for President's Address to both the Houses of Parliament and Finance Minister's Budget Speech.
21. Compilation and processing of material for matters such as:
    - Power sector reform
    - Private Sector participation including action taken reports
    - Notes for Estimates Committee
    - Ministers meeting on power scenario etc

(B) During the year 2017-18 there were four Parliament Sessions and the Admitted version of Questions were dealt with as follows:

S. No.	Particulars	Starred Question	Unstarred Question
1.	Budget Session 2017-18	5	46
2.	Monsoon Session 2017-18	9	130
3.	Winter Session 2017-18	23	247
4.	Budget Session 2018-19	6	24

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
- Fortnightly Report for P.M.O.
- DO letter from Chairperson, CEA to Secretary (Power)

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. The 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) 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), CompDDO 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 specific 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 acts 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 serves 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 has 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, e-Office (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.

1.15.3.3 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.

1.15.3.4 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:

(i) Online Application for Inspection of Electrical Installations

(ii) DPR Approval Process Monitoring System for Hydro Projects

(iii) 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 facilitates 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.

As per the provisions of ISO 9001:2008 prescribed in the Quality Manual, Monthly, Quarterly and Half Yearly Review Meetings are held in various Divisions/Wings at the level of Chief Engineers, Members and Chairperson respectively.

ISO 9001:2008 Quality Management System certificate of CEA is valid up to 14th September, 2018. Now, in order to adopt new QMS certification of CEA as per IS/ISO 9001:2015, Apex Manual of CEA as per ISO 9001:2015 is under preparation in CEA.

CHAPTER – 2

PLANNING FOR POWER DEVELOPMENT

2.1 Power Planning

2.1.1 Generation Planning Studies

i) Generation expansion studies for the preparation of National Electricity Plan using Electric Generation Expansion Analysis System (EGEAS) software, have been carried out in CEA, in which incremental capacity requirement in terms of Thermal, Hydro, Nuclear, etc to meet the projected load and energy requirement as per 19th Electric Power Survey Report of CEA for the period 2021-22 and 2026-27 has been worked out. Retirement of old units, Renewables and Captive injection have also been considered.

ii) After procuring a New Generation Expansion planning model namely ORDENA Software by CEA in December,2016, the Generation planning studies are being carried out using the Software for 2021-22 and 2026-27. It was found that the results matched with the NEP results.

iii) To assess the optimal mix of capacity addition for the years 2017-22 and 2022-27, Generation Planning Studies using EGEAS/ORDENA Software were carried out.

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. The draft National Electricity Plan covering the review of 12th Plan, detailed plan for 2017-22 and perspective plan for 2022-2027 was uploaded on CEA website for stakeholder's comments. Based on the comments received from stakeholders, final National Electricity Plan, Volume1 (Generation) has been Notified vide Extra Ordinary Gazette No. 1871, Sl. No. 121 under part-III, Section IV dated 28.03.2018.

2.1.3 Reports brought out

i) National Electricity Plan, Volume 1 (Generation) was published vide Extra ordinary Gazette No. 1871, Sl. No. 121, under part-III, Section IV dated 28.03.2018.

ii) Assessment of the optimal mix of capacity addition for the years 2017-22 and 2022-27 and preparation of the report on optimal generation mix keeping in view the INDC targets.

iii) Detailed analysis for flexible operation of coal based power plants in view of large-scale integration of Renewables.

iv) Estimation of Solar and Wind contribution during Peak Hours for the State of Madhya Pradesh.

v) Report of Demand Creation Sub Group constituted by Ministry of Power for in depth analysis of issues related to creation of demand to address the stress in Power sector.

2.1.4 Capacity addition during 12th Plan

i) As against a capacity addition target of 88537 MW, capacity addition of 99209.47 MW was achieved during 12th Plan(2012-17).

ii) As 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 MW Thermal, 0 MW Nuclear.

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

i) Member (Planning) was the Chairman of Demand Sub Group for in depth analysis

of issues related to creation of demand to address the stress in Power Sector and Chief Engineer (IRP) was the Member Secretary of the Committee constituted by Ministry of Power.

ii) Chief Engineer (IRP), CEA was Chairman of Expert group to input and consultation to POSOCO on various technical aspects of conducting study on Operational analysis for optimization of Gas based capacity.

iii) Chief Engineer (IRP) was the Member of the Committee on Optimal Energy mix in power generation on medium and long-term basis.

2.1.6 Procurement of Planning Model Software

The New Comprehensive Planning Model Software procured in CEA was successfully commissioned and tested. A fifteen days training program was arranged for CEA officers on familiarization with the Software.

2.1.7 National Level Data Registry System

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

In accordance with above provisions, it was decided that a National Level Data Registry System for all electricity generating units of the country above a specified capacity should be maintained by CEA 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 should be available with CEA.

Accordingly, a detailed framework, for National Level Data Registry System for registering of all electricity generating units was prepared by CEA and it was approved by the Ministry of Power. In the above framework, there is a provision of mandatory registration of all the electricity generating units of 0.5 MW and above capacity by assigning each of them a unique registration number.

The registration number to be assigned by CEA shall be a unique for each generating unit in the country and the registration number once assigned to a generating unit would not be changed. The status of generating unit may change (planned/ under construction/ commissioned/retired etc.). Even if the generating unit retires, its registration number would not be assigned to any other generating unit.

For implementing the aforementioned National Level Data Registry System, an E-Registration Portal is being prepared by CEA.

2.2 Electricity Demand

Electricity demand of the country is reassessed periodically, once in five years, for medium term and long term period. The demand projection exercise is carried out by a National Level Committee of Experts, constituted by CEA with the consent of Ministry of Power, by conducting an exhaustive Electric Power Survey (EPS) of India. Electric Power Survey is undertaken by Power Survey and Load Forecasting Division (erstwhile Data Management and Load Forecast Division), CEA, by obtaining inputs from Regional Power Survey Offices (RPSOs) located in various regions, along with data

obtained from various organizations/utilities. The electricity demand forecast is the basic input for formulation of Developmental Plans and Programmes & Schemes concerning generation, transmission, trading, distribution and utilization of electricity.

The 19th Electric Power Survey (EPS) Report of India (Electricity Demand Projection of 45 Mega Cities of the country & 23 districts of National Capital Region (NCR) including Delhi in two separate volumes) is under preparation. The Report shall cover year-wise electricity demand projection for 45 Mega Cities of the country & 23 districts of National Capital Region (NCR) including Delhi for the years 2016-17 to 2026-27. The Reports shall also cover perspective electricity demand projection for Mega cities and districts of National Capital Region including Delhi for the years 2031-32 and 2036-37.

2.3 Publication on All India Electricity Statistics – General Review & Growth of 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.

2.3.1 All India Electricity Statistics – General Review

General Review-2017 covers nationwide electricity statistics relating to Generation, Transmission, Distribution, Consumption and Trading of electricity 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 covers 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 General Review contains information on about 4248 Nos. captive plants of HV/EHV industries indicating installed generating capacity and generation by such captive plants. General Review-2017 containing the data for the year 2015-16 was published in April, 2017.

General Review-2018 containing data for the year 2016-17 is under finalization.

2.3.2 Growth of Electricity Sector in India

Publication titled "Growth of Electricity Sector in India from 1947-2017" was published in May, 2017 containing data for 2015-16 and provisional /estimated data for 2016-17 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.

2.4 Standing Committee on Derating, Uprating 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 proposals received for **retirement** of the units are placed for the approval of the Chairperson/Authority considering the decisions taken by the utilities based on their own techno-economic reasons.

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. Keeping in view the technical merits of the proposals received from various generating companies, the Committee makes recommendations for the approval of the Chairperson/Authority for **de-rating and up-rating** of the units.

During the year 2017-18, various proposals of de-rating, up-rating and retirement of the generating units were initiated, out of which 38 Nos. of thermal generating units with aggregate capacity of 2550.38 MW were retired, Chuzachen HPS (2 units) was uprated by 11 MW and Ratnagiri CCPP (9 units) was derated by 252.92 MW.

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 in 12th Plan.

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. As a follow up of the recommendations of working group III of NMEEE regarding retirement of old and inefficient thermal generating units, CEA has undertaken an exercise of identification of thermal units for phased retirement during 11th & 12th Plan period. A total of 2398 MW was retired during 11th Plan. During 12th plan a total of 5082.44 MW has been retired. As per the provisions of National Electricity Plan, a total of 4000 MW was envisaged for retirement during 12th plan.

Based on the assessment made by CEA, a coal based capacity of 22,716 MW is considered for retirement during 2017-22 which consists of 5,927 MW of capacity assuming that the normal trend of past retirement process and 16,789 MW which are attaining the age of 25 years and do not have space for installation of FGD (Flue Gas Desulphurization) system to curb SOx emissions in view of the latest environmental norms by MOEF.

A total of 2550.38 MW was retired during the year 2017-18. The list of thermal generating units retired during 2017-18 is given below:

Sl. No.	Name of Station/Plant	Unit No.	Installed Capacity (MW)	Utility/ Agency
1	Koradi TPS	5	200.00	MAHAGENCO
2	Utran CCPP (uprated Cap.)	1,2,3,4	144.00	GSECL
3	CHANDRAPUR(ASSAM)	1,2	60.00	APGCL
4	UKAI TPS	1,2	240.00	GSECL
5	SIKKA REP. TPS	1,2	240.00	GSECL
6	HARDUAGANJ TPS	5	60.00	UPRVUNL
7	OBRA TPS (derated Cap.)	1,2	90.00	UPRVUNL
8	BHUSAWAL TPS	2	210.00	MAHAGENCO
9	CHINAKURI TPS	1,2,3	30.00	DPSCLTD
10	Dishergarh TPS	1,3,4,5	18.00	DPSCLTD
11	Seebpore TPS	1,2,3,4	8.38	DPSCLTD
12	CHANDRAPURA(DVC) TPS	2	130.00	DVC
13	BOKARO `B` TPS	1,2	420.00	DVC
14	NAMRUP CCPP	1	20.00	APGCL
15	LAKWA GT	4	15.00	APGCL
16	PATRATU TPS	4,6,7,9,10	455.00	NTPC
17	PANKI TPS	3,4	210.00	UPRVUNL
	Total		**2550.38**	

2.6 Research & Development in Power Sector

2.6.1 R&D activities in Power Sector

The Central Power Research Institute (CPRI) is the nodal agency for Research & Development in the power sector. Over the years, the Institute has contributed in research in a number of areas and had also helped to fund utilities and academia for their research in the power related fields. Further, CPSUs like Bharat Heavy Electricals Limited (BHEL), and CPSUs of Ministry of Power like NTPC Ltd., Power Grid Corporation of India Limited (PGCIL), NHPC etc., also carry out R&D activities towards development of technology in areas of operational and application technologies keeping in view their commercial / business interests. Other research Institutions like Electrical Research & Development Association (ERDA), Indian Institute of Technology (IITs), Council of Scientific and Industrial Research (CSIR), Centre for Development of Advanced Computing (C-DAC) etc., also carry out research towards finding solutions to problem areas in the power sector.

Apart from the above, the Government of India through Ministry of Power has supplemented the efforts of other organisations in the area of R&D through three central schemes viz.,

i) National Perspective Plan (NPP);
ii) Research Scheme on Power (RSoP); and
iii) In-house Research and Development Scheme (IHRD) of CPRI.

The MoP is also supporting the research projects under UAY and IMPRINT scheme/programme of MHRD, where MoP is a stakeholder. Since the research projects under both the scheme/programme are mainly collaborative in nature involving participation of industry and the IITs, these are being considered as R&D proposals/projects under National Perspective Plan (NPP) scheme.

2.6.2 R&D Schemes being implemented under the Aegis of MoP

Ministry of Power had approved an outlay under XIIth Plan of Rs.45 crores for R&D

schemes under NPP, Rs.20 crores for Research Scheme on Power (RSoP) and Rs, 15 crores for In-house Research Scheme of CPRI, totalling to Rs 80 crores. Total 90 projects with an outlay Rs.60.3719 crore were approved during 12th Five Year Plan i.e till 2016-17.

SFC Memo of CPRI in respect of continuation of R&D schemes of Ministry of Power being implemented through CPRI beyond March, 2017 is submitted for approval of MoP.

A. Research & Development Scheme under National Perspective Plan (R&DNPP)

The projects proposed under this scheme are focused on development of New Product / Process Development leading to field implementation. The crucial needs of Power Sector require R&D to bridge the technology gaps in various subsections of power sector (Generation, Transmission & Distribution) trading of electricity. The Research Areas and topics are identified and prioritized. The R&D is to be aimed at either improving design of an individual plant component and/or evolving cost efficient overall process. R&D work needs to take advantage of the advances in IT, electronics and communication to improve the control & instrumentation system, data acquisition system and monitoring of system performance parameters. Normally the collaborator and MOP provide funding of the project in the ratio of 50:50 each (in case the collaborator is from equipment manufacturer or utility). However, in case the collaborator is from Technical/Research Institution, 100% funding can be provided by MOP

The Ministry of Power constituted a Standing Committee on R&D (SCRD) to frame 15 years National Perspective Plan for R&D in Indian Power Sector, in the year 2002. Standing Committee on R&D under the Chairmanship of Chairperson CEA has members drawn from leading organizations like CEA, CPRI, NTPC, NHPC, POWERGRID, BHEL, DIPP, DSIR and MNRE. Director General CPRI is the Member Convener for this committee. The mandate of this committee is to frame a perspective R&D plan. The Indian Power Sector is facing major challenges today with the introduction of reforms, globalization and liberalization policy of the government. With the increase in system expansion, stability and security problems have become more challenging. It is of vital importance to focus attention on ways and means to build expertise within the country to find solutions for the problems existing in the system and also for the problems that may arise in the future. Research is needed to bridge the knowledge and technology gaps, more so due to the faster pace of technological changes in today's world.

Uchhatar Avishkar Yojana:

Uchhatar Avishkar Yojana is 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 there, 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. The objectives of this scheme are as under:

i. To promote innovation in areas that are directly of relevance to the manufacturing and design industry
ii. To spur innovative mind-set in the students and faculty in premier technological institutes
iii. To bring a coordinated action between academia and industry
iv. To strengthen the laboratories and research facilities in the premier technological institutions
v. To have outcome-based research funding

The funding pattern of the projects selected under this scheme would be 25% by industry, 25% by participating Department/ Ministry and 50% by Ministry of Human Resource Development (MHRD). Whereas there would

be no limit on the project size, the overall annual investment would be limited to Rs 250 crores.

Impacting Research Innovation & Technology (IMPRINT)

The IMPRINT is a national initiative of Ministry of Human Resource Development 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. One of the domains identified is Energy. Ministry of Power is the host for Energy domain with the participant Departments/Ministries being MNRE, DST, DRDO, DAE, DoS and Diety.

The budget identified for this initiative is Rs. 1000 crores from the year 2016-17. MHRD has budgeted Rs.500 crores for funding research and matching contribution from other Ministries who are stakeholders in R&D is expected.

B. Research Schemes on Power (RSOP)

RSoP schemes are fully funded by MOP and aims to carry out need based research in power sector including research in various operational problems encountered in power system. The RSOP projects are undertaken by organisations including academia such as IITs, NITs, and utilities etc.

C. In-house R&D Scheme of CPRI

Under this Scheme various Divisions and Units of the CPRI take up Research Projects under the In-house R&D scheme for which fund is provided by Ministry of Power, Government of India. These schemes are fully funded by Ministry of Power. The scheme is aimed at: -

- Augmentation of Research and testing facilities.
- Improvements /New techniques in testing /Diagnostic methods /Research studies.
- Product /Process Improvements.
- Improvement in product standardization.

2.6.3 Other R&D initiatives and HRD in CEA (MoU with IIT, Delhi)

CEA, being a Statutory Authority in the Power Sector and the technical arm of Ministry of Power, has been given the mandate to promote research in matters affecting the generation transmission, distribution and trading of electricity.

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

In the light of the above, an MoU was signed between MoP / CEA & IIT Delhi to develop:

(I) R&D Project in Power Sector; and
(ii) Development of Human Resource relevant to the need of Power Sector to further strengthen R&D initiative in CEA.

The revised MoU has been signed between IIT, Delhi & CEA in July, 2013.

Under the obligation of MoU, two officers, one for M.Tech and another for MBA are currently pursuing their course.

2.6.4 High level Committee for assessment and review of R&D activities of Organization/PSUs under the Ministry of Power

A high level Committee was constituted under the chairmanship of Secretary(Power) in order to have a coordinated approach and proper monitoring of R&D efforts being carried in the power sector by Organisations/PSUs of the MoP. In its first meeting held on 19th January 2017, it was resolved to constitute a Sub-

committee under the chairmanship of Chairperson, CEA.

The terms of reference of the Sub-committee were:

i. To list out all major R&D activities being undertaken by Organizations/ PSUs under the Ministry of Power.
ii. To identify areas where there is an overlap and possibility for collaboration.
iii. To identify areas of importance for the power sector and focus areas for research in the next 3 to 4 years.

The sub-committee submitted its report in June 2017. Second meeting of High level committee was held on 19.09.2017 to discuss the report submitted. It was inferred that no significant overlap exists in the research efforts of the Organizations/PSUs. The report also consists of thrust areas of research for the next 3-4 years which will be helpful in shaping the future of Power sector of India.

2.6.5 Committee on Technical Aspects of Charging Infrastructure for Electric Vehicles

Ministry of Power set up the following two Committees with respective terms of reference to address the issues and draw the roadmap for setting up charging infrastructure related to Electric Vehicles:

(1) Committee on Technical Aspects Terms of reference of the Committee are as follows :
- Regulations/Standards to be framed for charging infrastructure set up
- Infrastructure

(2) Committee on Policy, Planning and Regulatory/Tariff related issues

Terms of reference of the Committee are as follows:
- Regulatory aspects and Policy interventions
- Tariff Issues
- Ownership structure to be adopted for the charging infrastructure
- Subsidies/Incentives for promotion required
- Planning of roll-out

Committee on Technical Aspects of Charging Infrastructure for Electric Vehicles headed by Member(Planning), CEA dealt with the technical and infrastructure related issues for charging infrastructure setup.

The meetings of the Committee were held on 12.02.2018 & 14.03.2018 and decisions on the Terms of Reference were finalized. Final report of the Committee has been submitted to the Ministry of Power.

2.6.6 ETD-52 (Committee to develop safety standards for energy storage systems)

A Committee (ETD-52) has been constituted under the aegis of Bureau of Indian Standards (BIS) to develop safety standards for energy storage systems under the chairmanship of Shri Pankaj Batra, Member (Planning). R&D division is also a part of the Committee and it was assigned the task to examine the proposed draft standards with the corresponding IEC documents and IEEE publications as available and submit its recommendations. The recommendations have been included in the final draft report. The final draft report is under circulation among the members of the Committee for further comments.

2.6.7 Conferences and Conclaves organised by R&D, CEA.

2.6.7.1 Conference on E-mobility to meet India's Electric Vehicles Target

Central Electricity Authority(CEA) in association with Independent Power Producers Association of India(IPPAI) organized a Conference on E-Mobility to meet India's Electric Vehicles Target on 24th January, 2018 at New Delhi. The conference was inaugurated by the Hon'ble Minister of State(IC) for Power and New and Renewable Energy.

The Conference had discussions and

presentations on the following topics related to Electric Vehicles roll out:

i. Policy Issues for Creating a Favorable Ecosystem to Meet India's E-Mobility targets and Global Practices
ii. Regulations including Tariff for E-Mobility
iii. Types of Chargers & Standards
iv Implementation & Roll Out of E-Vehicles & Charging Infrastructure at National, State & Local (Municipal & Panchayat) Level.

2.6.7.2 International R&D Conclave

CEA being a nodal body for the Ministry of Power (MoP), has powers under the Section 73(k) of the Electricity Act, 2003 to promote research in matters affecting the generation, transmission, distribution and trading of electricity, the Research and Development (R&D) Division of CEA has been overseeing and promoting the activities of research in the Indian Power Sector.

In order to direct focus in the area of research in the power sector and to create a platform for dissemination of knowledge in the field of R&D and to stimulate innovation so that new thrust areas can be identified, an **International R&D conclave was** organized on **20th and 21st February 2018** for promotion of research in the power sector in the whole country. This is also in view of the new smart grid technology coming up for handling the variability in the power from the renewable sources of energy.
The Conclave was a **2-Day event titled**

"Emerging Opportunities and Challenges of R&D in Indian Power Sector" held at New Delhi. The Hon'ble Minister of State(IC) for Power and New and Renewable Energy was the Chief Guest at the Conclave.

A total of 48 research papers, spread over seven sessions dealing with Thermal, Hydro, Renewable, Transmission, Grid Operation, Distribution and Trading/Marketing & Tariff were presented at the Conclave with each paper followed by interaction among the participants on various issues and challenges in the matter.

2.7 Fuel Management and Analysis

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

2.7.1 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, on monthly basis, all the power plants including plants designed on imported coal, plants having dedicated coal block, plants getting coal through e-auctions apart from the plants having coal linkages are monitored and monthly report is published on CEA website. As on 31st March 2018, the total coal stock available with the 114 Nos. plants was 16.3 Million Tonnes (MT) and twenty eight (28) power plant were critical in coal stock (coal stock for less than 7 days).

CEA is a member of following committees which review and monitor coal supply and related infrastructural constraints:

- 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.
- Infrastructure Constraints Review Committee, headed by the Secretary (Coordination), Cabinet Secretariat.

2.7.2 Coal Scenario for the Power Sector during 2017-18

2.7.2.1 Coal Supply Position for the year 2017-18

For the year 2017-18, coal based generation target was 958.4 BU and accordingly the requirement of coal for the year was estimated to be 630 Million Tonnes (MT). However, the actual coal based generation was 951.5 BU and the actual coal consumption was 608 MT during 2017-18. Coal receipt and consumption for year 2017-18 is given as under:

(Figures in MT)

Estimated Requirement (Domestic + Imported)	630.0 (584 + 46)
Receipt- Domestic coal (Actual)	538.6
Receipt- Imported coal (Actual)	56.4
Total Receipt (including Imported Coal)	595.0
Consumption (including Imported coal)	608.0

During the year 2017-18, the coal received by the power plants from domestic sources was 538.6 MT as against 494.7 MT during the year 2016-17. The total coal consumption for the year 2017-18 was 608 MT as against 575 MT over the same period last year i.e. 2016-17. The plant-wise details of the coal receipt and consumed during 2017-18 are enclosed at **Annexure 2A**.

2.7.2.2 Source-wise Receipt of Coal during the year 2017-18

During the year 2017-18, source wise break up of coal receipt at the power stations is

given below:

Source	Actual Receipts (Million Tonnes)
CIL & SCCL	468.0
Captive Mines	31.6
E- auction	39.0
Total (Domestic):	**538.6**
Import	56.4
Total:	**595.0**

2.7.2.3 Import of Coal during year 2017-18

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.

With the increased production of domestic coal, the coal being imported for blending with domestic coal has been decreasing. The coal imported for blending by the power utilities during 2017-18 was 17.04 Million Tonnes (MT) vis-à-vis 19.76 MT during 2016-17 resulting in reduction of 2.72 MT (13.7%). In addition to above, Power Utilities having plants designed on imported coal have imported 39.4 MT coal during 2017-18 vis-à-vis 46.30 MT coal during 2016-17 against estimated 46 MT during 2017-18.

2.7.2.4 Generation Loss

During the year 2017-18, power utilities have reported generation loss of about 15.2 BU (Provisional) due to coal shortage.

2.7.2.5 Specific Coal Consumption (kg/k Wh)

During the year 2017-18, the Specific Coal Consumption of the power plants designed on domestic coal was 0.662 kg/kWh and that of plants designed on imported coal was 0.465 kg/kWh.

2.7.2.6 Coal Quality Issues

In order to address quality concern of the coal supplied to power plants, it has been decided 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. On the basis of third party sampling analysis results, in case of difference between declared grade and analysed grade of coal, credit/debit notes are being issued by coal companies.

Third party sampling has been started by CIMFR at loading as well as unloading ends, which has resulted into lower ECR, thus benefiting the end consumers of electricity.

2.7.2.7 Estimation of Coal requirement for the year 2018-19

As per the coal based generation target of 1008.3 BU for the year 2018-19, FM division, CEA has estimated the total coal requirement for the year as 656 MT comprising 610 MT domestic coal and it was also taken into account that about 46 MT may be imported by the power plants designed on imported coal. The total coal availability from domestic sources is expected to be around 610 MT (including coal from CIL/SCCL, Captive Coal Blocks, E-Auction) showing no shortfall of domestic coal during 2018-19.

The details are as given below:

BU: Billion Units MT: Million Tonnes

S.No.	Description		
1	**Coal based generation**		
1.1	Coal based generation programme for 2018-19	BU	1008.3
2	**Coal Requirement**		
2.1	Coal requirement for plants designed on domestic Coal	MT	610
2.2	Coal requirement for plants designed on imported coal	MT	46
2.3	Total Coal Requirement	MT	656
3	**Coal availability from Indigenous sources**		
3.1	From CIL	MT	513
3.2	From SCCL	MT	53
3.3	From Captive Mines	MT	32
3.4	From e-auction	MT	12
3.5	Total domestic coal availability	MT	610
3.6	Shortfall in domestic coal availability	MT	0
3.7	Requirement of imported coal for blending	MT	0

It is seen from the above that power plants based on domestic coal would meet their requirement of coal from indigenous sources and may not require import of coal for blending. However, some power utilities/ power plants may plan for import of coal for blending for their coastal power plants considering economics in import of coal vis-à-vis domestic coal and Railway logistic constraints etc. Power plants designed on imported coal would continue to import about 46 MT to meet their coal requirement.

2.7.2.8 New initiatives for addressing issues related to coal supply to Power Plants

A. Flexibility in Utilization of Domestic Coal

The Government, on 04.05.2016, approved the proposal for allowing flexibility in utilization of domestic coal amongst power generating stations to reduce the cost of power generation. Under the scheme, the Annual Contracted Quantity (ACQ) of each individual coal linkage as per Fuel Supply Agreement is 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 by Ministry of Power, Govt. of India on 20.02.2017. As per the methodology, the State can divert their coal and take equivalent power from IPP generating 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 matrix as per their aggregate requirement.Under the flexibility, Gujarat has selected M/s GMR Chhattisgarh Energy Limited for taking 500 MW power for 8 months by transferring their coal from SECL to the GMR Raikheda plant.

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

After the discussion with all stake holders and approved by the Authority, a new methodology was issued 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.

2.7.2.9 Gas/Liquid supply to Gas based Power Stations

Out of total 25150 MW Gas/Liquid fuel based installed generating capacity in the country as on 31st March 2018, CEA monitored the supply of gas to 62 gas based power stations, using gas as the primary fuel, totaling to a capacity of 23842.7 MW (excluding liquid fuel based power plants).

2.7.2.10 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. Supply of gas to gas based power plants since 2008-09 has been as under:

Supply of gas to gas based power plants since 2008-09 has been as under:

Sl. No.	Years	Capacity at the end of year (MW)	Gas Required* (MMSCMD)	Average Gas Supplied (MMSCMD)	Shortfall (%) (MMSCMD)
(1)	(2)	(3)	(4)	(5)	(6)=(4)-(5)
1.	2008-09	13,599.62	66.61	37.45	43.8%
2.	2009-10	15,769.27	78.09	55.45	29.0%
3.	2010-11	16,639.77	81.42	59.31	27.2%
4.	2011-12	16,926.27	81.78	55.98	31.5%
5.	2012-13	18,362.27	90.7	40.0	55.9%
6.	2013-14	20385.27	97.9	27.13	72.3%
7.	2014-15	21665.57	104	25.2	75.8%
8.	2015-16	23075.57	113.63	28.26	75.1%
9.	2016-17	24037.17	118.16	30.32	74.3%
10.	2017-18	23842.17	114.50	30.72	73.2%

*** 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)

2.8 Renewable Energy

i. The Government of India has set a target of achieving Renewable Energy Capacity of 175 GW by the year 2022. This includes 100 GW of Solar, 60 GW of Wind, 10 GW consisting of Biomass & Bagasse and 5 GW of Small Hydro. As per the information received from Ministry of New and Renewable Energy (MNRE), as on 31.3.2018, the total grid connected installed capacity of renewable sources of generation was 69.02 GW.

ii. The Solar power tariffs in India have fallen in nominal terms from INR 17 /kWh in 2009 to INR 2.44 kWh (levelized tariff in respect of Bhadla Solar Park, Rajasthan) in May 2017, which is mainly due to decline in module prices, improvement in technology and competitive environment. The ever-declining solar power tariffs have encouraged good investments into the sector. The tariff discovered in the auction conducted by Gujarat Urja Vikas Nigam Ltd (GUVNL) for wind power also reduced to Rs 2.43 per kWh in Dec 2017.

iii. Government of India has increased the power generation capacity to be achieved from Solar Parks installations from the originally set target of 20 GW to 40 GW, through setting up of 50 Solar Parks in the country with a capacity of 500 MW or more concentrated in one area.

2.8.1 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. Renewable generation like solar and wind power is variable in nature and to tackle the variability/intermittency of generation from such sources, the requirement of a suitable balancing mechanism is essential to ensure grid security. Grid integration therefore is the priority item for expanding Renewable Energy generation in India.

A Committee was constituted under the Chairmanship of Member (Planning), CEA to study optimal location of various types of balancing energy sources /energy storage devices to facilitate grid integration of Renewable Energy Sources. The Committee held various Meetings, and the final report was submitted to MoP on 15-12-2017. The report covers, among other things, the balancing requirement, Ancillary market development and sharing of cost on the same.

2.8.2 Generation from Renewable Sources

Generation from Renewable Energy Sources for the years 2014-15, 2015-16, 2016-17 & 2017-18 and the graph indicating the installed capacity v/s generation from RE sources for the above period are given below:

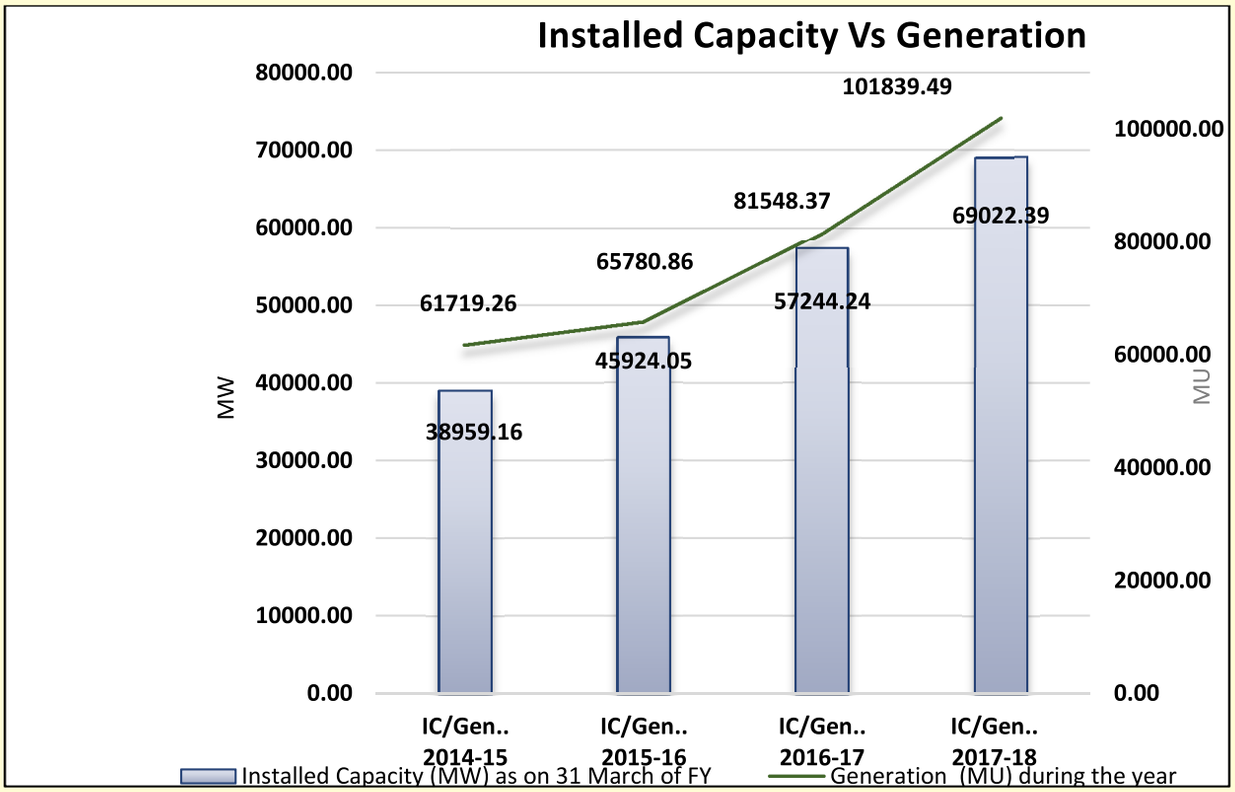
Years	Non RES Generation	RES Generation (MU)	Total Generation	Percentage of RE to total generation	CAGR (%) from 2014-15 to 2017-18		
					Total Generation	RES Generation	Non RES Generation
2014-15	1048673	61719	1110392	5.56	5.62	18.17	4.78
2015-16	1107822	65781	1173603	5.61			
2016-17	1160141	81548	1241689	6.57			
2017-18	1206306	101839	1308146	7.79			

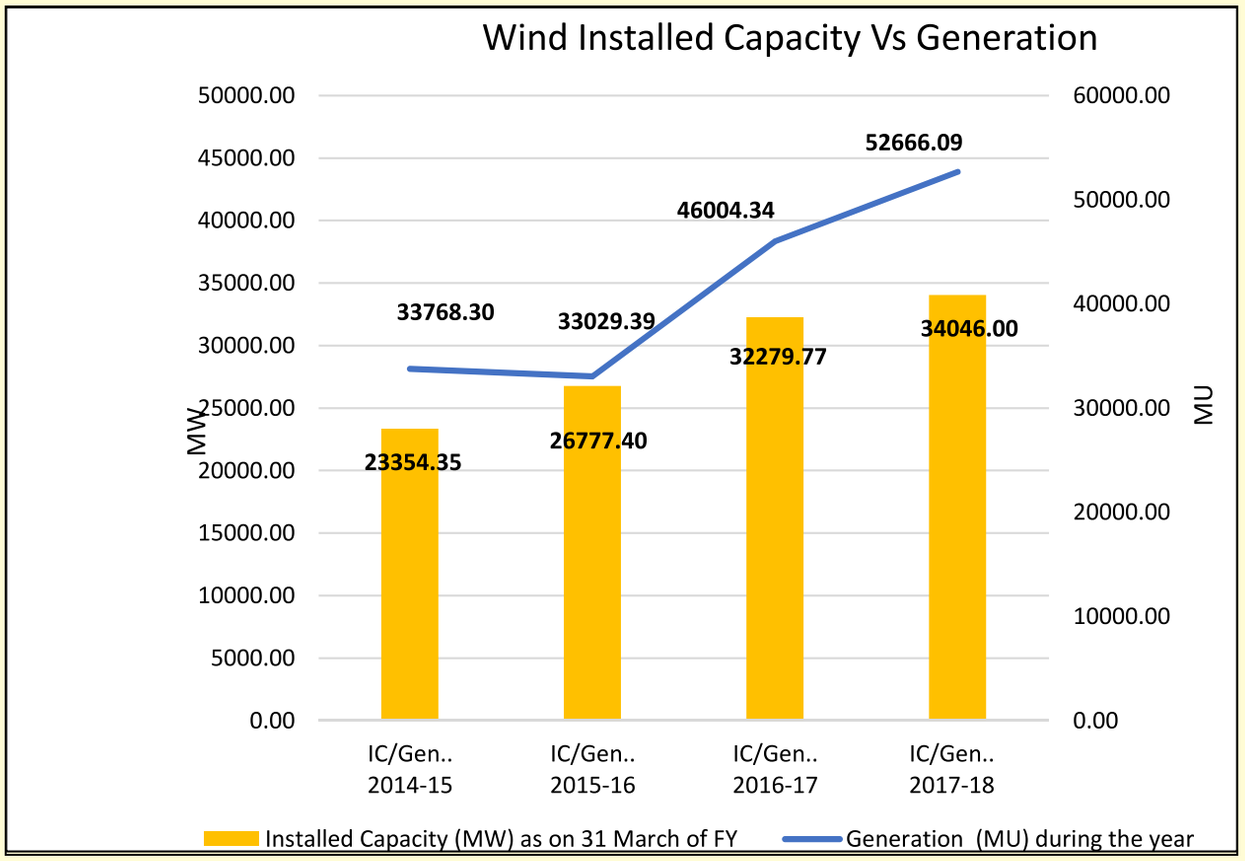
Renewable energy generation was about 7.8% of total energy generation in the country during 2017-18. Year wise generation from renewable energy sources (RES) indicating the growth rates is given below:

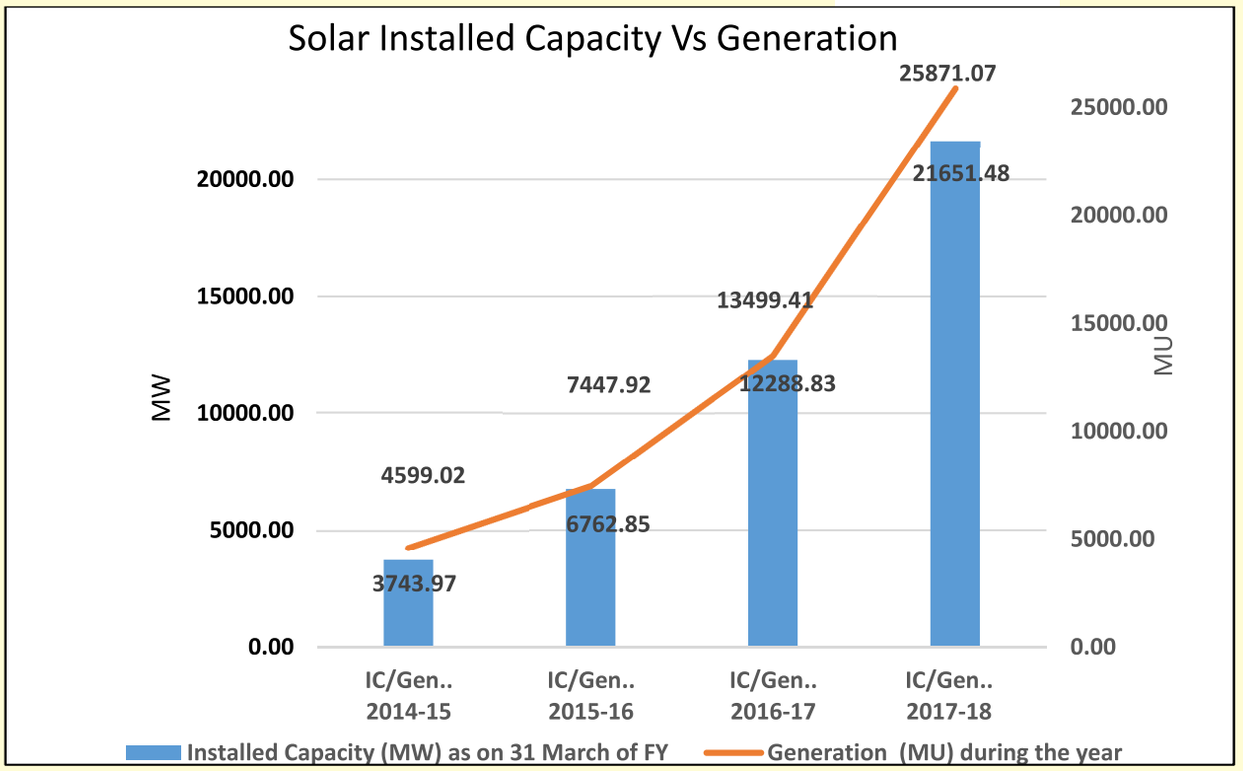
Year wise generation from Renewable Energy Sources (RES) in BU

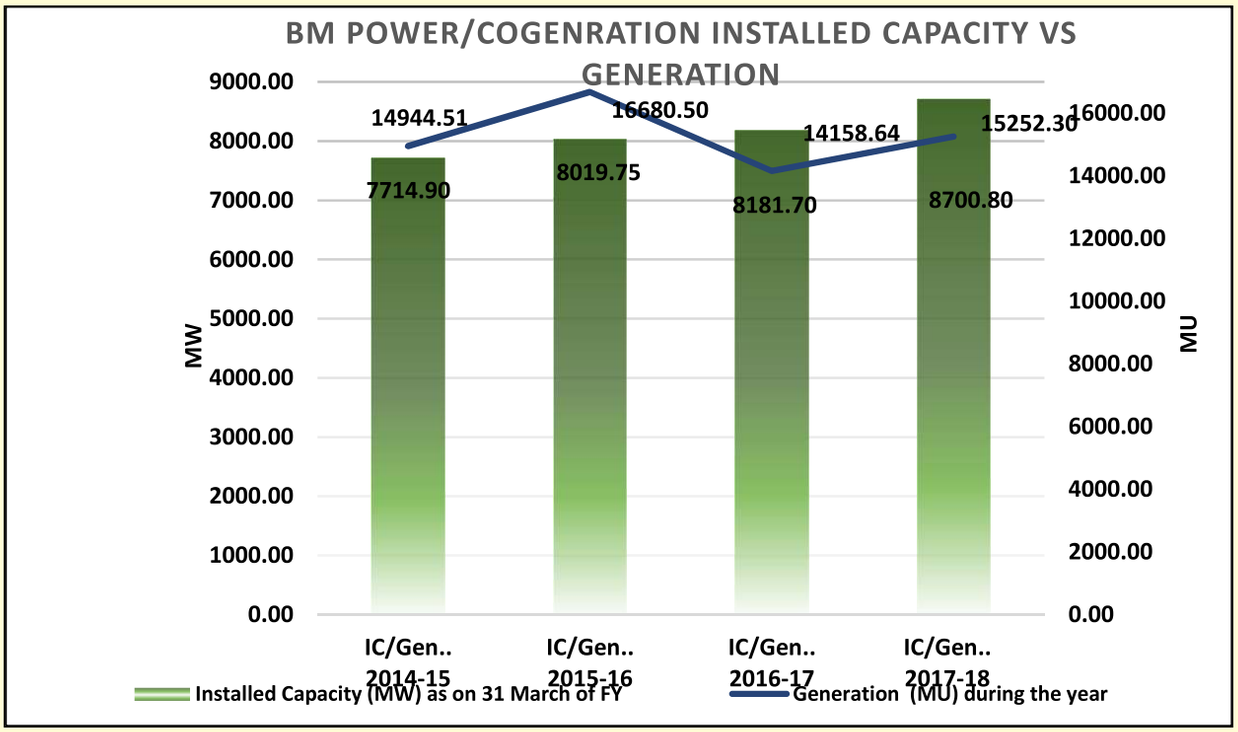
Year	Generation from RES (BU)	Year on year growth (%)	CAGR from 2014-15 to 2017-18
2014-15	61.72		18.17
2015-16	65.78	6.58	
2016-17	81.55	23.97	
2017-18	101.84	24.88	

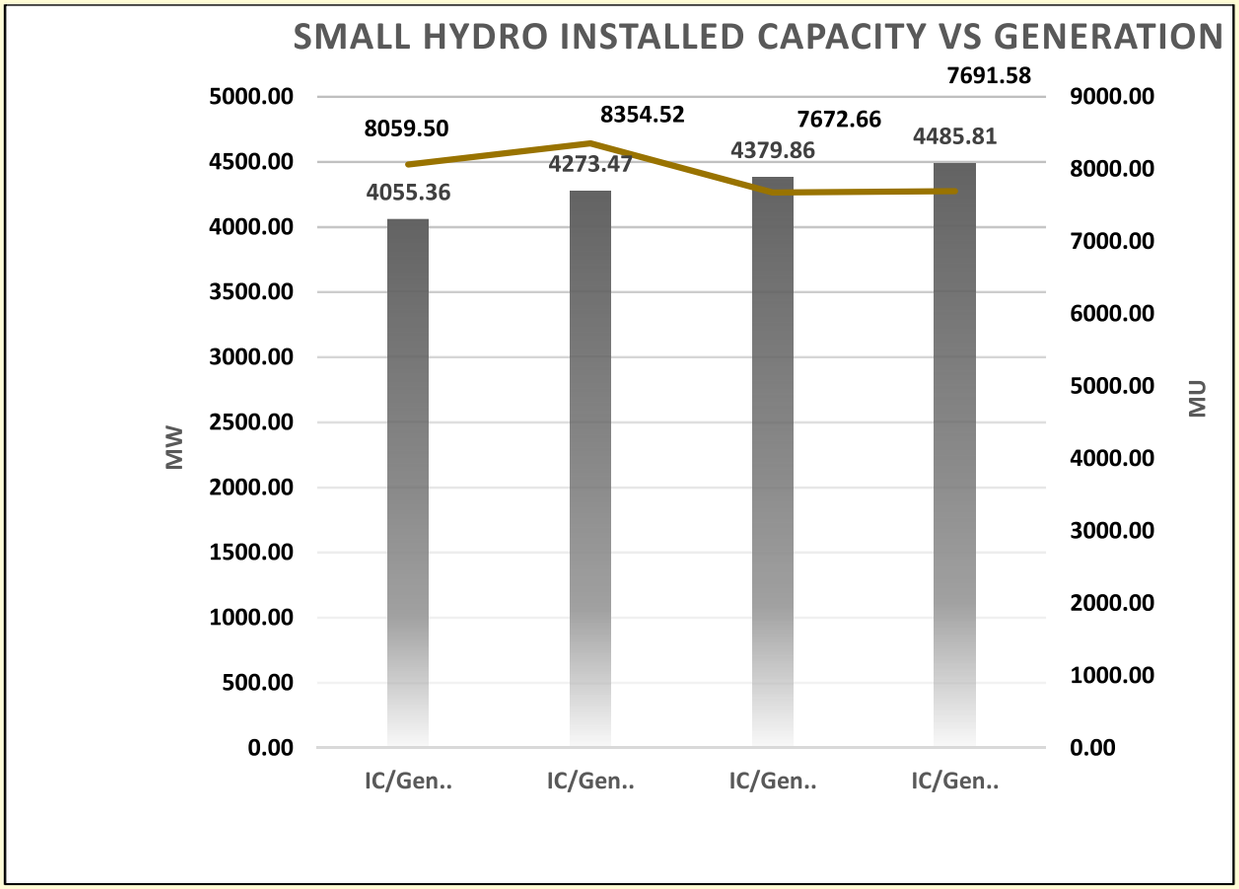
The generation from various types of renewable energy sources is depicted in the following graphs.

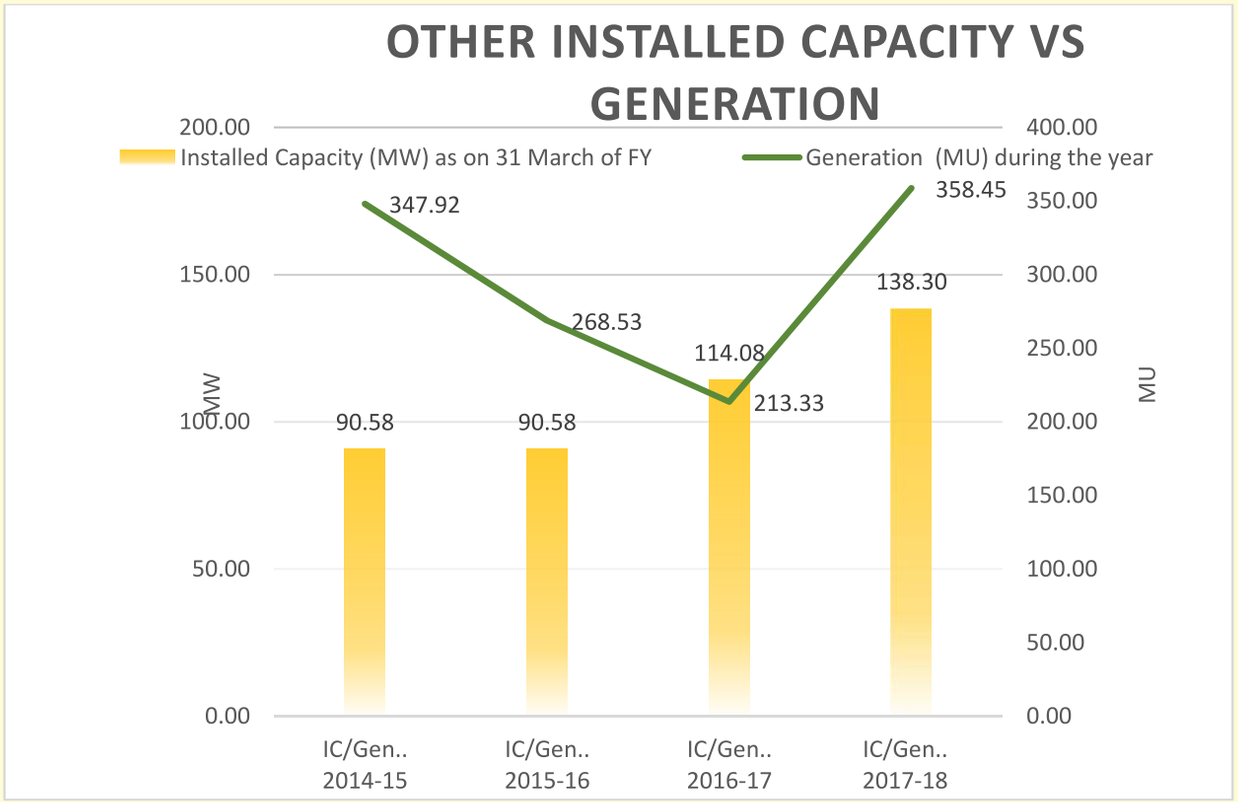



Wind Installed Capacity Vs Generation
50000.00
45000.00
40000.00
35000.00
30000.00
25000.00
20000.00
15000.00
10000.00
5000.00
0.00
MW
60000.00
50000.00
40000.00
30000.00
20000.00
10000.00
0.00
MU
33768.30
33029.39
46004.34
52666.09
23354.35
26777.40
32279.77
34046.00
IC/Gen.. 2014-15
IC/Gen.. 2015-16
IC/Gen.. 2016-17
IC/Gen.. 2017-18
Installed Capacity (MW) as on 31 March of FY
Generation (MU) during the year


Solar Installed Capacity Vs Generation
20000.00
15000.00
10000.00
5000.00
0.00
MW
25000.00
20000.00
15000.00
10000.00
5000.00
0.00
MU
4599.02
7447.92
13499.41
25871.07
3743.97
6762.85
12288.83
21651.48
IC/Gen.. 2014-15
IC/Gen.. 2015-16
IC/Gen.. 2016-17
IC/Gen.. 2017-18
Installed Capacity (MW) as on 31 March of FY
Generation (MU) during the year


BM POWER/COGENRATION INSTALLED CAPACITY VS GENERATION
MW
MU
9000.00
8000.00
7000.00
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
14944.51
16680.50
14158.64
15252.30
7714.90
8019.75
8181.70
8700.80
IC/Gen.. 2014-15
IC/Gen.. 2015-16
IC/Gen.. 2016-17
IC/Gen.. 2017-18
Installed Capacity (MW) as on 31 March of FY
Generation (MU) during the year


SMALL HYDRO INSTALLED CAPACITY VS GENERATION
MW
MU
5000.00
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
9000.00
8000.00
7000.00
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
8059.50
8354.52
7672.66
7691.58
4055.36
4273.47
4379.86
4485.81
IC/Gen..
IC/Gen..
IC/Gen..
IC/Gen..


OTHER INSTALLED CAPACITY VS GENERATION
Installed Capacity (MW) as on 31 March of FY
Generation (MU) during the year
MW
MU
200.00
150.00
100.00
50.00
0.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
90.58
90.58
114.08
138.30
347.92
268.53
213.33
358.45
IC/Gen.. 2014-15
IC/Gen.. 2015-16
IC/Gen.. 2016-17
IC/Gen.. 2017-18

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 9th Plan was 5750 MW that increased to 14050 MW by the end of 10th Plan, increased to 27750 MW by end of 11th Plan, and increased to 75,050 MW by the end of 12th plan. During the year 2017-18, 11400 MW of Inter-Regional transmission capacity has been added making the total capacity of 86450 MW by end of 31.03.2018.

Details of the Inter-regional transmission capacity in the country as on 31.03.2018 (excluding 132 kV link)are given at **Annexure – 3A.**

3.3 Regional Standing Committees on Power System Planning.

3.3.1 Brief Introduction:

The Regional Standing Committees on Power System Planning constituted by CEA is chaired by Member (PS) ,CEA and have representation of 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.

3.3.2 Following Standing Committee Meetings were held during 2017-18:

Northern Region:

- 39th meeting of the Standing Committee on Power System Planning of Northern Region held on 29-30th May, 2017 .

Western Region:

- 42nd Meeting of the Standing Committee on Power System Planning in Western Region held on 17.11.2017 .

Eastern Region:

- 19th Standing Committee Meeting on Power System Planning of Eastern Region held on 01.09.2017.

Southern Region:

- 41st Meeting of the Standing Committee on Power System Planning of Southern Region held on 22nd September, 2017.

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

3.4 Empowered Committee on Transmission

3.4.1 Brief Introduction:

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

As envisaged in the Guidelines, Ministry of Power had constituted an Empowered Committee on Transmission to identify inter-state transmission projects to be developed through competitive bidding and to oversee the process of competitive bidding.

As provided in the Guidelines, Ministry of Power has appointed PFC Consulting Limited (PFCCL) and REC Transmission Projects Company Limited (RECTPCL) as the Bid Process Coordinators (BPC) for carrying out the bidding process.

3.4.2 Status of the schemes identified by the Empowered Committee on Transmission for implementation through TBCB:

As on 31.03.2018, twenty three (23) Schemes are under implementation and fourteen (14) schemes had been commissioned by the Transmission Service Providers. In addition, there are two notified schemes for which the bidding process is in progress.

These schemes are given at **Annexure – 3C.**

3.4.3 Following meetings of the Empowered Committee on Transmission were held during 2017-18:

- 37th Meeting of Empowered Committee on Transmission was held on 20th September, 2017, at CEA.

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

3.4.4 Cost Committee:

Based on the decision taken in the 32nd Empowered Committee on Transmission held on 17th January, 2014, a Cost Committee was formed with the representatives from CEA, Powergrid/ CTU and BPCs to work out a matrix for different type of transmission lines which would consider different type of variables for estimating the project cost (for example, type of the terrains, wind zones, etc.). The Cost Committee 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 from power evacuations considerations for processing of concurrence by CEA

Northern Region :

a) Himachal Pradesh

(i) Revised cost estimation of Parbati III(520 MW) Hydro Electric Project by M/s NHPC.

(ii) DPR examination of Sach Khas(267 MW) by M/s L&T.

(iii) DPR examination of Dugar(449 MW) by M/s Dugar Hydro Power Limited.

(iv) DPR examination of Seli(400

MW) HEP by M/s Seli Hydro Electric Power Co. Limited.

(v) DPR examination of Kirthai II(930 MW) HEP by M/s JKSPDC.

(vi) DPR examination of Sawalkot (1856 MW) HEP by M/s JKSPDC.

(vii) DPR examination of Luhri – I (210 MW) HEP by M/s SJVNL.

(viii) DPR examination of Kwar (540 MW) HEP by M/s CVPPL.

(ix) DPR examination of Bursar (800 MW) by M/s NHPC.

(x) DPR examination of Reoli Dugli (430 MW) by M/s L&T Himachal Hydro Power Ltd..

(xi) MoC for Vishugad Pipalkoti HEP(444 MW)

(xii) MoC for Dam Toe Power House of Kishenganga HEP(330 MW) in J&K.

North Eastern Region

i) Attunli HEP (680 MW) in Arunachal Pradesh by M/s Attunli Hydro Electric Power Company Limited

ii) Tagurshit HEP(3x24.67=74MW) in Arunachal Pradesh by M/s L&T Arunachal Hydropower Lmited

iii) Dibang Multipurpose Project in Arunachal Pradesh (12x240W) by NHPC

iv) Umngot HEP (210 MW) in Meghalaya by MEPGCL

v) Mago Chu (3x32=96 MW) HEP , in Arunachal Pradesh by M/s SEW Mago Chu Power Corporation Limited (SMCPCL)

3.6 Examination of DPR/FR of Transmission Works.

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 Rs.193.56 crores

ii) DPR for transmission schemes under GEC in Rajasthan for KfW funding in place of deferred schemes with estimated cost of Rs. 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

Revised DPR of Arun-3 (4x225 MW) ATS between Didin (Nepal) to Bathnaha (India Nepal Border) including Dhalkebar Substation by M/s SAPDC.

Southern Region

I) DPR for wind and solar power transmission schemes of APTRANSCO to pose the scheme under 40 % NCEF Funding.

ii) DPR for Intra State scheme of TANTRANSCO under Green Energy Corridor –I , Package –II

3.7 Grant of prior approval of Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2017-18.

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 :

- Connectivity system of 750 MW Pholadi - Pokhran Solar Power park, Jaisalmer, Rajasthan by M/s Essel Saurya Urja Company of Rajasthan Limited (ESUCRL)
- Transmission system for Ultra

Mega Solar Park in Fatehgarh, distt. Jaisalmer Rajasthan.

Western Region :

- POWERGRID works associated with Additional 400 kV Feed To Goa - modification.
- Additional 400 kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool.
- Connectivity system for 300 MW wind power of M/s Ostro Kutch Wind Pvt. Ltd. (OKWPL).
- Connectivity system for Surguja Power Pvt. Ltd. (4x150MW), Parsa, Chattisgarh.
- Additional 2 nos. of 220 kV bays for 1x500MVA, 400/220 kV 3rd ICT at Khandwa (PG) S/s.
- Connectivity system for 500 MW wind power of M/s INOX wind infrastructure limited at Dayapur, Kutch, Gujrat (IWISL).
- Connectivity system for Renew Power Ventures Pvt. Ltd. (RPVPL) for its 400MW farm in Kutch, Gujrat.
- Connectivity system of 500 MW wind farms in Walka Mota, Bhuj, Gujrat (WWIL).

Eastern Region:

- "Eastern Region Strengthening Scheme-XX (ERSS-XX)" (Returned).
- "Transmission System for Transfer of power from generation projects in Sikkim to NR/WR (Part-B1)" (Returned).

Southern Region:

- "Transmission System for Ultra Mega Solar Power Park at Tumkur, Karnataka-Phase-I"
- "Transmission System for Ultra Mega Solar Power Park at Tumkur, Karnataka-Phase-II" - Modification regarding.
- Construction of 8 Km of 230 kV D/C Transmission line from "Mytrah Wind Farms to Tirunelveli Pooling Station"
- Construction of 230 kV Single Circuit Transmission line from "Orange Sironj Wind Generation Switchyard to Tirunelveli Pooling Station"
- Construction of independent transmission system within Indian territory (400kV Double Circuit overhead transmission line quad AAAC/ACSR conductor) for connecting their coal based thermal power plant (2x800MW) in district Godda of Jharkhand with substation at Bogra in Bangladesh to Adani Power (Jharkhand) Limited (APJL)

North Eastern Region:

- North Eastern Region Strengthening Scheme (NERSS-VI)(Modified)

3.8 Grant of authorisation to transmission proposals for Section 164 of Electricity Act, 2003 during 2017-18.

Northern Region :

- System Strengthening Scheme in Northern Region (NRSS XXXVI)" along with LILO of Sikar – Neemrana 400 kV D/C line at Babai (RRVPNL)

Western Region :

- Transmission system associated with Gadarwara STPS (2X800 MW) of NTPC (Part-A).
- Transmission system associated with Gadarwara STPS (2X800MW) of NTPC (Part-B).
- Transmission system strengthening

in WR associated with Khargone TPP (1320MW).

- Connectivity system for 300 MW wind power of M/S Ostro Kutch Wind Pvt. Ltd., Gujarat.

Eastern Region:

- 400kV Vedanta – Sundargarh/ Jharsuguda pooling station (PGCIL) D/C line of M/s Vedanta Limited (formerly known as Sesa Sterlite Limited / Sterlite Energy Limited).
- "765 kV Strengthening in Eastern Region (ERSS-XVIII)" of POWERGRID Medinipur-Jeerat Transmission Limited

Southern Region:

- To POWERGRID Southern Interconnector Transmission System Ltd. (PSITSL) for construction of "Strengthening of Transmission system beyond Vemagiri".
- To M/s Warora - Kurnool Transmission Limited (WKTL) for construction of "Additional Inter-Regional AC link for import into Southern Region i.e. Warora-Warangal and Chilakaluripeta-Hyderabad- Kurnool 765 kV Link".

North Eastern Region:

- To M/s Kohima - Mariani Transmission Limited (KMTL) for "North Eastern Region Strengthening Scheme (NERSS-VI).

3.9 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. Accordingly, draft National Electricity Plan (Transmission) for the country for the five year period from 2017-18 to 2021-22 has been prepared in consultation with CTU, STU, generating companies and RPCs based on studies carried out for various Load-generation scenarios considering seasonal variations of Load & generations. Draft National Electricity Plan (Transmission) has been submitted to MoP.

The draft document prepared on "National Electricity Plan (Transmission)" covers transmission lines and associated substations including the inter-regional transmission links for the plan period 2017-22 to meet the projected peak demand of 226 GW in the 2021-22 time frame as per 19th EPS.

3.10 Research & Development Works:

(a) Compendium of Tower Design: As per the Resolution of Power Minister's conference held in Vadodara in October 2016, a compendium of approved/tested tower designs (66kV and above voltage level) was prepared and published for the use of various power utilities.

(b) Pilot Audit of transmission towers of 400kV Abdullapur-Bawana D/C Transmission line, 400 kV D/C Panipat-Dadri-II D/C transmission line and 400 kV Panipat –Kaithal D/C transmission line of PGCIL was carried out in January, 2018.

(c) Pilot Audit of transmission towers of 400kV Samaypur-Bamnauli D/C Transmission line & 400 kV Bamnauli-Jatikara D/C transmission line of Delhi Transco Ltd. was carried out in February, 2018.

3.13 Representation/ Nomination in the Committees

(a) Member (PS), CEA is representing as member in Joint Steering Committee (JSC) for India-Bangladesh, India –Nepal and India-SriLanka cooperation. Similarly Chief Engineer (PSPA-II) is representing as member in Joint Working Group (JWG) and Joint Technical Team (JTT) in above cooperation.

(b) PSETD officers are represented in :

(i). Technical committees of BIS pertaining to overhead conductor, earth-wire, insulator & hardware, transmission line towers, surge arrestor, power cable, HV switchgear & controlgear, transformer, HVDC, solid insulating material, substation automation, high voltage engineering, battery etc.

(ii). Task force to formulate Power Sector Council of India (PSCI)

(iii). Sub-group for techno-economic appraisal of DPRs for PSDF funding.

(iv). Cost Committee and Bid Evaluation Committee for projects to be awarded through Tariff Based Competitive Bidding (TBCB)

(v). Preparation of Regulations for communication system in Power Sector.

(vi). Task force for issues related to Cyber Security.

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

Standing Committee constituted as per provision of Section 73, Clause (1) of the Electricity Act, 2003 taking representation from various power utilities in the Country investigates causes of failure of Transmission line towers and substation equipment of 220kV and above Voltage Class and suggests remedial measures to avert/ minimize the failure.

Standing Committee meetings are organized on regular basis to discuss the failures intimated by various power utilities and remedial measures to minimize such failures in future are recommended.

(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 the failure site for assessment of causes of failure, investigations were carried out. The details of failed transmission lines reported to CEA in the FY 2017-18 is enclosed at **Annexure-3G.**

(ii) Report of the standing committee of experts on the failure of EHV Transmission line towers (December 2015 - September, 2016) was finalized and uploaded on CEA website, circulated to MoP & various stake holders.

(b) Substation equipment failures:

(i) Report of the standing committee of experts on the failure of EHV Substation equipment was finalized and uploaded on CEA website, circulated to MoP & various stake holders.

(ii) Failure investigation of 100 MVA, 220/66-33/11 kV Transformer in Naraina substation of DTL, Delhi.

(iii) Details of failure of transformers and reactors reported to CEA in the FY 2017-18 is enclosed at **Annexure-3H**

3.15 Amendment of CEA Regulations / Miscellaneous Works

(a) The periodical comprehensive review of chapters of CEA (Technical Standards for construction of Electrical Plants and Electric lines) Regulations 2010 pertaining to 66 kV and above voltage class transmission line and substation was finalized.

(b) DPR of following projects were examined:

(i) Arun-3 ATS between Diding (Nepal) to Bathnaha (India Nepal Border) including Dhalkebar Substation extension.
(ii) Kaleshwaram lift irrigation project from power requirement consideration.
(iii) Evacuation of power from Wind and Solar projects in Anantapur & Kurnool Districts of Andhra Pradesh.
(iv) Power evacuation from Mawphu Hydroelectric Project Stage-II (85 MW), Meghalaya by NEEPCO.
(v) Electromechanical work of Dorjilung HEP (Kuri-I) in Bhutan.
(vi) Proposals of Punjab, Rajasthan, Haryana, Maharashtra, Karnataka, Tamilnadu, UP, MP, Jharkhand, NE States etc. for grant under PSDF Funding.

(c) Inputs on RFP documents & replies to bidders queries in respect of the projects to be awarded through TBCB were provided to PFC/REC.

(d) Meeting of task force to formulate Power Sector Council of India (PSCI) was conducted and preliminary report was prepared.

(e) The design document and drawing of Demo setup for utilization of transmission line tower infrastructure for mobile telecom purpose was examined.

(f) Technical Papers on Transmission System were presented in various Conferences / Seminars.

(g) Visit to Siemens, Bengaluru to assess cyber security testing facility was made.

(h) The training program for following Software was conducted successfully in the year 2017-18:

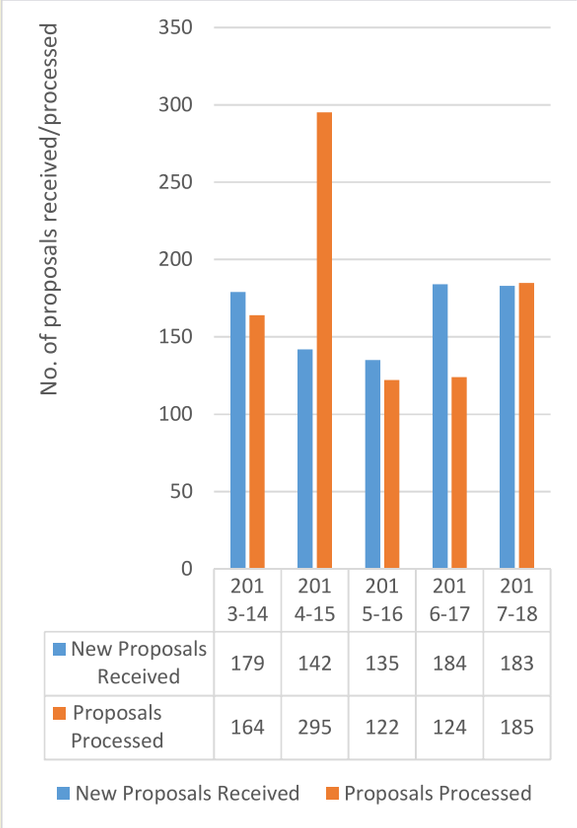
- CDEGS: For Earth mat design in Sub-stations, Electromagnetic interference etc.
- PSCAD - For System transient analysis.

3.16 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. Based on requests, the division also provided training of Induced Voltage computation to the officers of Power Utilities.

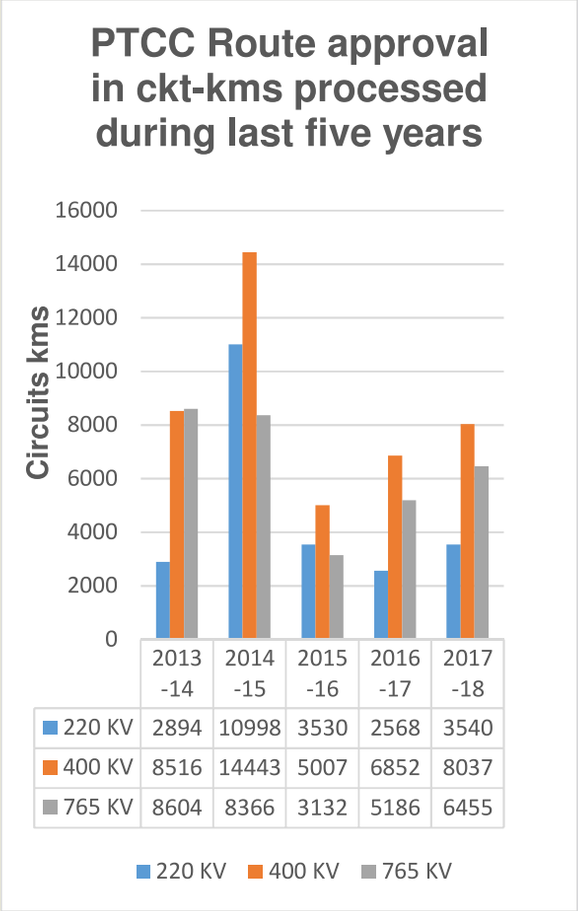
To achieve the objectives of PTCC, two Central PTCC meetings were held viz.104th Central PTCC meeting at Mysore on 9th June, 2017 chaired by Shri T.V Venkatram, PGM, Bangalore and 105th Central PTCC meeting on 10th November, 2017 at Cochin chaired by Chief Engineer (PCD), CEA. The meetings were attended 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 financial year 2017-18, 183 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 / processed for PTCC route approval during the last five financial years is given below:



It may be seen that during 2017-18, 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 was carried out in respect of 185 nos. CEA forwarded induced voltage details to BSNL, Defense & Railways for issuing the PTCC route approval. It included about 3540 Circuit kilometers of 220 kV lines, about 8037 Circuit kilometers of 400 kV lines and about 6455 Circuit kilometers of 765 kV lines. It is pertinent to mention that during 2017-18, due care has been taken to process PTCC cases of those transmission lines which were required to be charged on urgent basis; and with the result there has been no delay of charging of any line for want of PTCC approval.

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



3.17 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 has prepared the Report and submitted to Ministry of Power in Nov., 2016.

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

PCD Division coordinated and followed up with Wireless Planning and Coordination (WPC) Wing of Department of Telecommunications (DoT) to achieve timely frequency allocation for PLCC links of new

power transmission lines of power utilities in the country.

3.19 Telecommunication Consultancy and Technical Support

HE & RM Division, CEA carried out the consultancy assignment for Jigmeling 400kV GIS Substation, Bhutan. PCD Division prepared the Technical Specifications for PLCC System. During execution, PCD division rendered assistance, as and when required.

Similar assistance was provided to HE&TD Division, CEA in regard to telecommunication consultancy assignment for Punatsangchhu–I Hydroelectric Project (6X200MW), Bhutan.

3.20 Framing of Central Electricity Authority (Technical Standards for Communication System in Power Sector) Regulations, 2018

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

To prepare the Technical Standards of Communication System in Power Sector, 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 Technical Standards. The objectives of the Communication Standards were to ensure seamless integration, reliable, redundant and secure communication. These standards are applicable to all Communication Service Provider, Central & State Generating Company including Grid connected Captive Generating Plant, RE Generator, Transmission Licensees, Distribution Licensees, Bulk Consumers, whose electrical system is connected to transmission system, Market Operation Service Providers, Forecast/Weather service provider & Ancillary service providers. The performance and reliability requirements of communication system have also been specified, so that these aspects are taken care by the Communication Service Provider while designing the systems. The security requirements to manage cyber security risks have also been addressed.

The Communication Standards are divided into two parts. First part deals with the General Requirement for the Communication System including Objective, Functional Requirement, Standard Codes and Practices, General Conditions, Performance of the communication system, etc. The second part is in the form of Schedules dealing with the different technological options available for the communication system for Power Sector. In this part, the technical requirement of Interface System, Wideband Communication, PLCC, VSAT and GPRS based communication system have been described.

To seek public comments, the draft Communication Standards were placed in public domain.

3.21 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 procedures provided in Central Electricity Authority (Measures

Relating to Safety and Electric Supply) Regulations, 2010 (as amended). The Chief Engineer of Chief Electrical Inspectorate Division is appointed as Chief Electrical Inspector to the Government of India and is assisted by the officers of Chief Electrical Inspectorate Division and the officers from five Regional Inspectorial Organizations (RIO's) with Headquarters at New Delhi, Chennai, Shillong, Mumbai & Kolkata & they are appointed as Electrical Inspectors to the Government of India in discharging the various responsibilities, briefly described as under:

(a) Statutory 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) Inspection of Electrical installations in Cinema house and issue of no objection certificates for grant of annual license to the cinema house under the respective Cinematography Act in force in the Union Territories.

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

(e) Scrutiny of cases received regarding erection/alteration of building under overhead lines involving infringement of Regulations 60, 61 & 63 of Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations, 2010.

(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.

(g) As per the Gazette of India notification dated 1st March, 2018, the 2nd amendment of Central Electricity Authority (Measures relating to safety and electric supply) Regulations, 2010 was notified.

3.22 MAJOR ACHIEVEMENT IN TERMS OF INSPECTIONS DURING THE YEAR 2017-18 (Important installations inspected) :

3.22.1 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) **765kV Substations**: Wardha, Durg, Singrauli, Indore, Korba, Padghe, Solapur, Jabalpur, Sundargarh, Ranchi, Angul NTPC Sipat, NTPC Gadarwara, NTPC Narsinghpur, Kotra, Champa, Bilaspur, Bansia-Kotra, Sasan, Tamnar, Sasan (UMPP), Ahmedabad (CWRTL), Vindhyachal (CWRTL), Korba (TRN Power), Ahmedabad (RRWTL), Beed (PGPTL), Orai, Vemagiri, Aligarh, Chittorgarh, Ajmer, Osmanabad (PGPTL), Chandrapur (PGWTL), Bina (NHPTL), Seoni (JPL) , NTPC Darlipalli.

(ii) **400kV Substations** : Gwalior, Singrauli, Korba, Padghe, Satana, Vindhyachal, Aurangabad, Rewa, Raigarh, Solapur, Ambajogai, Jabalpur, Nagpur, Shajapur, Khandwa, Itarsi, Kudus, NTPC Khargone, Mundra (Adani), Beed (PGPTL), Chandrapur (PGWTL), Ballabhgarh, Mainpuri , Kaithal, Manesar, Biharsharif, Alipurduar, Rupnarayanpur, Daltonganj, Purnea, Gaya, Pusauli, Rourkela, Jamshedpur, Sundargarh, Angul, Muzaffarpur, Patna, Jharsuguda (OPGCL), Dharbhanga (DMTCL)

,Darlipalli (NTPC), Nabhinagar (NPGCL), Rourkela (PGCIL), Bassi,Kala Amb (PKATL), Gurgaon, Banala, Kurukshetra, Ranchi, Rajarhat, Sundergarh, Motihari, Kameng (NEEPCO), Tuirial HEP, NTPC Bongaigoan, Assam, Kudigi (NTPC), Tumkur, Yelahanka, Tuticorn, Dharwad, Karikudi.

(iii) **220kV Substations**: Bastar, Daman, Satana, Rewa, Itarsi, Ambajogai, Balipara.

(iv) **132kV Substations:** Namasai, Nabhinagar (NTPC), Indore (RRCAT), Gadarwara (NTPC), Haldia-Aiswarya (IOCL), Till-79, Doyang HEP, Zemabawk.

(v) **HVDC Substations:** Champa, Bhadrawati, Agra, Kurukshetra, Alipurduar, Vishwanath Chairiyali.

The details of electrical apparatus inspected at different voltage levels during the year 2017-18 is as given below: -

Apparatus / Voltage Level	Transformers /ICT (MVA)	Reactors (MVAr)	Capacitors(MVAr)	Bays (no.)	Bus (no.)	Statcom (no.)
765 kV	21698	11710	Nil	173	8	Nil
400 kV	12389	5201	1068.54	304	54	5
220 kV	1210	Nil	Nil	72	31	Nil
132 kV	302.5	26.8	Nil	33	4	Nil
33 kV	1270.55	Nil	Nil	8	Nil	Nil
HVDC 800 kV	5825`6	Nil	Nil	Nil	Nil	Nil

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

B) Generating Units :

Dhobnipali (RKM Power), Singrauli (Essar Power), Raigarh (NTPC), Gadarwara (NTPC), Raigarh (SKS), Champa (KSK), Meja Thermal Power Project, Kameng HEP, Pare HEP, Tuirial HEP, Kudigi (NTPC).

The region wise summary of generating units inspected during the year 2017-18 is as given below: -

RIOs	NR	SR	WR	ER	NER
No. of Inspections	1	5	7	Nil	4
Gen. Capacity (MW)	660	869.85	4000	Nil	773

C) Transmission Lines:

(i) **765 kV Lines :** Jabalpur-Orai, Aurangabad-Padghe, Raipur (Pool)-Rajnandgaon, Sipat-Bilaspur, New Parli - Solapur, Sasan UMPP–Vindhyachal, Hyderabad-Nizamabad, Jharsuguda-Dharamjaygarh, Seoni-Bina (LILO), Ajmer–Chittorgarh, Orai-Aligarh, Kanpur–Jhatikara (LILO), Agra – Meerut (LILO), Satna-Gwalior (LILO).

(ii) **400 kV Lines**: Kurukshetra - Jind, Dehradun-Abdullapur, Allahabad-Kanpur Part-I, RAPP 7&8 - Kota (Part-A), Bhadrekhi (UPPTCL)–Orai (PGCIL), Chittorgarh (RRVPNL)-Chittorgarh (PGCIL), Ajmer (RRVPNL)– Ajmer (PGCIL), Nizamabad – Shankarpalli, Maheswaram - Nizamabad Mahabubnagar, Parli - Parli, Wardha - Parli, Gwalior - Morena, Kala-Kudus, Padghe-Padghe, Solapur NTPC-Solapur PG, Aurangabad - Boisar, Mouda - Betul, Lara-Champa ,Gaya-Nabhinagar, Punasantchu-Alipurduar, Daltonganj - Pusauli, Raghunathpur-Ranchi, Kameng Balipara, Karcham Wangtoo – Abdullapur (LILO), Sikar-Neemrana (LILO), Uri - Wagoora line (LILO), Khandwa - Rajgarh (LILO), Dehagam-Pirana (LILO), Rourkela-Raigarh (LILO), DMTCL Barh-Gorakhpur (LILO).

(iii) **220 kV Lines:** Magarawada-Ringanwada.

(iv) **132 KV Lines:** Tilla -79 - RC Nagar Line, Nirjuli-Ranganadi, Hailakandi, North Karanpur-Tandwa, Earth Electrode Line at Alipurduar Substation.

(v) **International 132 KV Transmission Lines:** Katiya (Bihar) - Kusaha (Nepal), Raxaul (Bihar) - Parwanipur (Nepal).

Summary of transmission lines inspected at different voltage levels during the year 2017-18 is given below: -

(Data in Circuit Km)

RIOs / kV	NR	SR	WR	ER	NER
765 kV	1200	451	1801	78.384	Nil
400 kV	1096	552.86	1865	990.724	57
220 kV	Nil	Nil	12.2	Nil	Nil
132 kV	Nil	Nil	Nil	81.661	69.0
110 kV	Nil	5.32	Nil	Nil	Nil
66 kV	Nil	Nil	Nil	Nil	Nil
33 kV	6.3	30.15	Nil	7.90	101.6
11 kV	4.7	Nil	2.6	3.6	Nil
800 kV HVDC	Nil	Nil	Nil	Nil	Nil

D) Electrical installations of the following were inspected during the year 2017-18: NTPC, PGCIL, DVC, NHPC, SJVNL, BBMB, NEEPCO, THDC, SAIL, GAIL, IOCL, HPCL, BPCL, ONGC, AAI, NALCO, BALCO, AIR, CPWD, Port Trusts Airports, IITs, BARC, NBCC, AIIMS BEL, BHEL, DRDO, Private sectors in SEZ, UTs, ISTS, ISGS, etc.

3.22.2 Inspections done for Renewables :

Solar power plants at following locations: GAIL Petrochemical Complex, Pata, Aligarh Muslim University Aligarh, IIT-BHU Varanasi, BHEL Haridwar, BHEL Jhansi, NLC India ltd. Tamil Nadu, Jaipur International Airport, BEL Bolangir (Odisha), NSCBI Airport Kolkata, ONGC, IOCL, RCFL, RAF, IISE&R, HUL, CPWD, DHNPDCL (Velugam), Shipping corporation, JNPT, IIT Gandhinagar, etc. Small Hydro Plant at NTPC Singrauli.

Summary of Generation capacity of Renewable Energy Sources inspected during the year 2017-18 is given below: -

RIOs	NR	SR	WR	ER	NER
Gen. Capacity (MW)	30.1	611.562	35	25	Nil

3.22.3 Cinemas/Theatres installations inspected : -

Summary of Cinemas/Theatres installations inspected during the year 2017-18 is given below :

RIOs	NR	SR	WR	ER	NER
No. Of Inspections	Nil	18	7	Nil	Nil

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

Major installations inspected :

a) **Generating plants** - OTPC Palatana, Tripura; Doyang HEP, Nagaland, BSPCL Bokaro, NTPC Talcher, DVC – RTPS & BTPS, NALCO CPP, IOCL Barauni CPP, NSPCL CPP Durgapur, NTPC Barh, Adani Mundra, Seoni (JPL), Chattisgarh (GMR), Sasan, Chattisgarh (RKM), Korba (TRN), Bharuch (TPL),Chattisgarh (SKS), NHPC Parbati-III Hydro Power Station, NTPC Koldam Hydro Power station, etc.

b) **Substations** – Monarchak (NEEPCO); Doyang HEP Nagaland, Dikrong (NEEPCO), Jamshedpur, Raghunathpur (DVC), Barh (NTPC), Champa, Raigarh, Jabalpur, Kotra,Tamnar,Indore, Korba, Bina, Seoni, Mundra,Tamnar, Damoh, Janjgir Champa, Kutch, Shajapur, Bharuch, PGCIL Panchkula, HVDC Mahendragarh Terminal of Adani Pvt. Ltd.

c) **Electrical installations** of BPCL, NEEPCO, NTPC, OIL, ONGC, PGCIL, SAIL, IOCL, HPCL, AAI, CPCL, NALCO, AIR, CPWD, Kolkata Port Trust, GAIL, NFL, DVC, NHPC, SJVNL, BBMB, THDC, ISTS, ISGS, etc.

3.23 Inspections done in UTs : -

Details of inspections done in UTs during the year 2017-18 is given below: -

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

UTs	AN	DNH	DD	PDY
No. of Inspections	5	172	72	101

3.24 Self-certifications approval issued by RIOs: -

No. of self-certifications issued during the year 2017-18 is given below: -

RIOs	NR	SR	WR	ER	NER
No.	1	144	5	16	Nil

3.25 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.

As on 31st March 2018, 390970 Ckm & 826958 MVA of transmission lines & transformation capacity (220 KV & above) respectively exist in the country.

For the year 2017-18, RFD program for commissioning of 23,086 Ckm of transmission lines comprising of 4927 Ckm of 765 kV, 11424 Ckm of 400 kV and 6735 Ckm of 220 kV transmission lines was envisaged. 100.14% of this target was achieved by commissioning of 23119 CKm of transmission lines, whose break-up is 3819 CKm of 765 kV, 13813 CKm of 400 kV and 5487 CKm of 220 kV. Details of transmission lines commissioned /completed during 2017-18 are given in **Annexure-3I.**

In respect of transformation capacity for the year 2017-18, RFD program of 53978 MVA of transformation capacity comprising of 3000 MW at ±800 kV HVDC, 19000 MVA at 765 kV, 20805 MVA at 400 kV and 11173 MVA at 220 kV was envisaged. 159.68% of this target was achieved by adding 86193 MVA transformation capacity comprising of 3000 MW at ±800 kV HVDC, 23000 MVA at 765 kV, 41815 MVA at 400 kV and 18378 MVA at 220 kV. Details of Substations commissioned / completed during 2017-18 are given in **Annexure-3J.**

Voltage-wise /Sector-wise actual achievement vis-à-vis RFD program for the year 2017-18 in respect of transmission lines and sub Stations are given in **Charts I to VI and VII to XII** respectively.

For the year 2018-19, RFD Program of 22647 Ckm for transmission lines and 62600 MVA of transformation capacity (Substations) has been finalized. The detail of RFD program at 765 kV, 400 kV and 220 kV is 6285 Ckm, 9431 Ckm & 6931 Ckm respectively. The RFD program for transformation capacity additions at ±800KV HVDC, 765 KV, 400 KV and 220 KV levels is 3,000 MW, 22200 MVA, 21900 MVA and 15500 MVA respectively for FY 2018-19. The progress of all transmission elements is being monitored expeditiously for commissioning as per their schedule.

Chart-I

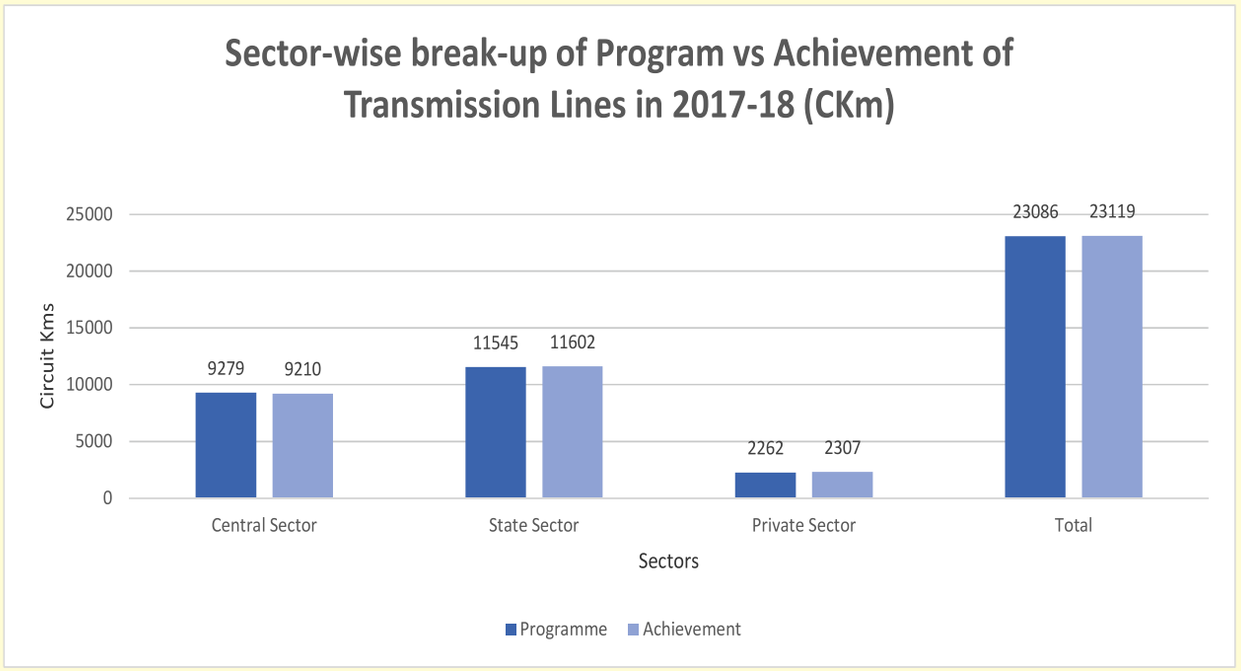


Chart-II

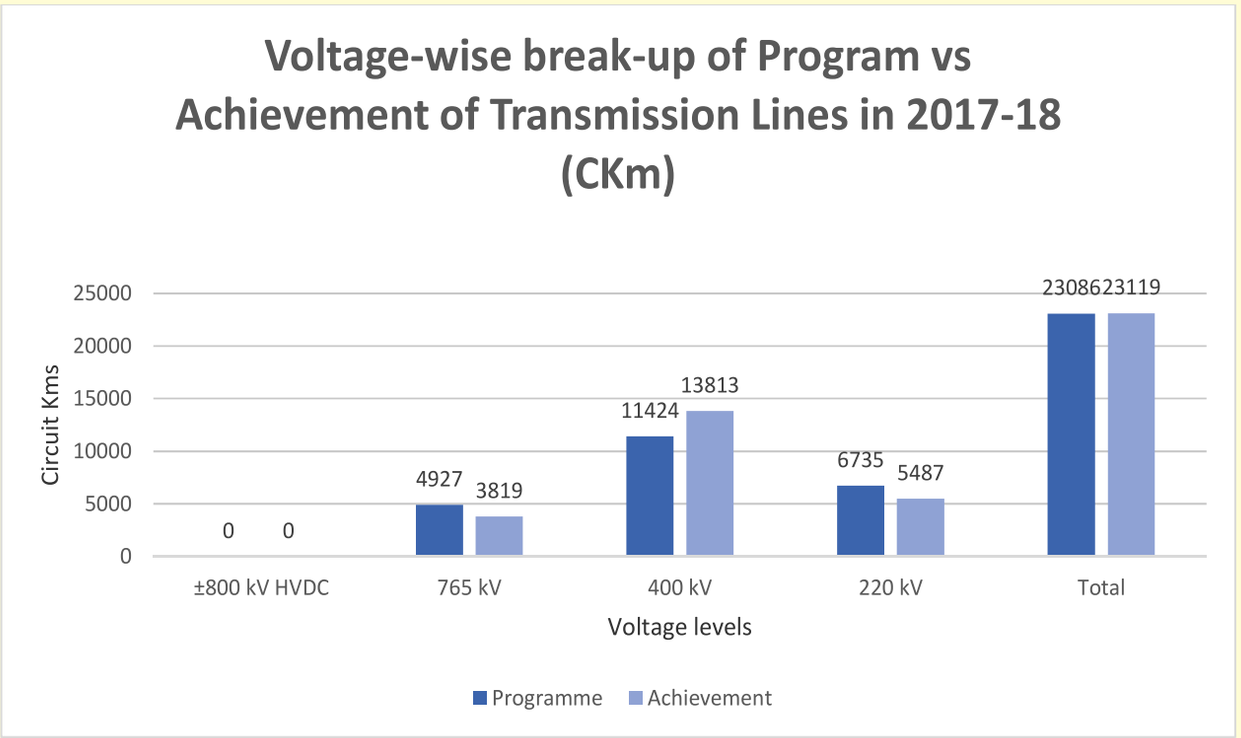


Chart-III

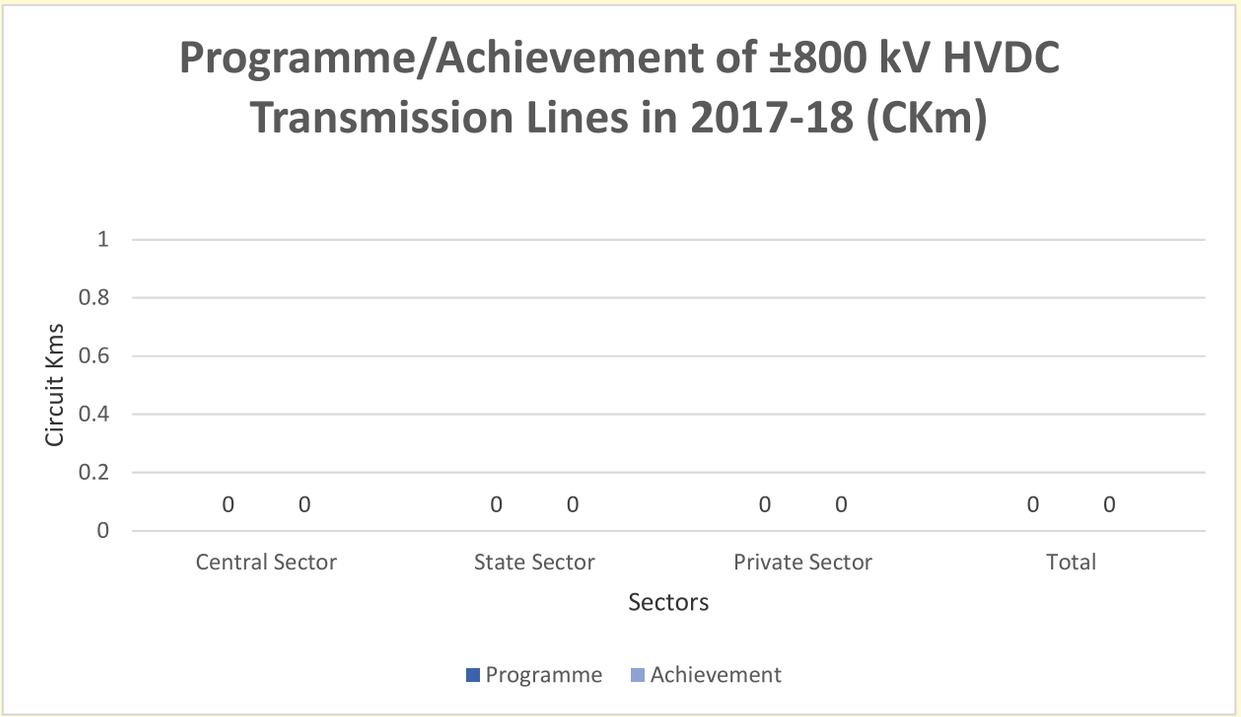


Chart-IV

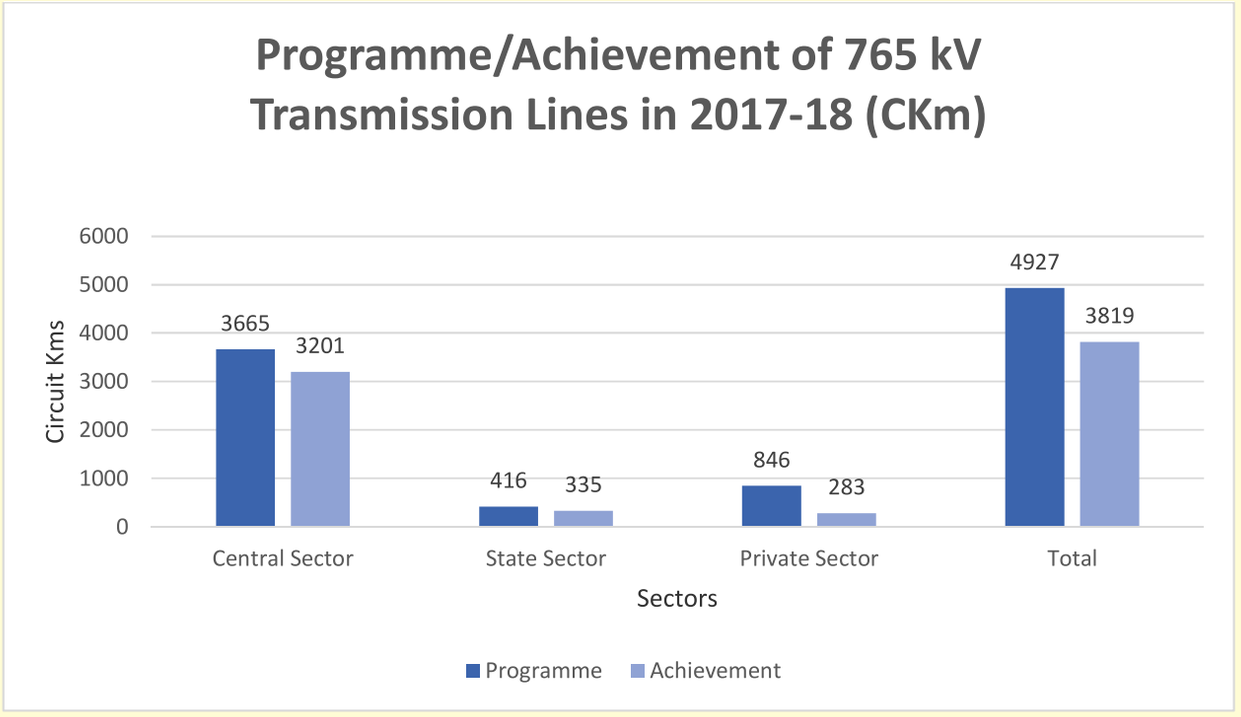


Chart-V

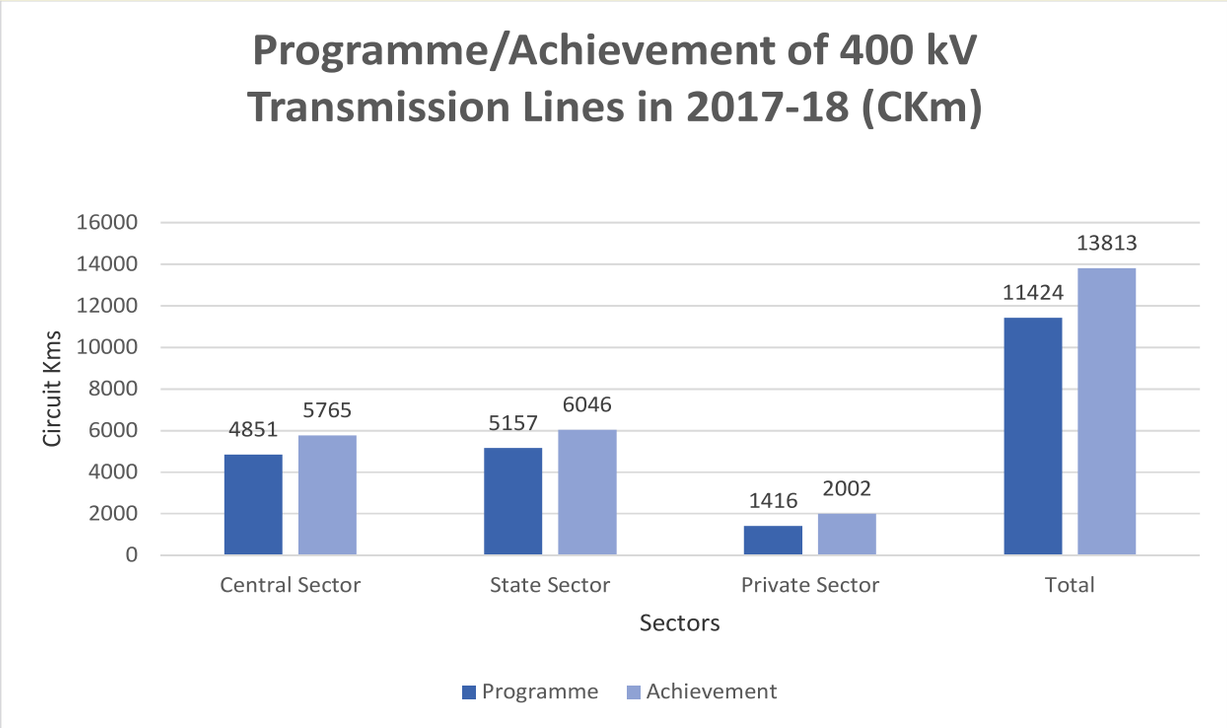


Chart-VI

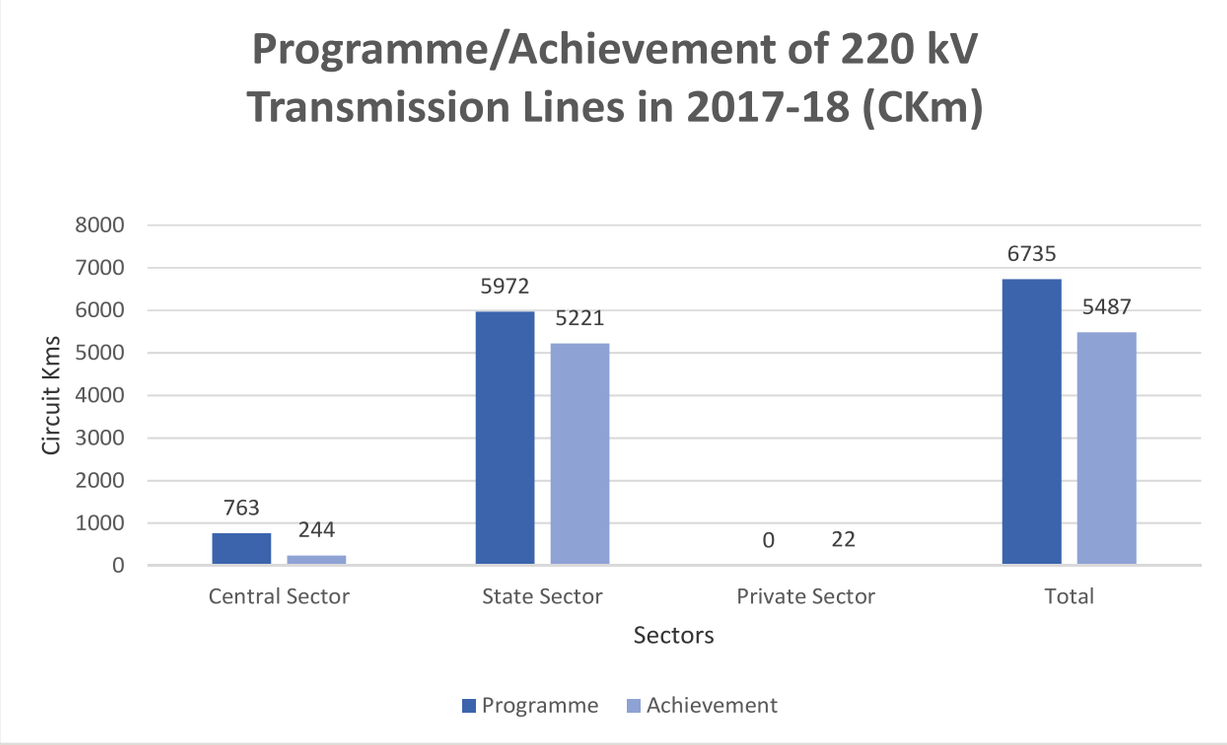


Chart-VII

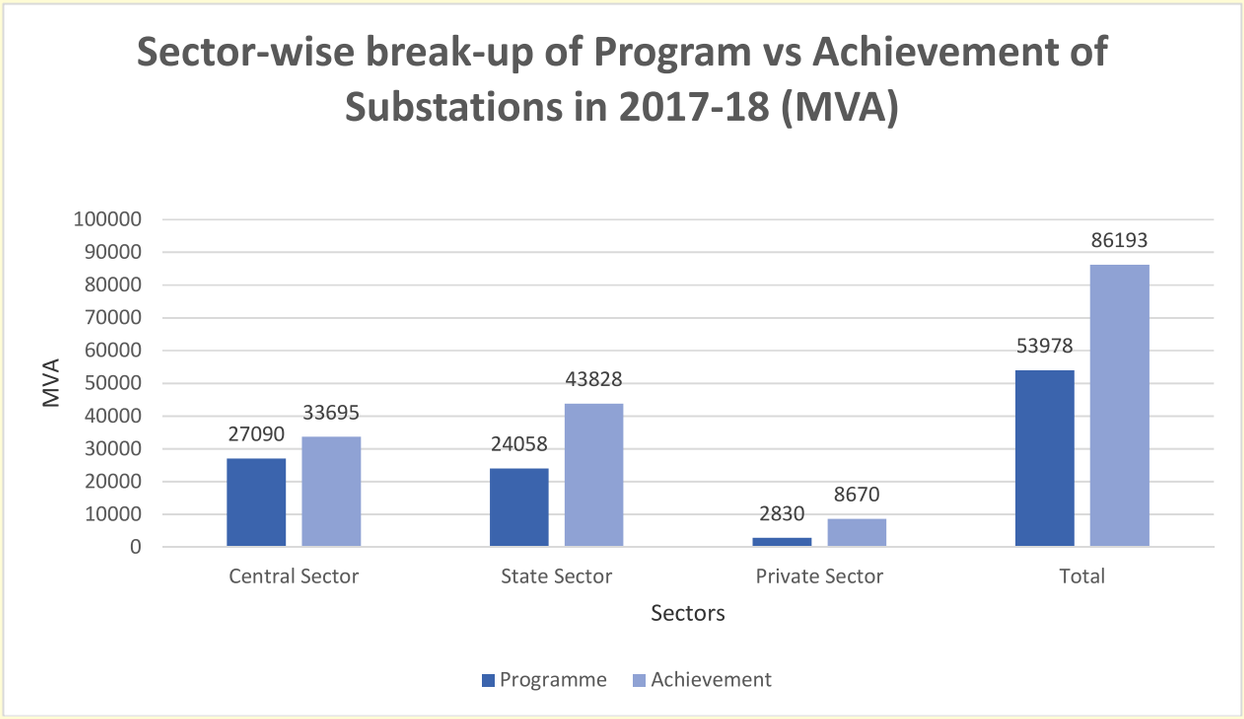


Chart-VIII

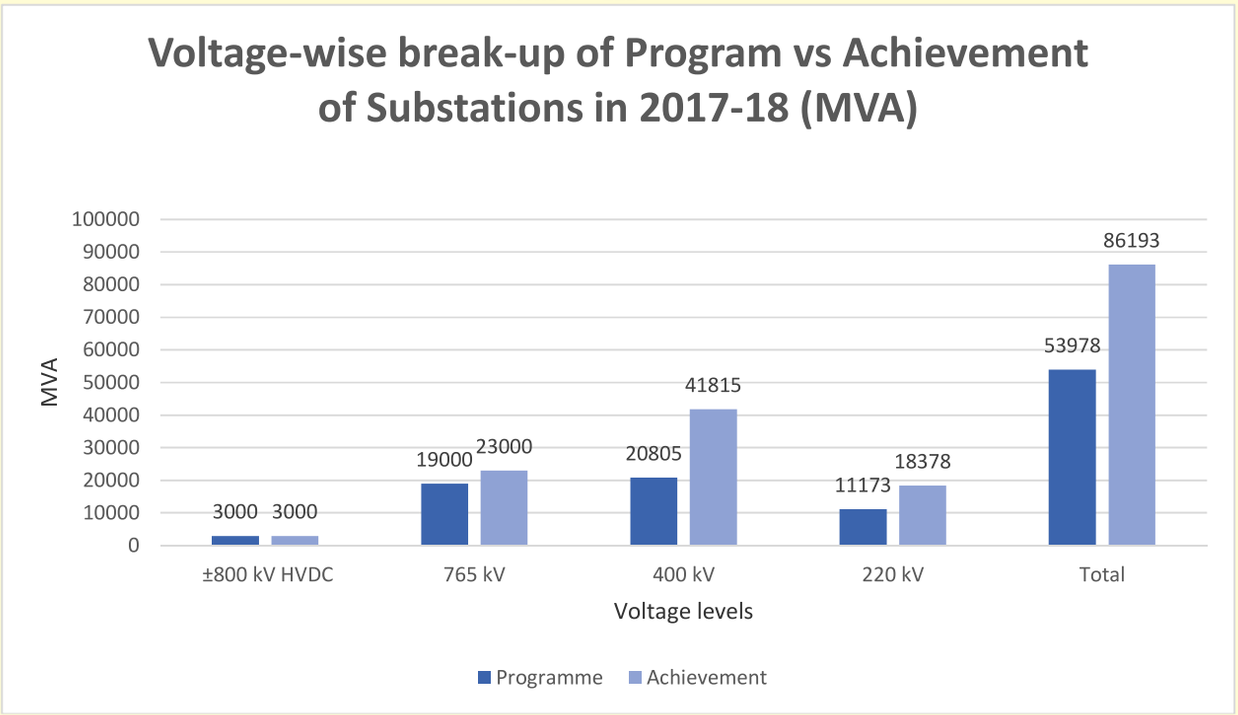


Chart-IX

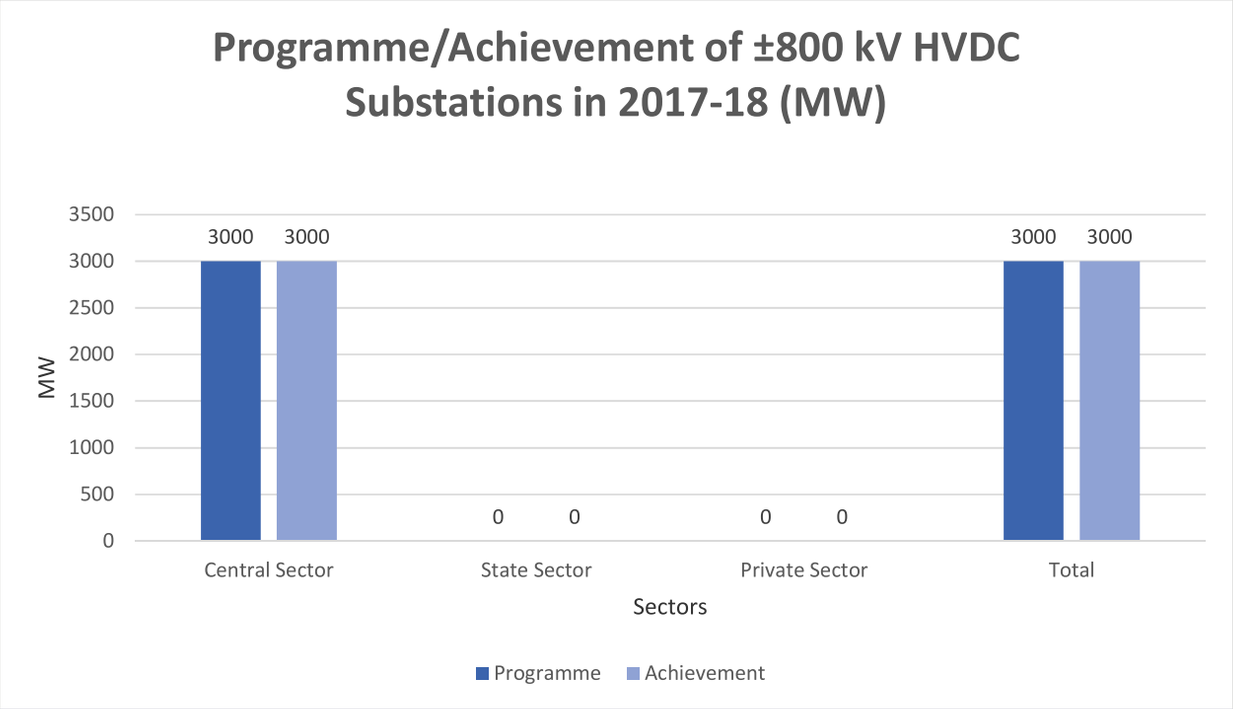


Chart-X

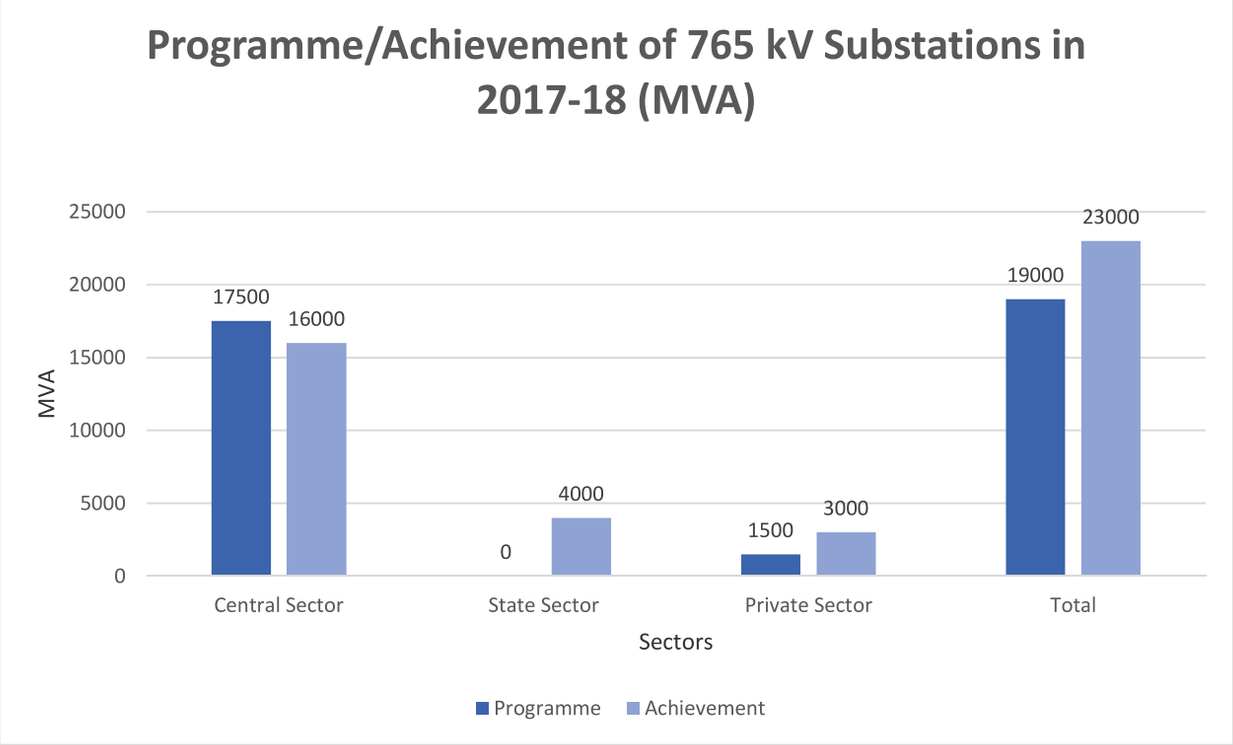


Chart-XI

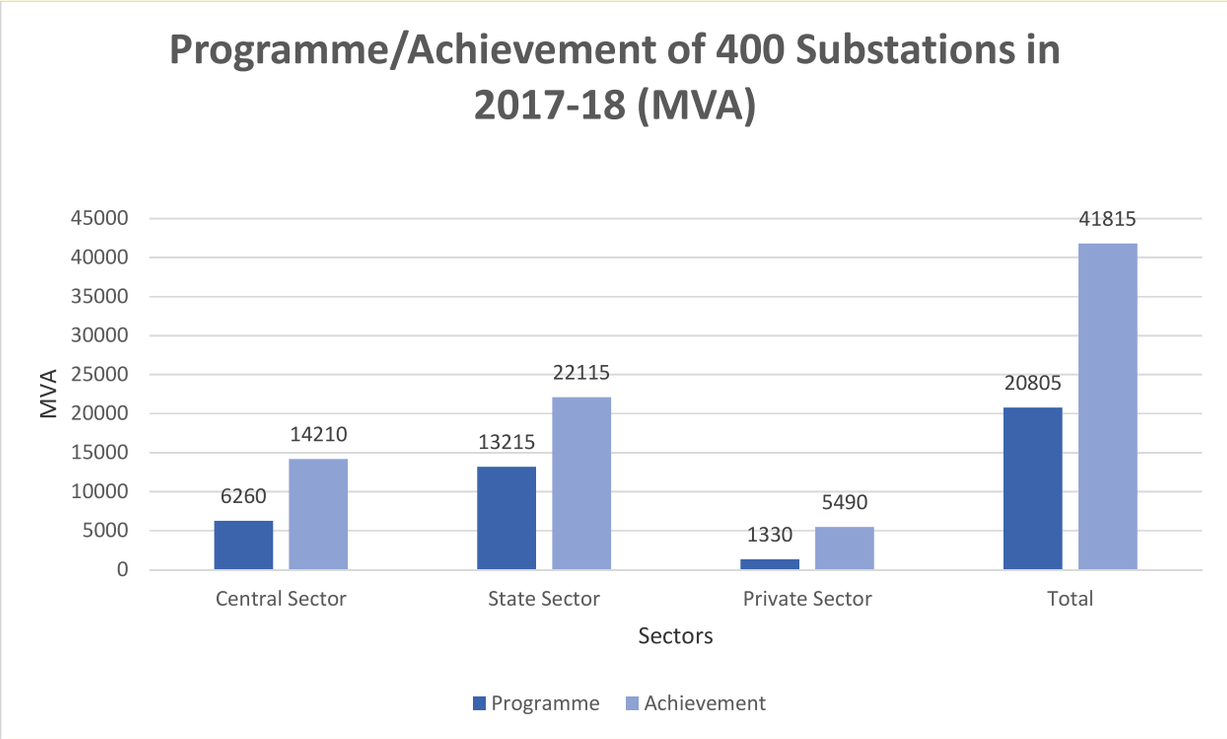
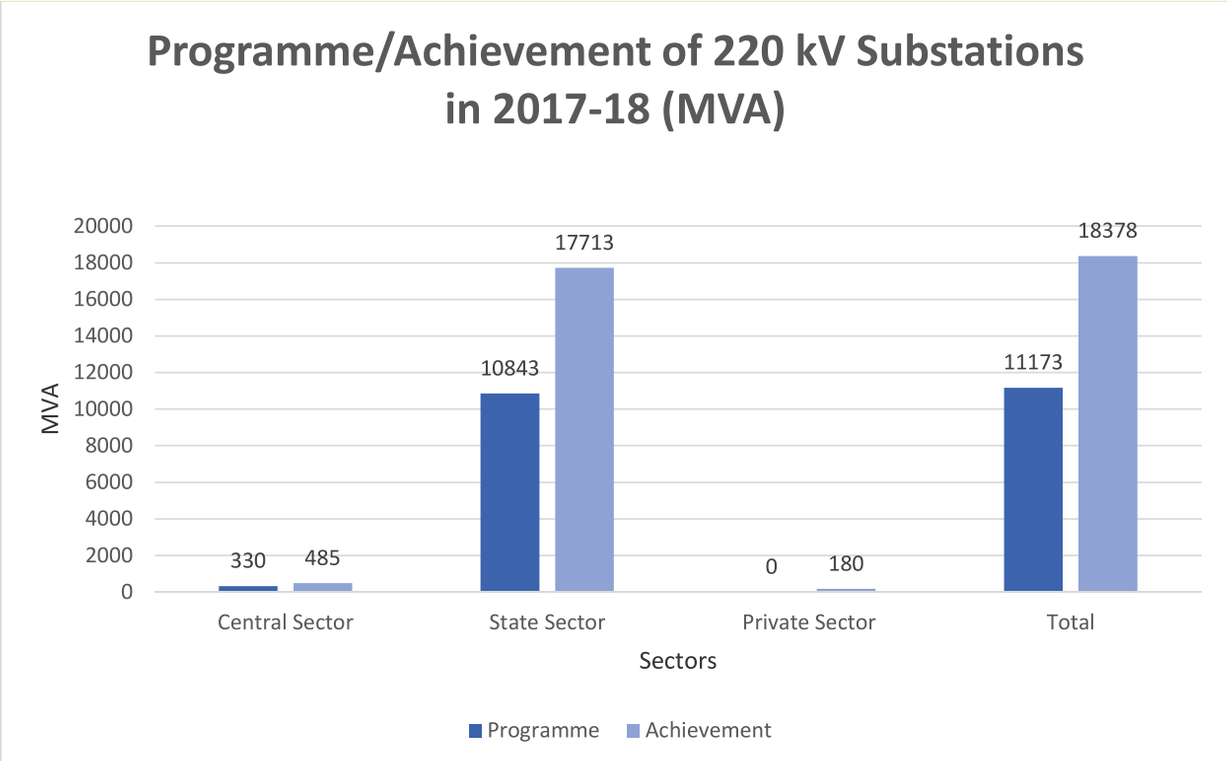


Chart-XII



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

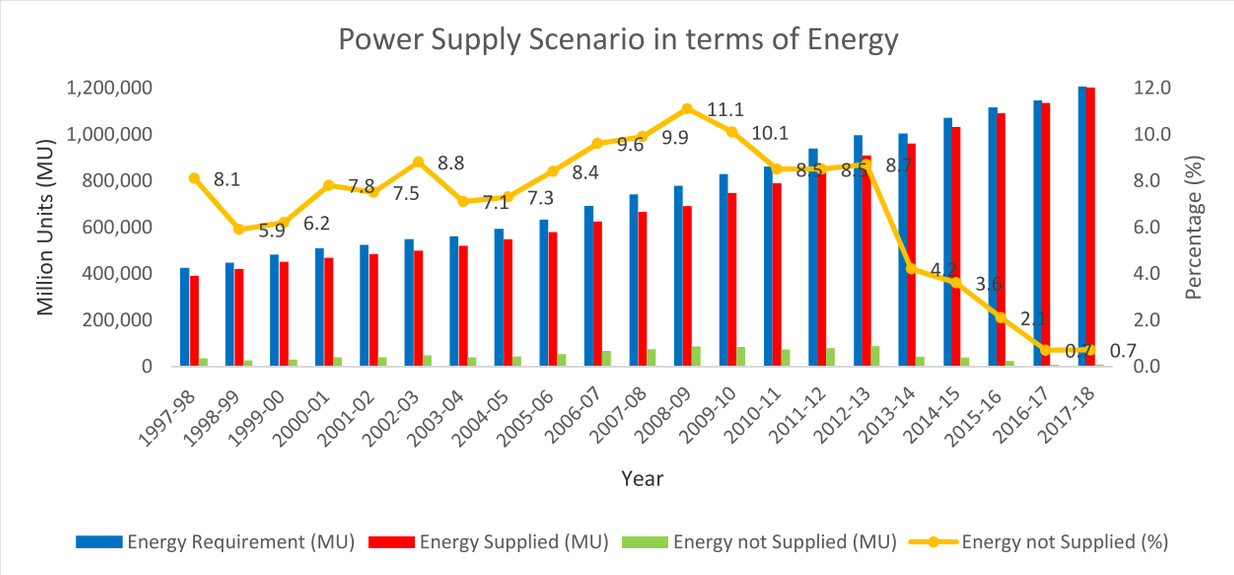
The Central Electricity Authority brings out the All India Power Supply Position on a monthly basis, both in terms of energy and peak giving the requirement, energy supplied and energy not supplied in Million Units (MUs) as well as in percentage and the peak demand, peak met and demand not met both in terms of Mega Watt (MW) and percentage. The total energy requirement in the country during 2017-18 was 12,13,326 Million Units (MUs) as against 11,42,928 MUs during the previous year, registering an increase of 6.2%. The total energy supplied in the country during

2017-18 was 12,04,697 MUs as against 11,35,332 MUs during the previous year, registering an increase of 6.1%. The energy not supplied during the year 2017-18 was 8,629 MUs (0.7 %) against 7,596 MUs (0.7 %) during the previous year. The peak demand during the year 2017-18 was 1,64,066 Mega Watt (MW) as against 1,59,542 MW during the previous year, registering an increase of 2.8%. The peak demand met during 2017-18 was 1,60,752 MW as against 1,56,934 MW during the previous year, registering an increase of 2.4%. The demand not met during the year 2017-18, increased from 2,608 MW (1.6%) to 3,314 MW (2.0%) as compared to previous year.

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

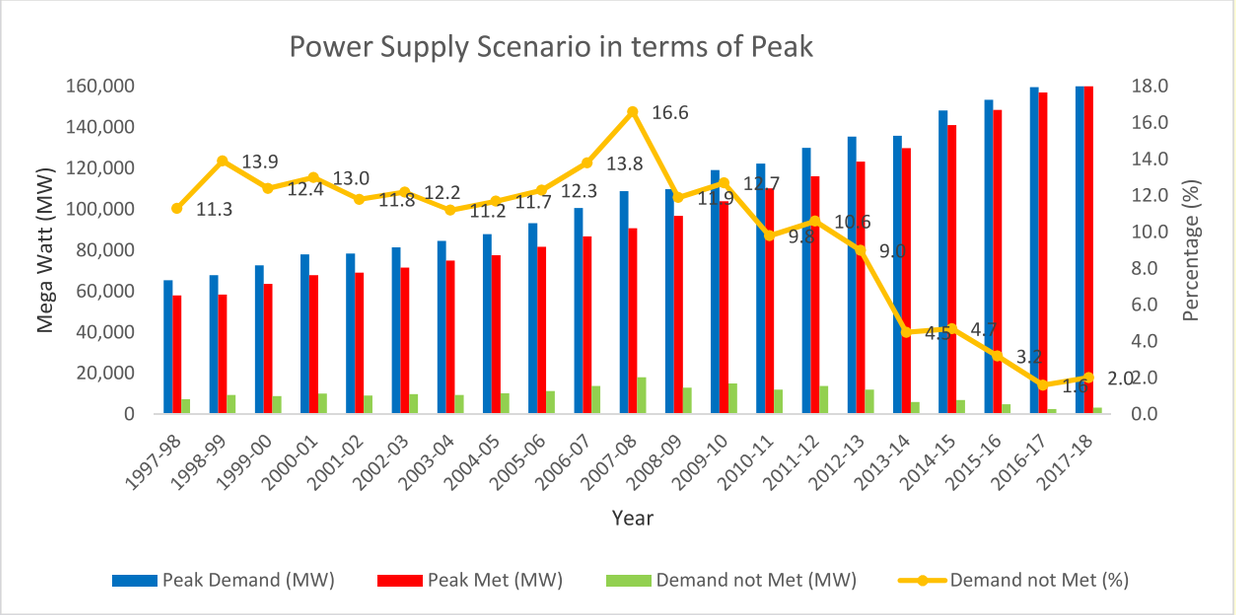
Energy:

Year	Energy Requirement (MU)	Energy Supplied (MU)	Energy not Supplied	
			(MU)	(%)
1997-98	424,505	390,330	34,175	8.1
1998-99	446,584	420,235	26,349	5.9
1999-00	480,430	450,594	29,836	6.2
2000-01	507,216	467,400	39,816	7.8
2001-02	522,537	483,350	39,187	7.5
2002-03	545,983	497,890	48,093	8.8
2003-04	559,264	519,398	39,866	7.1
2004-05	591,373	548,115	43,258	7.3
2005-06	631,554	578,819	52,735	8.4
2006-07	690,587	624,495	66,092	9.6
2007-08	739,343	666,007	73,336	9.9
2008-09	777,039	691,038	86,001	11.1
2009-10	830,594	746,644	83,950	10.1
2010-11	861,591	788,355	73,236	8.5
2011-12	937,199	857,886	79,313	8.5
2012-13	995,557	908,652	86,905	8.7
2013-14	1,002,257	959,829	42,428	4.2
2014-15	1,068,923	1,030,785	38,138	3.6
2015-16	1,114,408	1,090,850	23,558	2.1
2016-17	1,142,928	1,135,332	7,596	0.7
2017-18	1,213,326	1,204,697	8,629	0.7



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



The Power Supply Position in terms of energy and Peak during 2017-18 is enclosed at **Annexure-4A**.

Details of the state-wise allocation in the country as on 31.03.2018 is enclosed at **Annexure-4B**.

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 5th 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 Northern Region has an installed capacity of 92,967.45 MW as on 31-03-2018 consisting of 58720.46 MW thermal, 19753.77 MW hydro, 1620.00 MW nuclear and 12873.22 MW from renewable energy sources. The Northern Grid faced an energy shortage of 1.7% and a peaking shortage of 3.8% during the year 2017-18 as compared to energy and peak shortages of 1.6% and 1.4% respectively during previous year.

Northern Region is connected to Eastern Region through ± 500kV HVDC back-to-back station at Sasaram, 765 kV Sasaram-Fatehpur S/C line, (New) 765 kV Gaya-Varanasi S/C line, 765 kV Gaya-Balia S/C line, 765 kV Gaya-Varanasi S/C (LILO of 765 kV Fatehpur-Gaya at Varanasi), 400 kV Allahabad-Sasaram D/C line, 400 kV Biharshariff - Balia D/C line, 4 No. of 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 Biharshariff-Varanasi D/C line. ± 800 kV Agra- Bishwanath Chariayali (multipole) 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 back-to-back HVDC Vindhyachal, Pole-1 of ± 800 kV Champa – Kurukshetra HVDC link, ± 500 kV Mundra –

Mohindergarh Bipole HVDC link, 765 kV Agra-Gwalior line 1 & 2, 765 kV Phagi - Gwalior line 1 & 2, 400 kV Bhinmal – Zerda D/C line, 400 kV Kankroli – Zerda D/C line, 400 kV RAPP – Shujalpur D/C line, 220 kV Auraiya – Malanpur D/C line, 220 kV Auraiya – Mehgaon D/C line, 220 kV Modak – Bhanpura D/C line, 220 kV Sakatpura – Badod D/C line.

The commissioning of Pole-III & Pole-IV of ± 800 kV Agra-Alipurduar has further enhanced transmission capability between NR and ER. The commissioning of Pole-2 of ± 800 kV Champa – Kurukshetra HVDC link has further enhanced transmission capability between NR and WR.

4.4.2 Western Regional Grid

The Western Region has an installed capacity of 111148.99 MW as on 31-03-2018 consisting of 81415.11 MW thermal, 7447.50 MW hydro, 1840.00 MW nuclear and 20446.38 MW from renewable energy sources. The Western Grid faced an energy shortage of 0.1% and a peaking shortage of 0.8% during the year 2017-18 as compared to Nil energy shortage and peak shortage of 0.4% during previous year.

Total capacity of 4060 MW (including renewables 2141.95 MW) was added in Western Regional Grid in this year including central sector, state sector & private sector. Total Renewable installed capacity is 20446.38 MW in WR as on 31.03.2018. Capacity growth of Renewable energy is 11.70 % compared to the year 2016-17 (18304.43 MW). On the Renewable front, WR has registered installed capacity addition of 905.5 MW (Wind Energy) and 1236.5 MW (Solar Energy) in the year 2017-18. The annual growth of 7.23 % and 49.0 % was recorded for wind and solar respectively.

Total Transmission lines of 6261 ckt km including 765 kV & 400 kV were added in 2017-18. Transformation capacity of 12345 MVA was added in the year 2017-18. Reactive compensation in the form of line reactors and bus reactors of 3588 MVAR and 1550 MVAR respectively was added during the year. STATCOM at Satana and Solapur of 675 MVAR was also added during this year.

Western region is connected to Eastern region through 765 kV N. Ranchi-Dharmjaygarh D/C line, 765 kV Jharshuguda-Dharmjaygarh D/C line, 400 kV Ranchi -Sipat D/C line, 400 kV Rourkela -Raigarh D/C line, 400 kV Jharshuguda - Raigarh D/C line, 220 kV Budhipadar – Korba D/C line and 220 kV Budhipadar- Raigarh D/C line : to Northern region through back-to-back HVDC Vindhyachal, Pole-1 of ± 800 kV Champa – Kurukshetra HVDC link, ± 500 kV Mundra – Mohindergarh Bipole HVDC link, 765 kV Agra-Gwalior line 1 & 2, 765 kV Phagi - Gwalior line 1 & 2, 400 kV Bhinmal – Zerda D/C line, 400 kV Kankroli – Zerda D/C line, 400 kV RAPP – Shujalpur D/C line, 220 kV Auraiya – Malanpur D/C line, 220 kV Auraiya – Mehgaon D/C line, 220 kV Modak – Bhanpura D/C line, 220 kV Sakatpura – Badod D/C line and to Southern 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.

Besides, WR-NR inter regional connectivity strengthened with charging of 800 kV HVDC Champa-Kurukshetra pole-II in Sept, 2017, 765kV Jabalpur-Orai D/C and LILO of 765kV Satna-Gwalior-1 at Orai in Mar, 2018. Owing to this, WR-NR ATC has increased to 9800MW from quantum of 8050 MW.

4.4.3 Southern Regional Grid

The Southern Region has an installed capacity of 102514.57 MW as on 31-03-2018 consisting of 53017.26 MW thermal (Coal 45782.02 + Gas 6473.66 + Diesel 761.58), 11808.03 MW hydro, 3320 MW nuclear and 34369.28 MW from renewable energy sources. The Southern Grid faced an energy shortage of 0.2% and a peaking shortage of 0.4% during the year 2017-18 as compared to

an energy shortage of 0.2% and no peaking shortage during previous year 2016-17.

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 bi-pole 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.

4.4.4 Eastern Regional Grid

The Eastern Region has an installed capacity of 34402.16 MW as on 31-03- 2018 consisting of 27421.64 MW thermal, 4942.12 MW hydro and 1038.40 MW from renewable energy sources. The Eastern Region faced energy shortage of 0.8% and peaking shortage of 1.5% during the year 2017-18 as compared to energy and peaking shortages of 0.7% and 0.6% respectively during previous year.

Eastern Region is the only region connected to all other Regions of the country as well as neighbouring countries Bangladesh, Bhutan and Nepal. It is connected to Northern Region through 765 kV Gaya-Varanasi D/C line, 765 kV Gaya-Balia S/C line, 765 kV Sasaram-Fatehpur S/C line, 400 kV Muzaffarpur-Gorakhpur D/C line with TCSC, 400 kV Motihari-Gorakhpur D/C line, 400 kV Patna-Balia Q/C line, 400 kV Biharshariff-Balia D/C line, 400 kV Biharshariff -Varanasi D/C line, 400 kV Sasaram-Allahabad/Varanasi D/C line bypassing HVDC back to back link at Sasaram and 220 kV Sasaram-Sahupuri S/C line; to Western Region through 765 kV N. Ranchi-Dharmjaygarh D/C line, 765 kV Jharshuguda-Dharmjaygarh D/C line, 400 kV Ranchi -Sipat D/C line, 400 kV Rourkela -Raigarh D/C line, 400 kV Jharshuguda - Raigarh D/C line, 220 kV Budhipadar – Korba D/C line and 220 kV Budhipadar- Raigarh D/C line; to Southern Region through 765 kV Angul-Srikakulam D/C line,Talcher-Kolar HVDC bipole link, HVDC back to back link at Gazuwaka and 220 kV Balimera-Upper Sileru S/C line; and to North-Eastern Region through 400 kV Binnaguri-Bongaigaon D/C line, 400 kV Alipurduar-Bongaigaon D/C line and 220 kV Alipurduar –Salakati D/C lines. It has international connectivity with Bhutan through 400 kV Binaguri-Tala T/C, 400 kV Binaguri-Malbase S/C line, 220 kV Birpara–Chukha D/C line and 220 kV Birpara– Malbase D/C line; with Bangladesh through 400 kV Beharampur– Bheramara D/C line; and with Nepal through 400 kV Muzaffarpur–Dhalkebar S/C line (presently charged at 132 kV level), 132 kV Valmikinagar-Surajpura line, 132 kV Kataiya-Kusaha D/C line and 132 kV Raxaul –Parwanipur line.

4.4.5 North-Eastern Regional Grid

The North-Eastern Region has an installed capacity of 3916.63 MW as on 31-03-2018 consisting of 2292.07 MW thermal, 1342.00 MW hydro and 282.56 MW from renewable energy sources. The North Eastern Grid faced an energy shortage of 2.8% and a peaking shortage of 4.1% during the year 2017-18 as compared to energy and peaking shortage of 2.8% and 0.5% respectively during the previous year, mainly on account of transmission and distribution constraints.

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 Role of NPC Division is 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) Work related to National Reliability Council for Electricity (NRCE).
d) Providing assistance to the Grid Study Committee.

4.5.1 National Power Committee (NPC)

Keeping in view the ever growing complexity of Power System, NPC was established by Ministry of Power vide order dated 25th March, 2013., to evolve a common approach on issues related to reliability and security of the grid, at National level. Chairperson, CEA is the Chairperson of NPC. Member (GO&D), CEA, Member Secretaries and Chairpersons of RPCs, the Chairpersons of Technical Co-ordination Sub Committees (TCC) in five regions are members of NPC. Chief Engineer (NPC), CEA is Member Secretary of NPC. Since its formation, NPC has commenced 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.

Seventh meeting of the NPC was held during 2017-18. Important decisions like reviewing of Under Frequency Relay (UFR) based load shedding scheme for the whole country were taken by NPC. 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.

NPC has been 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 has been constituted under Member Secretary, NPC with members from all RPCs, CEA, POSOCO, CTU and NTPC. The Guidelines are under progress and two (02) meetings of the working group have been held during 2017-18.

4.6 Power System Development Fund (PSDF)

i. Ministry of Power, vide letter No. 29/9/2010-R&R (Vol-II) dated 10th January, 2014 circulated a scheme regarding operationalization of the Power System Development Fund (PSDF) and utilization of funds deposited therein. As per this scheme, NLDC has been designated as the Nodal Agency for implementation of this scheme and PSDF has been declared Public money. Therefore, money lying in the PSDF account is being regularly transferred to Public Account. The total fund transferred from regulatory Pool Accounts to PSDF up to 31.03.2018 is Rs.13780.80 Crores.
ii. A three tier structure has been created under the scheme for operationalization of PSDF as mentioned below:
    a) Appraisal Committee headed by Chairperson, CEA has been constituted for scrutiny (techno-economic appraisal) and prioritization of the various project proposals for funding from PSDF. The Appraisal Committee is assisted by a Techno-Economic Sub-Group headed by Chief Engineer (NPC), CEA for examining the scheme proposals.
    b) After scrutinizing the proposals, the

Appraisal Committee shall submit its Appraisal Report and recommendations in writing to the Central Commission and to the project entity who has submitted the proposal.

c) A Monitoring Committee headed by Secretary, Ministry of Power will consider the projects for sanction based on Appraisal Report and regulatory approval of the Central Commission in accordance with the extant rules/instructions for sanction/approval and release of funds.

iii. During 2017-18, eight meetings of techno-economic subgroup, four meetings of Appraisal Committee and three meetings of Monitoring Committee were held for scrutiny/sanction of grant from PSDF.

iv. As on 31st March 2018, a total of 101 schemes have been sanctioned with a total grant amount of Rs. 10,260 Crores from PSDF. These include 44 numbers of schemes with grant amount of Rs. 2992 Crores sanctioned during the year 2017-18. Details are as given below:

Project Entity	During 2017-18		Previous Years		Total	
	Number	Grant	Number	Grant	Number	Grant
State/UT	40	2443.82	48	3170.18	88	5614.00
RPCs	1	6.50	4	57.04	5	63.54
BBMB	1	23.27	-	-	1	23.27
DVC	1	140.50	1	25.96	2	166.46
PGCIL	1	378.04	3	3781.52	4	4159.56
PGCIL/RECTPCL	-	-	1	233.03	1	233.03
Total	**44**	**2992.13**	**57**	**7267.73**	**101**	**10260**

Most of the utilities which have availed funding from PSDF are in various stages of implementation of their schemes. Execution of these projects would enhance the grid security and reliability.

4.7 National Reliability Council for Electricity (NRCE)

Hon'ble CERC vide Order dated 11.12.2013 in Petition No.188/SM/2012 with IA No.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 4th 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 5th 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.

4.8 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 13th 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 were appointed for this purpose.
As per the recommendations of the above Task Force, one Consultant (Tractebel, Romania) was appointed to carry out the tasks as given below:

Task I: To study the status of implementation of recommendations of enquiry committee and

Task II: To study the protection audit report of 762 substations across the country carried out after grid failure of July 2012 and conduct on site Protection audit check of the works already carried out, for at least 10% (76 nos.) of 762 Substations.

The Consultant had completed the task and submitted the final report.

The other Consultant (Powertech Labs Inc., Canada) was appointed to study the following six tasks:

Task–I: Examination and Recommendation of Methodology for Optimum Calculation of Transfer Capability (TTC/ATC/TRM) in the Planning and the Operational Horizons.

Task-II: Calculation of Transfer Capability (TTC/ATC/TRM) for entire country.

Task-III: Guidelines for developing and implementing System Protection Scheme (SPS) and islanding schemes and review existing schemes.

Task-IV: Operational Planning and Long term planning for secure and efficient operation of the grid.

Task–V: Suitable suggestions in the Regulatory framework to ensure Secure and efficient grid operation.

Task-VI: To review the tuning of all Power Electronic Devices (including FACTS and HVDC) and suggest retuning of setting of these devices, as per report of Task Force.

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

Both the Consultants had completed the tasks and submitted the final report of all the tasks. 4th meeting of Grid Study Committee was held during 2017-18. The Committee has accepted the Task I & II Report of the Consultant M/s Tractebel and the Task I, II & III Reports of the Consultant M/s Powertech Labs Inc. The Consultancy project is targeted to be completed by June 2018.

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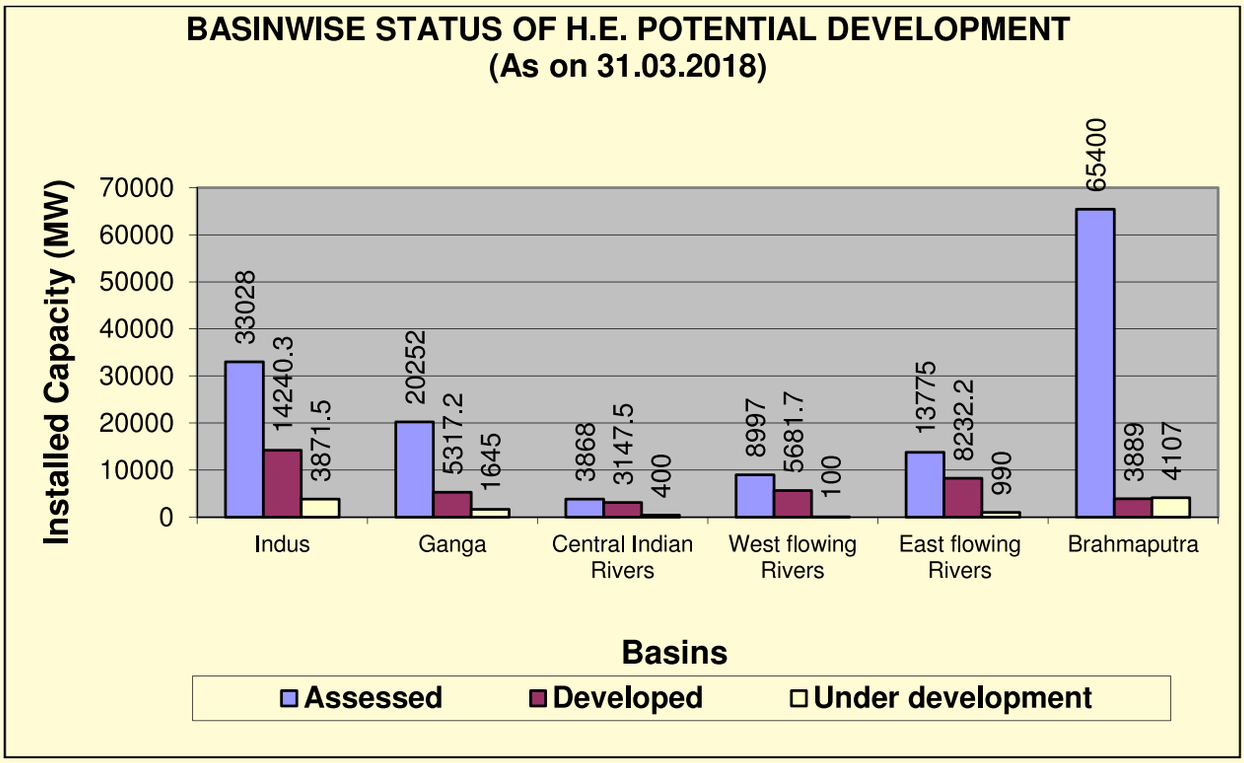
CHAPTER – 5

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 31.03.2018, the hydro-electric schemes in operation account for only 27.87% (40507.8 MW) and those under execution for 7.65% (11113.5 MW) of the total potential in terms of installed capacity. Thus, the bulk of the potential (64.48%) remains to be developed.



Further, 63 sites for development of Pumped Storage Schemes (PSS) with probable total installation of about 96524 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.

In addition, the study for the assessment of small hydro potential has been completed in June, 1996 by CEA. 1512 small hydro-electric schemes with aggregate installed capacity of about 6782 MW on canal falls/ river-streams have been identified. Subsequently MNRE has been vested with the responsibility of developing Small Hydro Power (SHP) projects up to 25 MW station capacities.

5.2 50,000 MW Hydro-Electric initiative

Under the 50,000 MW Initiative, preparation of Preliminary Feasibility Reports (PFRs) of

162 hydro-electric projects spreading in 16 states was taken up by CEA as nodal agency in the year 2003-04 with CPSUs/State agencies as Consultants. CEA's role 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 to complete these feasibility studies. The PFRs were completed in Sept., 2004 for all these projects with an installation of 47,930 MW. The details of these projects are given at **Annexure -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. In addition, DPR of 17 schemes (9248 MW) have been concurred by CEA while DPR for 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 issues related to Environment & Forest Clearance, Law & Order and other issues.

5.3 Construction Monitoring of Hydro Projects

Hydro Project Monitoring Division is monitoring the progress of construction of on-going sanctioned hydro power projects (above 25 MW) in pursuance to Sections 73(f), 73(i) and 73(j) of the Electricity Act, 2003.

The progress of each project is monitored continuously through site visits, interaction with the developers & other stake holders. Chairperson, CEA/ Member (Hydro), CEA holds review meetings with the Power Projects Monitoring Panel (PPMP) 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 **Annexure-5B**.

5.4.1 Hydro capacity programme during 2018-19

Hydro Capacity Addition Monitorable Targets planned for the year 2018-19 is 910 MW (710 MW in Central Sector, 167 MW in State Sector, and 33 MW in Private Sector.). Project-wise details are given at **Annexure-5C.**

5.4.2 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. As per the Guidelines for formulation of DPRs for Hydro Electric Schemes, their acceptance and examination for concurrence, CEA provides assistance to various Central/State agencies in the matter of survey, investigation and preparation of DPRs of hydro projects costing more than Rs.1000 Crs.

In addition, the consultation meetings are held by CEA, CWC, GSI and CSMRS with project developer and guidance is provided by the appraising agencies for making a good quality and bankable DPR.

A total of 13 HEPs including 3 Pumped Storage Schemes with aggregate capacity of 6784 MW are presently under Survey & Investigation in the country. A total of 9 No. of DPR (3995 MW) have been prepared under the procedure so far including 4 nos. of DPRs (856 MW) prepared during 2017-18.

5.5 Project Planning & Optimization Studies

- Revised Power Potential studies of

Ujh MPP, J&K (62X3 MW+ 4X2.5 MW) with Design Energy of 238.66 MU was carried out considering environment flows as per approved TOR by MoEF & CC.

- Consultancy Services are being rendered for Preparation/ Updation of Detailed Project Report of Kuri-Gongri HEP (2640MW) in Bhutan and Sharavathy Pumped Storage Project (2000MW) in Karnataka and Tlawng HEP in Mizoram.

5.6 Studies & Other Activities Related to Hydro Power Planning

- Draft IFC Report on Climate Investment Opportunities in South Asia was examined for comments.
- Final report on Cumulative Impact Assessment and Carrying Capacity Study (CIA & CCS) of Chenab River Basin in Himachal Pradesh, Dibang & Kameng basin in Arunachal Pradesh was examined and commented upon.
- Synthesis Report on a Program of Studies on Low Carbon Development of the People's Republic of China and India was examined and commented upon.
- Draft Note for Cabinet for Constitution of Ganga Management Board as per UP Reorganization Act, 2000 was examined and commented upon.
- Project Proposal from Government of Nagaland for financial assistance from AIIB was examined and commented upon.
- The Draft final report by Expert Body (EB-II) in respect of hydro projects to study Cumulative Impact Assessment (CIA) and carrying capacity of river Ganga in general for development of HEPs in upper reaches of river Ganga and focusing upon likely impacts caused by HEP structures, has been prepared and submitted to MoEF in Sep'17.
- Examined proposal of POSOCO/ CERC for "Implementation of Hydro Generators as Fast Response Ancillary Services (FRAS)".
- Examined proposal regarding flexibility in generation and scheduling of Hydro & Thermal Power Stations.
- **New Hydro Policy**

  A Committee to suggest policy intervention for hydro power development was constituted by MoP in Feb, 2016. Subsequently, based on the recommendations of the Committee a proposal for revival of hydro sector has been formulated which is under active consideration with Govt. for achieving faster capacity additions from under construction hydro projects. Ministry of Power had prepared an EFC memo and the views of all the stakeholders were also invited.

- **Indus Water Treaty (IWT) Matters**
  - Adequacy of Pondage of Sawalkote, Kirthai-II, & Kwar H.E Projects in J&K and Dugar, Seli & Sachkhas H.E Project in Himachal Pradesh mentioned in their DPRs , as per IWT was examined with reference to IWT provisions.
  - Meetings of the World Bank with senior representatives of India and Pakistan on issues related development of Kishenganga and Ratle HEPs in Washington, USA held on 30th Jul'2017 to 01st Aug' 2017 and 14th & 15th August, 2017 were attended.
  - 114th Meeting of Permanent Indus Commission held on 29th & 30th March, 2018 at New Delhi was attended.
- **Participation in Other Expert Committees & Assistance in Preparation of Reports**

- Expert Committee for "Proper Management of Water Resources in North Eastern Region".
- Committee on 'Flexibilisation of Thermal Power Plants'.
- Committee constituted under the Chairmanship of Chaiperson, CEA, to Improve Hydro Generation by one-third within the existing Capacity.
- Sub-Committee under the Chairmanship of Chairperson, CEA to study the issue of shifting hydro power stations from Base Station to Peak Station.
- Committee constituted under the Chairmanship of Chairman, BBMB to study the status and impact of silt upon the Hydro-electric Projects including impact on power generation, flooding etc. across the country.
- Committee under the Chairmanship of CMD, NHPC on "NHPC to Become Grid Stabilizer using Hydro Power"

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

  a) Examined the Power Potential Studies on impact of change in MDDL due to reduction in Pondage carried out by M/s GVK for Ratle HEP.

  b) Issue of pondage in respect of Kishenganga & Ratle HEP.

5.7 Co-operation with Neighboring Countries in Hydro Power

During the year, following works were attended 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(DPR) of Kuri-Gongri HEP (2640 MW) in Bhutan and a team of Officers from CEA & WAPCOS visited site of the project for discussion on layout & other issues with RGOB officials and WAPCOS site team engaged in Survey and Investigation work, for various project component locations such as Dam, Power House, Pot head yard etc.
- DPR of Kuri-I (Dorjiling) (1125 MW) in Bhutan was examined & comments were sent to Bangladesh side in this regard.
- Matters relating to revision of tariff for existing Chukha HEP(336 MW) and Tariff negotiation of upcoming Mangdechhu HEP (720 MW) in Bhutan.
- Rendering review consultancy for Preparation/Updation of DPR of Pancheshwar Multipurpose Project (PMP) including Re-regulating dam at Rupaligad (4800 MW + 240 MW) in Nepal. DPR Chapter on "Benefit Assessment and Project Optimization" of Pancheshwar Multipurpose Project prepared by WAPCOS was examined and observations furnished to MoP/ MoWR, RD & GR/CWC/ WAPCOS.
- 11th Meeting of Expert Level Mechanism (ELM) between India and China on 26th - 29th Mar'2018 at Hongzhou, China to discuss issues relating to Trans-Border Rivers was attended. The MoU and Implementation Plan on provision of hydrological information of Yaluzangbu/ Brahmaputra River was agreed upon in the meeting.

5.7.1 International Cooperation

The matters relating to co-operation on hydropower development with the countries

like Canada, Norway, Ethiopia, Croatia and Hungary were attended.

5.8 Hydro Power Plants Performance & Operation Monitoring

- The report "Review of Performance of Hydro Power Stations" for the year 2016-17 has been published. Performance of 695 units in 200 Hydro Stations with aggregate Installed Capacity of 44478.42 MW (above 25 MW) was analyzed in respect of their outages & generation in this report.
- Mid-term review of generation performance of hydroelectric stations of the country for the year 2017-18 was carried out in Dec' 2017 after withdrawal of South-West monsoon. Based on interaction with Power Utilities, the generation targets were reviewed for the remaining part of the year 2017-18.
- Month-wise /station-wise hydro generation targets in respect of HE Stations (above 25 MW) totaling to 130 BU for year 2018-19 were finalized in consultation with various utilities.

5.9 Hydel Generation Performance during year 2017-18

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

Region	Generation (BU)		Deviation (+/-)
	Target	Actual	(%)
Northern	71.58	74.73	4.41
Western	17.08	9.18	-46.25
Southern	28.68	19.02	-33.68
Eastern	18.66	17.52	-6.10
N-Eastern	5.40	5.67	4.91
All India	**141.40**	**126.12**	**-10.80**

Against target of 141.40 BU, the actual energy generation during the year 2017-18 was 126.12 BU, which was 10.80% less than the target. The lower generation was primarily on account of less rainfall in the catchment areas of the hydro power stations.

5.10 Renovation & Modernisation of Hydro Electric Projects

5.10.1 R&M Phase-I Programme :

Recognizing the benefits of the R&M programme, Govt. of India set up a National Committee in 1987 to formulate strategy on R&M of Hydro Power Projects. Based on the recommendations of the National Committee and subsequent reviews, a programme for renovation, modernization and uprating of Hydro Power Stations was formulated by Central Electricity Authority in which 55 schemes were identified with an aggregate generating capacity of 9653 MW in Phase-1. The total cost of these R&M schemes was estimated as Rs.1493 Crores with expected benefit of 2531 MW.

5.10.2 R&M Phase-II Programme:

The hydro policy of Govt. of India, declared in 1998, accorded priority to renovation & modernization of Hydro Power Plants. Accordingly, 67 hydro R&M schemes having an aggregate capacity of 10318 MW were identified to be undertaken under Phase-II Programme till the end of X Plan to accrue a benefit of 3685 MW at an estimated cost of Rs.

2161 Crores. Details of achievements are given at 5.11.1.

5.11 National Perspective Plan:

CEA formulated the National Perspective Plan for Hydro Power Stations in the year 2000 and integrated R&M proposals under Phase-II programme along with the left out schemes as recommended in Phase-I programme of the National Committee. The left out schemes were those, which were either under implementation or were yet to be taken up for implementation. This Perspective Plan was for R&M during IX, X and XI Plans with 117 schemes having an aggregate installed capacity of 19370 MW with benefits of 7755 MW at an estimated cost of Rs.4654 Crores.

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 projects (13 upto 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 19481 MW had been completed at the end of the XII Plan (i.e by 31st March 2017). A benefit of 3635 MW through Life Extension, Uprating and Restoration has been accrued.

During the XII Plan, 21 schemes (2 in central sector & 19 in state sector) with an installed capacity of 4150 MW have accrued a benefit of 549 MW through Life Extension, Uprating and Restoration completed till March, 2017. Summary is given at **Table I.**

5.11.2 Programme for R&M during 2017-22 and 2022-27

An aggregate capacity of 9209.80 MW at 48 Hydro Electric Power Station (7 in Central Sector and 41 in State Sector) is programmed for R&M during 2017-22, which will accrue benefit of about 4725.35 MW through Life Extension, Uprating and Restoration. Out of the 48 schemes expected for completion during 2017-22, 2 schemes in Central Sector with an aggregate capacity of about 213.4 MW have been completed till March, 2018 and have accrued a benefit of 48.4 MW through Life Extension. Summary is given at **Table II**.

During 2022-27, an aggregate capacity of 2058 MW at 20 Hydro Electric Power Station (1 in Central Sector and 19 in State Sector) is programmed for R&M. Summary is given at **Table III**.

Summary of R&M of Hydro Electric Projects (As on 31.03.2018)

I. Hydro R&M schemes completed up to XII Plan

Sl. No.	Schemes completed in Plan Period	No. of Projects			Installed Capacity (MW)	Actual Expenditure (Rs. in Crs)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	VIII Plan	2	11	13	1282.00	127.37	429.00 [39.00(U) + 336.00 (Res.) +54.00(LE)]
2.	IX Plan	8	12	20	4892.10	570.16	1093.03 [339.00(U) + 331.03(Res.) + 423.00(LE)]
3.	X Plan	5	27	32	4336.60	1029.24	829.08 [123.40(U) + 01.25 (LE) + 4.43(Res.)]
4.	XI Plan	4	14	18	4821.20	294.84	735 [12 (U) + 15 (Res.) + 708 (LE)]
5.	XII Plan	2	19	21	4149.60	1127.69	549.40 [58 (U)+ 476.40 (LE)+15(Res.)]

II. Hydro R&M schemes Programmed for completion during 2017-22

Sl. No	Category	No. of Projects			Capacity (MW) covered under R&M	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	7	41	48	9209.8	6300.41	4725.35 [149.7(U) + 4575.65(LE)]
2.	Under Implementation	3	21	24	4691.10	3012.80	2111.50 [116.20 (U)+ 1995.30 (LE)]
3.	Under Tendering	1	13	14	2594.10	2207.04	848.25 [27.5 (U) + 820.75 (LE)]
4.	Under DPR Preparation/ Finalization/ Approval	1	7	8	1711.20	1046.51	1717.20 [6 (U) + 1711.20 (LE)]
5.	Completed	2	0	2	213.4	25.34 (Actual Cost)	48.4 (LE)

III. Hydro R&M schemes Programmed for completion during 2022-27

Sl. No	Category	No. of Projects			Capacity (MW) covered under R&M	Estimated Cost (Rs. in Crs.)	Benefit (MW)
		Central Sector	State Sector	Total			
1.	Programmed	1	19	20	2058	1285.79	782 [31(U) +751(LE)]
2.	Under Tendering	0	2	2	66	182.29	72 [6 (U) + 66 (LE))
3.	Under DPR Preparation/ Finalization/ Approval	1	5	6	685	1103.50	710 [25(U) + 685 (LE)]
4.	Under RLA Studies	-	12	12	1307	-	-

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

5.11.2.1 Achievements under R&M in Hydro during the year 2017-18

Two (2) Hydro R&M schemes namely Ganguwal & Kotla (1x24.2 & 1x24.2 MW) and Dehar Power House (1x165 MW) of BBMB, having an aggregate capacity of about 213.4 MW have been completed during the year 2017-18 at a cost of about Rs.25.34 Crores with accrued benefit of about 48.4 MW through Life Extension of Ganguwal & Kotla HEP.

5.11.2.2 Programme for the year 2018-19

For the year 2018-19, it is programmed to complete 10 schemes having capacity under R&M of about 1496 MW. On completion of these schemes, there will be a benefit of about 699 MW through Uprating, Life Extension and Restoration at an estimated cost of about Rs. 494 Crores. The details of these 10 schemes are as under:

S. No.	Name of Scheme	Installed Capacity (No. x MW)	Capacity under R&M (No. x MW)	Cost (Rs. in Cr.)	Agency
1	Ganderbal	2x3+2x4.5	2x4.5	39.30	J&KSPDC
2	Chenani	5x4.66	5x4.66	39.14	J&KSPDC
3	Rihand	6x50	6x50	132.2	UPJVNL
4	Nagarjuna Sagar Ph-II works	1x110+7x100.8	1x110+7x100.8	22.17	TSGENCO
5	Nagarjuna Sagar Left Canal Power House	2x30.6	2x30.6	30.99	TSGENCO
6	Bhadra River Bed units	2x12	2x12	28.015	KPCL
7	Sholayar	3x18	3x18	199.55	KSEB
8	Sholayar-I	2x35	2x35	120	TANGEDCO
9	Gandhi Sagar	5x23	5x23	21.83	MPPGCL
10	Hirakud-II (Chilima)	3x24	1x24 (U-3)	65.67	OHPC

5.12 Concurrence / Appraisal of Hydro Schemes:

During the year 2017-18, CEA appraised and accorded concurrence/ appraisal to 3 Nos. Hydro Electric Schemes aggregating to capacity of 5531 MW as detailed below:

Hydro Electric Schemes accorded Concurrence / Appraisal by Central Electricity Authority during 2017-18

S. No.	Name of Scheme/ State/ Executing Agency	Installed Capacity (MW)	Estimated Cost	Date of Concurrence/ Appraisal by CEA
1.	Loktak down stream HEP in Manipur by M/s Loktak Downsteam Hydroelectric Corporation Ltd.	(2x33= 66 MW)	Rs.1352.77 Cr. (Price at Feb.2015 level)	**5.5.2017**
2.	Sankosh HEP, in Bhutan by M/s.THDC India Limited	(8x312.5MW+3x28.3= 2585 MW)	Rs.15709.59 Cr. (Price at April.2016 level)	**6.6.2017**
3.	Dibang Multipurpose project in Arunachal Pradesh by M/s. NHPC Limited	(12x240=2880 MW)	Rs 17510.84 Cr. (Price at July.2016 level)	**18.9.2017**
	TOTAL:	**5531 MW**		

CHAPTER-6

THERMAL POWER DEVELOPMENT

6.1 SETTING UP OF ULTRA MEGA POWER PROJECTS (UMPPs)

The Government of India had launched an initiative 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 route employing Super Critical Technology. To tie-up for necessary inputs and clearances such as land, fuel through captive mining blocks, water and 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.	Name of UMPP	Type	Date of Transfer	Levellised Tariff (in Rs. Per kWh)	Successful developer
1.	Mudra, 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 terminate PPA with M/s RPL.

Other UMPPs in Pipeline:

- For Odisha UMPP (village Bedabahal in Sundergarh district) afresh bid would be issued after finalization of SBDs. Reallocation of coal blocks for Odisha UMPP is under progress.
- Initially Cheyyur UMPP (District Kanchipuram, Tamil Nadu) was proposed on imported coal due to coastal location. However, Ministry of Power in the meeting held on 02.11.2017 with procurers decided that due to lower tariff, Cheyyur UMPP would be developed on domestic coal on the same location having capacity of 4000 MW considering availability of land and other factors. Exploring the possibility of Cheyyur 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.

- A site at Husainabad, Deoghar dist. has been identified for setting up of 2nd UMPP in Jharkhand. Water availability is a critical issue. Govt. of Jharkhand was requested to identify alternate source of water or alternate site having sufficient quantity of water for Deoghar UMPP. Power allocation from this UMPP has been made to Jharkhand, Gujarat, Tamil Nadu, Haryana, Kerala, Goa and Karnataka.
- A site at Bijoypatna 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 2nd UMPP in Tamil Nadu is not environmentally suitable. State Govt. agreed to propose alternate suitable site and proposal is awaited since 2014.
- Land is not sufficient in the proposed site at Chikhli-kob in Gir-Somnath District for 2nd UMPP in Gujarat and private land needs to be acquired. CEA in April 2017 requested Govt. of Gujarat (GoG) to identify Pvt. land adjacent to the site and furnish the details in response of GoG assurance for Pvt. land acquisition. Response from GoG is awaited.
- For UMPP in UP, proposed at Etah, major portion of land is agricultural land and very 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.
- A site at Niddodi village in Karnataka has been identified for UMPP by CEA and Govt.of Karnataka but further progress on this site could not be taken up due to local resistance. CEA has requested Govt of Karnataka to propose new site.

6.1.1 SITE INVESTIGATIONS OF UMPPs

(i) 1st Odisha UMPP, Sundergarh

Necessary input on Design & Detailing of RCC box Culvert, Design of Plate Girder Bridge at River Crossing, Revised Intake Arrangement Report, R&R Colony for Project Affected Families was communicated to UMPP Division.

(ii) Banka UMPP, Bihar

Necessary input on Topographical Survey Report Sheet of Power Plant Area and Plant Layout Super-imposed on Topo-sheet of Banka UMPP was communicated to UMPP Division.

6.2 CONSTRUCTION MONITORING OF THERMAL POWER PROJECTS

At present, 69171.15 MW capacity is 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 Coal Block Allocation

After the cancellation of 204 coal blocks by Hon'ble Supreme Court in year 2014, 51 coal blocks catering to 62,330 MW have been allocated to various Power Utilities. Out of this 51 coal blocks, 9 coal blocks have been allocated through e-auction process and 42 coal blocks have been allocated to Government Sector Power Projects as per Coal Mines (Special Provisions) Act, 2015. In addition to above, 14 coal blocks have been allocated to various Central/State utilities under Rule- 4 of the Auction of Coal Mines Rules, 2012 and 01 (one) coal block which was allotted through Screening Committee. Thus total 66 Nos. coal blocks have been allocated to Power sector. Presently 07 (Seven) Nos. Coal Blocks are under production.

6.3.1 Coal Linkage Policy–2017 (SHAKTI)

- A New more transparent coal allocation policy for power sector, 2017 SHAKTI Scheme for Harnessing and Allocating Koyala Transparently in India) has been issued by Ministry of Coal in May, 2017. This new coal linkage policy would ensure a proper mechanism for sourcing coal by the power plants as per their schedules and would ensure that all projects are supplied coal as per their entitlement.
- FSA would be signed with pending LOA holders after ensuring that the plants are to be commissioned before 31.03.2022, all specified conditions of LOA fulfilled within specified time frame and nothing adverse is detected against the LOA holders.
- Requests from State and Central Sector power utilities for accord of coal linkage have been received under SHAKTI Policy Para B(i). Thermal Power Projects of State and Central Sector totaling to capacity of 13,800 MW have been accorded coal linkage by SLC(LT) under this Scheme.
- As per SHAKTI Policy Para B(ii) Coal linkages 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. 10 nos. of such IPPs having 11,549 MW of installed capacity and 9,045 MW of PPA capacity have secured coal linkages for 32.682 MTPA (G13 equivalent) under this scheme. Out of this, FSAs has been signed with 07 nos. of Power Projects, totaling to coal quantity of 31.135 MTPA (G-13 Equiv.).
- As per SHAKTI Policy Para B (iii), future coal linkages may be granted on auction basis for power producers / IPPs without PPAs that are either commissioned or to be commissioned.

Coal drawal will be permitted only against valid long term PPAs, which the successful bidder shall be required to procure and submit within two (2) years of completion of auction process. In this regard an IMC has been constituted to recommend over issues arising during its execution.

- As per SHAKTI Policy Para B(iv) 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. Applications from four (04) states viz. Gujarat, U.P., M.P. & Maharashtra for a total capacity of 10,860 MW have been received for coal linkage under this policy.
- Power requirement of Group of States can be aggregated and procurement of power on tariff based bidding shall be made by a designated agency under SHAKTI Policy para B(v). Power Finance Corporation Ltd. (PFC) has been nominated as designated agency. Further, PFC Consulting Ltd (PFCCL), (a wholly owned subsidiary of PFC) has been assigned this work on behalf of PFC.
- Linkages shall be granted to Special Purpose Vehicles for setting up Ultra Mega Power Projects under Central Government initiative through tariff based competitive biddings under SHAKTI Policy para B (vi).
- Coal shall be supplied to IPPs having PPAs based on imported coal through auction subject to the availability of coal and the condition that such supply does not adversely impact the availability of coal for plants based on domestic coal with full pass through of cost saving to consumers under SHAKTI Policy para B(vii). An IMC has been constituted to formulate draft methodology for the same.

6.4 Clean Development Mechanism

Central Electricity Authority (CEA), brings out a CO_2 Database for all grid connected Power Stations in the country on annual basis. The objective of this Database is to facilitate the consistent and accurate quantification of CO_2 emissions baseline to be used by CDM project developers in country. Version 12.0 of Database for the year 2015-16 is available on CEA website www.cea.nic.in and the Database for the year 2016-17 has been under preparation and likely to be finalized soon.

6.4.1 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 2016-17 for thermal power stations. This database has been compared and reviewed on Quarterly basis.

6.4.2 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 is 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 & 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 2016-17 were invited from TPSs, requesting them to furnish their all-round performance data. Accordingly, one hundred four applications from Thermal Power Stations were received for participation in Performance Awards Scheme 2016-17. The evaluation of Performance Awards Scheme for the year 2016-17 have been completed.

6.4.3 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 2016-17 were invited from TPSs requesting them to furnish information on various environmental parameters such as CO_2 emission, SPM emissions at stack, Fly Ash Utilization and Effluent Discharge etc. Accordingly, 57 applications from Thermal Power Stations were received for participation in Environment Management Award Scheme 2016-17 and the evaluation of the same has been completed.

6.4.4 Phasing Plan for Implementation of New Environment Norms

New Environmental norms have been issued by Ministry of Environment, Forest and Climate Change(MoEF&CC) in December 2015 for Thermal Power Stations making norms for Suspended Particulate Matter(SPM) more stringent than existing norms. Norms for SOx, NOx and Mercury have also been notified for the first time. Norms for water consumption in Thermal Power Stations have also been issued for the first time. An Implementation Plan for compliance with above environmental norms has been prepared and submitted to MoP which extends from the year 2018 to 2022.

6.4.5 National Energy Conservation Awards 2017

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 2016-17 proposals received from three industrial sectors viz.,Dairy, Fertilizer, and Thermal Power Stations were evaluated by CEA. The awards to the best performing firms in each of the above three sectors were given during National Energy Conservation Day function held in New Delhi on 14th December, 2017.

6.5 THERMAL CAPACITY ADDITION PROGRAMME

6.5.1 Thermal capacity addition during 2017-18

The thermal capacity addition target for the year 2017-18 was 11366.15 MW, a capacity of 8710 MW was commissioned during the year. This includes 6710 MW Capacity which was commissioned from the target 2017-18 and 2000 MW additional capacity commissioned. The details of target/achievements for the year 2017-18 is enclosed at **Annexure 6A**. Sector-wise details of target and achievement during the year 2017-18 are as follows :

SECTOR	THERMAL (In MW)	
	Target	Actual
CENTRAL	4880	3170
STATE	3546.15	1760
PRIVATE	2940	3780
TOTAL	**11366.15**	8710

6.5.2 Thermal Capacity Addition Programme for the year 2018-19

A thermal capacity addition programme of 8216.15 MW has been finalized for the year 2018-19. The details of the Thermal Capacity Addition programme is enclosed at **Annexure-6B**. The details of programme are as follows:

SECTOR	THERMAL (in MW)
	Target
CENTRAL	2760
STATE	4506.15
PRIVATE	950
TOTAL	**8216.15**

NOTE: It has been decided in the meeting convened on 9th March 2018 under the chairmanship of Secretary (Power), that the targets for capacity addition would be identified "Commissioning and COD" with effect from 01.04.2018 onwards. The units for capacity addition will be considered only after achieving COD.

6.6 Thermal Technology Development and Design & Engineering

6.6.1 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.

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 for likely commissioning in 13th Plan and beyond. Initially supercritical units were designed with steam parameters of 247 kg/cm^2, 537/565 deg C. Subsequently, the parameters of 247 kg/cm^2, 565/593 deg C and higher are being adopted for supercritical units.

Ultra Supercritical Thermal Power Plants with steam pressure of around 270 kg/cm^2 and temperatures of around 600 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 of NTPC and Jawaharpur STPP & Obra-C STPP of UPRVUNL are already with steam parameters of Ultra supercritical class.

6.7 Important Activities

Following activities were also undertaken:

(a) Associated with the "Scheme for utilization of Gas based power generation capacity". The scheme was approved by Cabinet Committee on Economic Affairs for revival and improvement in utilization of Gas based plants which were lying idle or underutilized due to shortfall in the production of domestic natural gas.

(b) Standard technical specification for retrofit of wet limestone based flue gas desulphurization (FGD) system in typical 2x500 MW thermal Power Plant was taken up and finalized document uploaded on CEA web site.

(c) Standard technical specification for retrofit of sea water based flue gas desulphurization (FGD) system in thermal Power Plant was taken up.

(d) Review of CEA Report of 2012 on Land requirement for thermal Power Station was taken up.

(e) Preparation of specification on Biomass pellets, based on agro based residue, for co-firing in pulverized coal based thermal power stations and preparation of guidelines for blending of Biomass pellets (5%-10%) with coal in coal based thermal power stations was taken up.

(f) 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.

(g) Associated with deriving the treated sewage water quality desired by Power Plants for mandatory use of sewage water for thermal power plants as per Tariff Policy, 2016.

(h) Monitored the progress of manufacturing facilities of indigenous manufacture of power equipment for compliance of PMP milestones under Bulk Tender I & II and reports of the visits performed in this respect were prepared.

(i) 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 is under progress.

(j) The investigation of three accidents/ failures occurred in Kalisindh STPS as referred by RRVUNL to CEA was carried out and reports were furnished to RRVUNL.

(k) 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.

(l) Study by Expert Group on CFBC

Technology set up by Ministry of Power under Chairmanship of Member (Thermal), CEA is under progress for its feasibility for Adoption in Power Sector.

(m) Officers of TE&TD Division are represented in the following Committees:

i. CE (TE&TD) is a member of Standing Committee on PMP under Member (Thermal) CEA for monitoring & imposition of Liquidated Damages (LD) for Phased Manufacturing Programme (PMP) under the Bulk tender –I (660 MW) & Bulk tender- II (800 MW).

ii. Chief Engineer (TE&TD) is Member-Secretary of "Sub- Committee-9 "key inputs for power sector" with Director(Projects),NTPC as Chairman of the Sub-committee for NEP – 2015.

iii. Director (TE&TD) is a member of the water tube boiler Sub-Committee constituted by Central Boilers Board (CBB).

iv. Officer from TE&TD division is nominated as a Member on Board of Directors of Puducherry Power Corporation Limited, Puducherry.

v. CE(TE&TD) is Member-secretary of Task Force constituted under Chairmanship of Member (Thermal), CEA for review of Regulations titled Central Electricity Authority (Technical Standard for construction of Electrical plants and Electric lines) Regulations, 2010.

vi. Director (TE&TD) was the member of the Committee under Chairmanship of Member (Thermal) for verification of claims received from Bidders for PSDF Support under the "Scheme for utilization of Gas based power generation capacity".

vii. Director (TE&TD) was 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".

viii. CE(TE&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.

ix. CE(TE&TD) is member 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.

6.8 Renovation & Modernisation and Life Extension of Thermal Power Plants

The main objective of Renovation and Modernisation (R&M) of thermal generating units is to make the operating units well equipped with modified / augmented latest technology equipment and systems with a view to improving their performance in terms of output, reliability and availability, reduction in maintenance requirements, 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.

6.8.1 Renovation and Modernisation (R&M) and Life Extension Programme (LEP) from 7th Plan onwards

R&M Programme in a structured manner was initiated in 1984 as a centrally sponsored

programme during 7th Plan. The programme continued during the two Annual Plans 1990-91 & 1991-92 and during the 8th, 9th, 10th, 11th and 12th Plan. The Plan wise achievements are given below:-

S. No.	Five Year Plan	Year	No. of TPS / No. of Units	Capacity (MW)	Additional Generation Achieved MU/ Annum*	Equivalent MW**
1	7th Plan & 2 Annual Plans	85-86 to 89 - 90 & 90 -91, 91-92	**34 / 163**	**13570**	10000	2000
2	8th Plan (R&M) (LEP)	1992 to 1997	**44 / 198** 43/(194) 1 /(4)	**20869** (20569) (300)	5085	763
3	9th Plan (R&M) (LEP)	1997 to 2002	**37 / 152** 29/ (127) 8/ (25)	**18991** (17306) (1685)	14500	2200
4	10th Plan (R&M) (LEP)	2002 to 2007	**9/25** 5/(14) 4/(11)	**3445** (2460) (985)	2000	300
5	11th Plan (R&M) (LEP)	2007 to 2012	**21/72** 15/(59) 6/(13)	**16146** (14855) (1291)	5400	820
6	12th Plan (R&M) (LEP)	2012 to 2017	**18/37** 8/16 10/21	**7202.5** 4560.50 2641.76	----	----

*Tentative figure.

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

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

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

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)

6.9 Achievements of R&M and LE Projects during 12th Plan (upto 31.03.2018)

Life Extension works on 2 thermal generating units with aggregate capacity of 410 MW were completed in FY 2017-18. The details of achievements of R&M/LE Projects during 2017-22 (upto 31.03.2018) is furnished below:

Details of Thermal Power Units where R&M Works have been completed during 2017-22

Sl. No.	Name of the TPS	Unit No.	Capacity MW	Utility	State/Centra Sector	Date of Synchronisation after LE Works
1.	Ukai	4	200	GSECL	State Sector	17-05-2017
2.	Wanakabori	3	210	GSECL	State Sector	27-11-2017
Total State-2 units			410 MW			

6.10 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 the data/information collected & compiled, Quarterly Review Report on status of R&M projects were prepared.

6.11 Thermal units under shutdown for R&M and LE works

The following 4 Units were under shut down for execution of 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.	Koradi TPS	MSPGCL	Maharashtra	6	210
4.	Obra TPS	UPRVUNL	U.P.	12	200
Total					**620**

6.12 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 the ones 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

The implementation plan including units commissioned upto 31.08.2017 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	**27230**	**55**
2021	**64027.5**	**172**
2022	**64704.5**	**178**
Plan not Available	**150**	**1**
Total	**161552**	**415**

ii) Year wise FGD Phasing Plan

Year	Capacity	Units
2018	**500**	**1**
2019	**1300**	**2**
2020	**10705**	**28**
2021	**23495**	**97**
2022	**28525**	**94**
Plan not Available	**1400**	**9**
Total	**65925**	**231**

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.

According to the FGD phasing plan, 1 Unit of 500MW of Trombay TPS is to be completed by 2018. The current Status of FGD installation/ESP Upgradation for **Unit#5 of Trombay TPS of Tata Power** is as follows:

1. FGD Installation-Sea water FGD is installed at Unit#5 and is already in operation to meet the SO2 emissions norms.
2. ESP Upgradation- Unit#5 ESP refurbishment project is already undertaken. Refurbishment of 2 Streams has been completed. Work on third Stream is in advanced stage of completion which would lead in meeting of the SPM Norms.

For Year 2019, according to the FGD phasing plan a total of 8 Units of Combined Capacity of 4940 MW are to be completed. Under this the status of following Units have been received and is as under.

i) **Mahatma Gandhi STPP, Jhajjar Power Ltd. (JPL), Haryana** has already installed FGD at the time of Project Construction. FGD is now under renovation for both the units in order to meet the parameters set by new MOEFCC guidelines. In this regard, OEM has already made a site visit to assess the suitability of existing system and improvements to be made to meet new SO2 emission norms. MGTPS (JPL) has installed ESP and FF hybrid design for control of SPM. With the help of this, JPL is complying with environment norms for SPM and it remains below 50 Mg/Nm3.

ii) **Hinduja National Power Corporation Limited for the Vizag TPP** have appointed Tata Consultancy Engineers as their consultants who have visited the site along with a team for survey and collecting necessary inputs Technical and Operating Parameters to conceptualize the FGD requirement.

6.12.1 Summary of Current Status of Implementation of phasing plan for FGD Installation

S.No	Description	Capacity(MW)	Units
Central Sector			
1	Central sector where FGD to be installed	46905	122
2	Finalisation of Specification planned	14190	29
3	Bids Awarded	2480	5
4	NIT done	840	4
5	NIT Planned	13740	44
6	Bids opened	4725	9
7	Feasibility study under process	10930	31
State Sector			
1	State sector where FGD to be installed	49085	156
2	Tendering process to be initiated	8880	24
3	Requsted for FGD implementation date to be revised	1200	2
4	Not feasible as per developer	200	1
5	Feasibility study under process	17380	58
6	Feasibility study carried out	13090	37
7	Due to space constraint, alternative options of FGD installations being explored	1000	4
8	Complies with the norms	1050	5
9	Boiler is CFBC, hence FGD is not required.	215	3
10	Administrative approval is under process.	6070	22
Private Sector			
1	Private sector where FGD to be installed	57085	119
2	Tender Under process	11740	23
3	Bid under evaluation	3270	7
4	NIT issued	1200	2
5	As per developer, FGD Installation is not required.	540	2
6	FGD Installed	1820	3
7	Complies with the norms	300	1
8	Feasibility study carried out	22870	41
9	Feasibility under process	12165	34
10	Need Extension	3180	6

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

Sl. No.	Name of Thermal Power Station	Unit No.	Capacity (MW)	Timeline for FGD
1	**Dadri (NCTPP), U.P.**		**1820**	
		1	210	31.12.2019
		2	210	31.12.2019
		3	210	31.12.2019
		4	210	31.12.2019
		5	490	31.12.2019
		6	490	31.12.2019
2	**GHTP (Lehra Mohabbat), Punjab**		**920**	
		1	210	31.12.2019
		2	210	31.12.2019
		3	250	31.12.2019
		4	250	31.12.2019
3	**Harduaganj, U.P**		**500**	
		8	250	31.12.2019
		9	250	31.12.2019
4	**Indira Gandhi STPP, Haryana**		**1500**	
		1	500	31.12.2019
		2	500	31.12.2019
		3	500	31.12.2019
5	**Mahatma Gandhi TPP, Haryana**		**1320**	
		1	660	31.12.2019
		2	660	31.12.2019
6	**Panipat TPS, Haryana**		**720**	
		6	210	31.12.2019
		7	250	31.12.2019
		8	250	31.12.2019
7	**Rajiv Gandhi TPS, Hisar, Haryana**		**1200**	
		1	600	31.12.2019
		2	600	31.12.2019
8	**Yamun anagar (DCTPS), Haryana**		**600**	
		1	300	31.12.2019
		2	300	31.12.2019
9	**Talwandi Sabo TPS, Mansa, Punjab**		**1980**	
		1	660	31.12.2019
		2	660	31.12.2019
		3	660	31.12.2019
10	**Nabha Power Ltd, Rajpura, Punjab**		**1400**	
		1	700	31.12.2019
		2	700	31.12.2019

6.13 "Coal-Fired Generation Rehabilitation Project-India" funded by World Bank.

The World Bank has financed the "Coal-Fired Generation Rehabilitation Project-India" for demonstrating Energy Efficiency Rehabilitation & Modernization (EE R&M) at coal fired generating units through rehabilitation of 640 MW of capacity across three States-West Bengal, Haryana and Maharashtra. The above project has two components: -

Component-1: Energy Efficiency R&M at Pilot Projects

This component would fund implementation of Energy Efficient R&M of 640 MW capacity comprising Bandel TPS Unit-5(210 MW) of WBPDCL, Koradi TPS Unit-6(210 MW) of Mahagenco and Panipat TPS Unit-3&4 (2x110 MW) of HPGCL. The World Bank has earmarked US $ 180 million of IBRD loan and US $ 37.9 million of GEF grants for the Component-1.

Component-2: Technical Assistance to CEA and Utilities

The Technical Assistance component of the project is aimed at providing support in implementation of EE R&M pilots, developing a pipeline of EE R&M interventions, addressing barriers to EE R&M projects and strengthening institutional capacities of implementing agencies for improved operation and maintenance practices. The World Bank has earmarked US $ 7.5 million GEF grant for the Component-2.

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

(A) Bandel TPS (Unit-5, 210 MW)

WBPDCL issued Letter of Award (LOA) to M/s Doosan Heavy Industries & Construction Co. Ltd and their associate on January 10, 2012 and the contract was signed on 29th February, 2012. Unit Shut Down was taken on November 17, 2013 and Zero Date of R&M works of BTG package was declared as 2nd Dec, 2013. The Zero Date of R&M works of BTG package was declared as 2nd Dec, 2013. The R&M project consisted of the major packages, viz., Main Plant Package (BTG - Boiler, Turbine & Generator), Coal Handling System Package (CHP), Ash Handling Package & Water System Package (AHP & Water). R&M works at Unit-5 of Bandel have been completed and the Unit has been synchronized on coal on 21st September,2015.

(B) Koradi TPS (Unit-6, 210 MW) Background

The total estimated cost of the project is around US$ 110.5 Million and the fund allocation for the Koradi TPS is loan of around US $ 59 million (Loan)), grant of around US $ 12.45 million. In addition to above Technical Assistance of US $ 3.3 million under GEF Grant has been provided for 10 consultancy studies.

The Commercial Operation Date of the unit is 30.03.1982 & the unit is about 34 years old. The zero date for R&M project is 3rd March, 2014. The unit is under shutdown since 20th July, 2015 and targeted synchronization date is 18-02-2018.

Expected date of synchronization is 20-04-2018.

Status of Physical Progress

i) **BTG Package:** Mahagenco issued the Letter of Award to BHEL on May 31,2013. The contract was signed on December 18, 2013. Overall 89.61% work of BTG package completed.

ii) **Electrical Package :** Mahagenco issued the Letter of Award to M/s ABB Ltd on March 19, 2012 and the final contract was signed on May 25, 2012. Overall 78.79% work of Electrical package completed.

iii) **BOP Package:** 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. DM Plant & Pre-Treatment System Package has been cancelled. The need based work of DM Plant & Pre-Treatment System shall be carried out separately by O&M section. Under Cooling Tower Plant Package overall 70.47% work completed.

6.14 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 carryout 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. Accordingly, generating units are selected from Ukai and Wanakbori TPS (GSECL), Ramagundem STPS (NTPC) and Vijaywada TPS (APGENCO) for pre – primary studies. After Pre-Primary Studies, JCOAL finalized 3 units viz., Vijaywada TPS Unit-1 (210MW) of APGENCO, Wanakbori TPS Unit-1 (200 MW) of GSECL and Kahalgaon STPS Unit-2 (210 MW)of NTPC for full-fledged diagnosis. The final report had been submitted in December 2012.

The 2nd Phase MOU between CEA and JCOAL was signed on 11.06.2012 for carrying out detail diagnostic study for energy efficiency oriented R&M activities in three nos. of units. Durgapur TPS unit no.4 (210 MW LMZ Unit) of DVC and one unit each from Badarpur TPS and Unchahar TPS of NTPC were selected for studies during the 2nd phase. JCOAL team visited these stations during December, 2012. The final study report for energy efficiency oriented R&M activities was submitted on 15th April, 2013.

The 3rd Memorandum of Understanding (MoU) on India – Japan Cooperation for Project on Efficiency & Environment Improvement for Sustainable, Stable and Low Carbon Supply of Electricity was signed on 22nd January, 2016.

Under Clean Coal Technology (CCT) Programme a study tour to Japan has been organised during current year from 29th Nov, 2017 to 7th Dec, 2017. The participants from CEA, MoP, DVC, NTPC and State Utilities visited the latest USC power stations at Japan. Total 89 officers from MoP, CEA and different power utilities participated in the study tour under CCT Training Progamme

Under CEA- JCOAL Co-operation a study on replacement of old units of Badarpur TPS by highly efficient super critical units of higher size has been carried out. JCOAL team has carried out three site surveys and investigations in the month of Nov,2015, Jan, 2016 and in March, 2016. The report on the study has been submitted in June, 2016 by JCOAL.

JCOAL has also carried out feasibility study on replacement of Singrauli STPS Stg. I & II units (5x200 MW+2x200 MW) of NTPC between December, 2016 to March, 2017.

Unit-3 of Dadri TPS of NTPC was identified for implementation of full-fledged diagnosis study i.e. Residual Life Assessment (RLA) study. JCOAL team has conducted RLA/Diagnostic Study at Unit-3 Dadri TPS of NTPC from 30th November, 2015 to 10th of December, 2015. The report on RLA/CA study of Unit-3 of Dadri TPS has been submitted by JCOAL. The objective of the RLA Study is to identify the remaining life and the current condition of Unit -3, to constitute the base for formulation of the plan of R&M implementation that is tentatively scheduled in 2018.

One day workshop on " Project on Efficiency and Environmental Improvement for Sustainable, Stable and Low-carbon Supply of Electricity" was held on 11th Nov, 2016 and 10th Nov 2017 at New Delhi by CEA and JCOAL. Various stake holders from Central/State/Private in power sector participated in the workshop.

A Kick-off Meeting on Study on O&M enhancement of existing units of DSTPS, DVC under CEA-JCOAL Cooperation was held among NEDO, JCOAL, CEA and DVC on 13th October 2017 at Kolkata in order to share O&M and safety related best practices. The expert team from Japan also visited

DSTPS, DVC for the purpose of O&M Study from 11.12.2017 to 14.12.2017.

Interim Report of Activities during the Site Study for O&M Study at Durgapur Steel Thermal Power Station has been submitted by JCOAL to CEA on 15th Dec 2017.

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 submitted. SCR Pilot test at NTPC's Sipat TPS is being carried out to meet the NOx level in the flue gas as per new environmental norms. A diagnostic study for optimal environmental measures at Dadri TPS was conducted in January, 2018.

6.15 Decommissioning of old and inefficient Units

25 years or more old inefficient Thermal Units in Government Sector aggregating to approximately 10000 MW capacity have been identified in September 2015 for decommissioning in a phased manner. 6075 MW Thermal Units have been retired since September 2015 to till 31st March, 2018. In addition to above, 797.32 MW of private sector/ Gas based/ DG Set units have also been retired since Sept., 2015 to March, 2018.

6.16 Use of Treated Sewage Water by TPS under NMCG

As per the Tariff Policy 2016, it is envisaged to explore the possibility of recycle/ reuse of the treated waste water from STP's for non-potable use (cooling purpose) in existing Thermal Power Plants within 50 km radius from STP's. Accordingly, the mapping of thermal power stations within the vicinity of 50 km from STPs across the country has been undertaken. In this regard, nine thermal power stations namely Solapur, Mouda, Meja, Dadri, up-coming Patratu, Rattan India Nasik TPS (Phase-II), Yelanhanka CCPP, Khaperkheda TPS & Chandrapur STPS power stations have been identified for use of treated sewage water. State power utility, MAHAGENCO has tied up with Nagpur Municipality Corporation through a long term agreement for supply of treated sewage water to their Koradi Power station in Maharashtra. The monitoring committee set up by Ministry of Power is monitoring this initiative to provide the STP water to power plants. The Power plants, promoting the use of this STP water, will be provided benefits under the Tariff Policy'2016. As per the mapping done, 7867 MLD STP Water is available. Out of the above 7867 MLD, STP water discharge, the potential water to be utilised in Thermal Power Plants is under exploration.

6.17 Orders Placed for New Thermal Power Plants

During 2017-18, Main Plant orders have been placed on EPC basis for New Thermal Power Projects totaling to 9040 MW. Details of these projects are given below :

Sl. No.	PROJECT	Implementing Agency	Plant Configuration	Capacity (MW)	Main Plant (BTG)
1	Udangudi TPP Stage -I	TANGEDCO	2x660	1,320	BHEL
2	Bhusawal TPP Unit-6	MAHAGENCO	1x660	660	BHEL
3	Patratu STPP Ph -I	M/s Patratu Vidyut Utpadan Nigam Ltd. (PVUNL)	3x800	2,400	BHEL
4	Panki Extn. TPP	UPRVUNL	1x660	660	BHEL
5	Yadadri TPP	TSGENCO	5x800	4000	BHEL
			Total	**9040**	

6.18 Environment Clearance to New Thermal Power Projects:

During the year 2017-18, Environment Clearance was granted to 5(Five) Nos. projects totaling 10260 MW capacity as per details given below:

List of Thermal Power Projects accorded Environment Clearance during 2017-18					
Sl. No.	**Name of Project**	**Capacity (MW)**	**Developer**	**State**	**Date of Environment Clearance**
01.	Yadadri Thermal Power Station - 5x800 MW	4000	TSGENCO	Telangana	29.06.2017
02.	Panki Ex tension Power Project 1x 660 MW	660	UPRVUNL	Uttar Pradesh	29.06.2017
03.	Udupi TPP (Phase-II) 2x800 MW	1600	M/s Udupi Power Corporation Limited (UPCL)	Karnataka	01.08.2017
04.	Godda TPP - 2x800 MW	1600	M/s Adani Power (Jharkhand) Ltd	Jharkhand	31.08.2017
05.	Patratu TPP at Patratu, Phase -I - 3x800 MW	2400	M/s Patratu Vidyut Utpadan Nigam Ltd. (PVUNL) JV of NTPC & Govt. of Jharkhand	Jharkhand	07.11.2017
	Total Capacity	**10260 MW**			

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

6.19.1 Monitoring by CEA

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

The said report is now also being uploaded on website of CEA for bringing the information in public domain.

6.19.2 MoEF & CC Notification on Fly Ash Utilization

To address the problem of pollution caused by fly ash and to reduce the requirement of land for disposal of fly ash, MoEF&CC issued notification dated 14th September, 1999 on fly ash utilization and subsequently issued amendments to the said notification on 27th August, 2003, 3rd November, 2009 and 25th January, 2016. The 3rd November, 2009 notification had stipulated targets for utilization of the fly ash, so as to achieve 100% utilization by all thermal power stations in a phased manner - existing thermal power units within five years and those commissioned after 3rd November, 2009 within four years. However, the goal of 100% fly ash utilization could not be achieved within the stipulated timeline. In view of the same, further notification in January, 2016 has followed.

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

6.19.3 Fly Ash as a Resource Material

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

6.19.4 Important Areas of Ash Utilization

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

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

6.19.5 Status of Ash Generation & Utilization for the Year 2016-17

The report for the year 2016-17 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 2016-17, the present status of fly ash generation & utilization is given in the table below:

Description	Status in Year 2016-17
Nos. of Coal/Lignite based Thermal Power Stations from which data was received	155
Data received for an installed capacity (MW)	157377.00
Coal consumed (Million ton)	509.46
Ash content (%)	33.22
Fly Ash Generation (Million ton	169.25
Fly Ash Utilization (Million ton)	107.10
Percentage Fly Ash Utilization	63.28

It may be seen from above that 63.28 % 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 2016-17. This is on higher side from the previous year i.e. 2015-16.

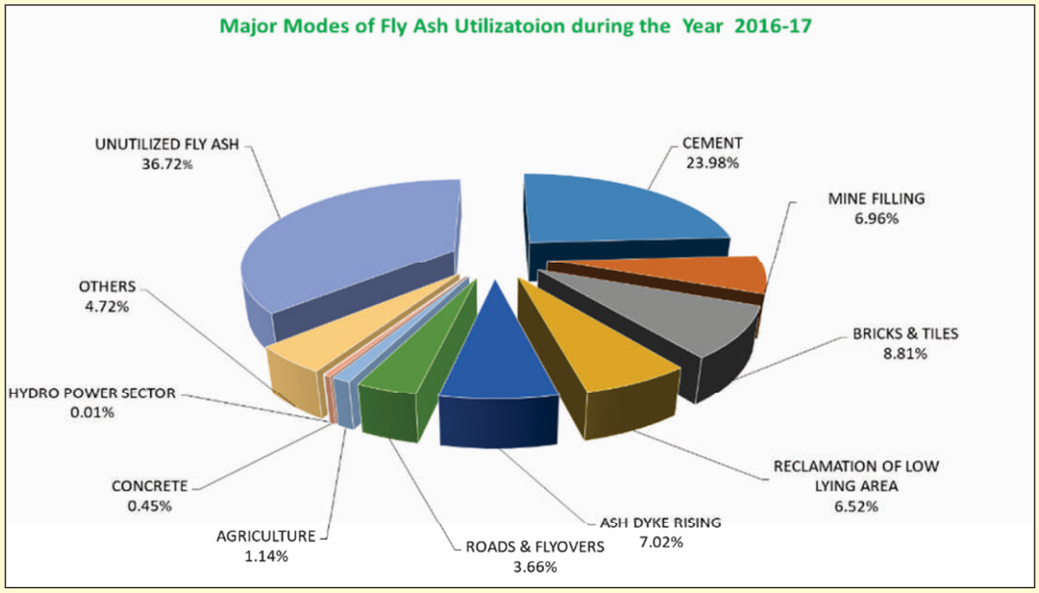
(B) Modes of Ash Utilization during year 2016-17

The major modes in which ash was utilized during the year 2016-17 is given in table below:

MAJOR MODES OF FLY ASH UTILIZATION DURING THE YEAR 2016-17

Sl. No.	Modes of utilization	Fly ash utilization in the Year 2016-17	
		Quantity (Million-ton)	Percentage (%)
1	Cement	40.5869	23.98
2	Bricks & Tiles	14.9110	8.81
3	Ash Dyke Raising	11.8888	7.02
4	Mine filling	11.7827	6.96
5	Reclamation of low lying area	11.0392	6.52
6	Others	7.9840	4.72
7	Roads & flyovers	6.1942	3.66
8	Agriculture	1.9243	1.14
9	Concrete	0.7647	0.45
10	Hydro Power Sector	0.0197	0.01
11	Unutilized Fly Ash	62.1577	36.72
Total		**169.2534**	**100.00**

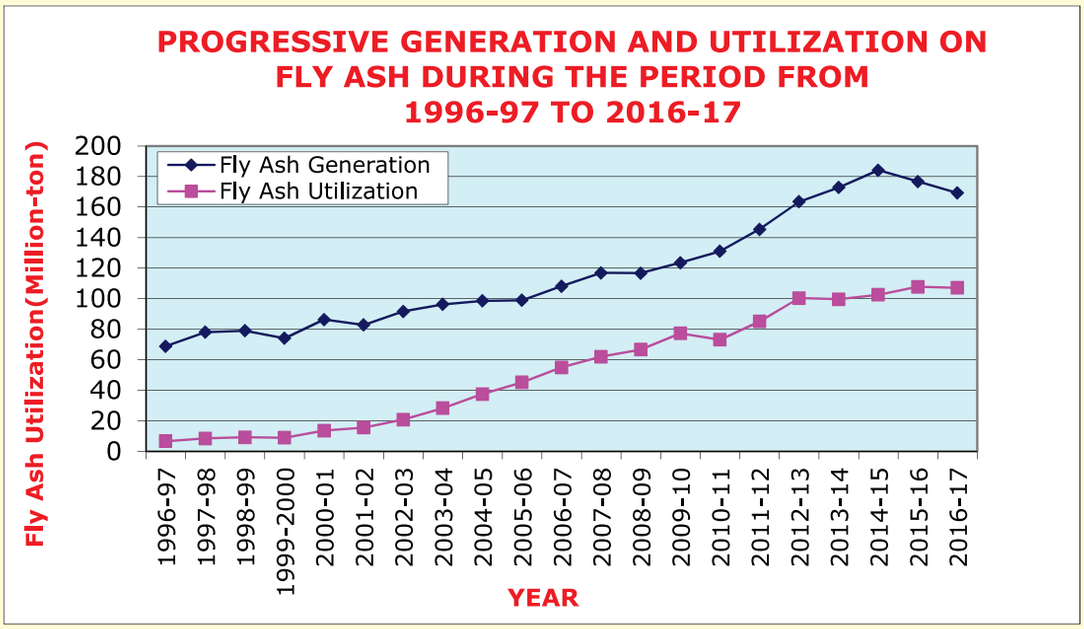
The utilization of fly ash in various modes in percentage during 2016-17 in the form of a pie-diagram is given below:



The maximum utilization of fly ash during 2016-17 to the extent of 23.98 % has been in Cement sector, followed by 8.81 % in making of bricks & tiles, 7.02 % in ash dyke raising, 6.96 % in mine filling, 6.52 % in reclamation of low-lying area, 3.66 % in roads & flyovers, etc.

6.19.6 Progressive Fly Ash Generation & Utilization during the period from 1996-97 to 2016-17

The fly ash utilization has increased from 6.64 million tonnes in 1996-97 to a level of 107.10 million tonnes in 2016-17. A graph showing about progressive trend in fly ash generation and its utilization for the period from 1996-97 to 2016-17 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.

6.19.7 Conclusion

The highest level of fly ash utilization of about 63.28% is achieved during the year 2016-17. It would require a lot of efforts to achieve 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 recent amendment should be effectively implemented. As per this report about 36.72% un-utilized fly ash is lying dumped at the various Thermal Power Stations in the country.

6.19.8 Web Based Monitoring System And A Mobile Application For Utilization Of Fly Ash

Annual Fly ash utilization has remained about 60% of the fly ash generated and therefore, it has become a matter of concern in view of its adverse environmental effect and its progressive accumulation may lead to a situation when ash pond may not be in a position to accommodate fly ash further. In view of seriousness and urgency of the issue, NITI AAYOG has convened several meetings on "Policy Framework on Utilization of Fly Ash and Slag". During one of its meetings on 17.03.2017, NITI AAYOG desired an online repository of the fly ash generated by thermal power plants indicating the following parameters:

- Cumulative amount of fly ash available in the ash ponds as on 31.3.2017
- Quantum of fly ash generated for the respective month (ex. For the month of April 2017)
- Number of ash ponds available and their approved capacity in metric tonne.
- Cumulative stock of fly ash available in the ponds for month as on 30th April 2017.
- Total quantum of fly ash disposed to the consuming industries, which is located within the vicinity of 100 kms, 101-500 kms, etc. along with the details of the consumers. In this detail, it should also be indicated whether the transportation was paid by the thermal power or not. Similarly, it should also indicate whether fly ash has been given free or it has been charged. If it has been charged, then the rate should also be indicated for each consumer.
- Balance stock of fly ash available in the ash ponds for 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 & utilization. A workshop for facilitating the users had been organized on 28th August, 2017. Further, two video conferences were organized on the above issues on dated 12.09.2017 & 05.10.2017 with the help of M/s NTPC Limited. Feeding of data by the Thermal Power Stations on the web based monitoring system is under progress. The mobile application "ASH TRACK" is a GIS-based interface between fly ash generators and potential fly ash users. It contains useful information regarding quantum of fly ash available at nearby TPS, contact details of nodal officer of concerned TPS, etc.

6.20 PERFORMANCE AWARDS IN POWER SECTOR

6.20.1 Comprehensive Award Scheme for Power Sector

An award scheme was introduced by the Ministry of Power in 1983 for recognizing the meritorious performance of thermal power stations. The scheme was modified over the years in view of evolving requirements. In 2004-05, Comprehensive Award Scheme was introduced by the Ministry of Power covering

various facets of power sector with the objective of developing a spirit of competitiveness among the generating stations in thermal, hydro & nuclear generation, transmission &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 2015- 16, some modifications have been proposed in 7 nos. of schemes concerned Divisions as felt necessary. As regards number of awards, it is to mention that maximum possible number of awards for year 2015- 16 shall increase from previous year's 38 nos. to 40 nos. plus 1 consolation award.

The Comprehensive Award Scheme includes the following ten(10) categories of award with the 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 distribution companies	- 3
• Performance of Rural Distribution Franchises.	- 3
• Environment Management for coal based Thermal Power Stations.	- 1
Total Award -	**40+1***

***Consolation award**

6.20.2 Awards for the year 2015-16

The data/inputs received from various power utilities/ Organizations in respect of individual award schemes for the year 2015-16 have been evaluated by CEA & recommended list of awardees has been prepared and sent to Ministry of Power. The award distribution function is yet to be held for the year 2014-15 & 2015-16.

6.21 Private Sector participation in Power Sector

With the enactment of Electricity Act 2003, a new system has evolved with the active participation of Private/Independent power producers (IPPs) in the power sector. This Act has created a legal framework for development of Electricity supply industry through liberalized Generation, Power market development and provided open access to the Generators and Consumers. In order to achieve the set objectives, the Government has issued National Electricity Policy and Tariff Policy. For the purpose of facilitating

procurement of power through competitive bidding, the Government has also 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 during 2005. Many power utilities in states i.e. Haryana, Punjab, Uttar Pradesh etc. have already taken initiative to invite bids for development of thermal power projects through tariff based competitive bidding. List of such Case -II tariff based competitive bidding projects, totaling to 7,800 MW since 2005 is given hereunder :

Projects Commissioned / Under Construction based on Tariff Based Competitive Bidding (Case-II) by States

S.No.	Name of the Project	Location	Capacity(MW)	Remarks
Haryana				
1)	Jhajjar	District Jhajjar	2x660	Project is commissioned.
Punjab				
2)	Talwandi Saboo	District Mansa	3x660	Project is commissioned.
3)	Rajpura	Rajpura District Patiala	2x660	Project is commissioned.
Uttar Pradesh				
4)	Anpara 'C'	Distt. Sonebhadra	2x600	Project is commissioned.
5)	Bara TPP	Distt. Allahabad	3x660	Project is commissioned.
Total			**7800 MW**	

Many State Utilities and their Discoms have contracted substantial amount of power from IPPs through Case -I bidding. 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.

Private sector is showing keen interest in investing and setting up new generating facilities. As a result, the scenario in the Power sector appears quite promising and Government of India is making its best efforts to facilitate Independent Power Producers to overcome various challenges in the way of project implementation. The Private Sector contributed 2670 MW (Thermal-1970 MW & Hydro-700 MW) to generation capacity during 10th Plan Period (2002-07), whereas during 11th Plan period (2007-12), the capacity of 23,012 MW (Thermal- 21,720 MW & Hydro- 1292 MW) was commissioned, contributing around 41.87% of total conventional capacity addition. During 12th Plan, Private Sector contributed 54279 MW (Thermal 53660 MW and Hydro 619 MW) comprising of 55.8% of total conventional capacity. During the year 2017-18 upto 31.03.2018, Private Sector has contributed 3985 MW (Thermal- 3780 MW & Hydro-205 MW) comprising of 42 % of total conventional capacity addition.

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CHAPTER - 7

DISTRIBUTION AND RURAL ELECTRIFICATION

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.

All these action plan documents were prepared by the Consultants with the guidance of the Committee under Central Electricity Authority (CEA) have been approved and signed by the respective States and UTs between September 2014 to April 2017, and the roll-out plans as identified in these documents are under various stages of implementation by them. All these signed copies of action plan documents are available in the website of Powermin.gov.in and powerforall.co.in.

For monitoring of implementation of Roll out plans/action plans as envisaged in 24x7 PFA documents and to facilitate the States/UTs in reporting the same, MOP has on 8th December 2016, set up a Central 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.

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.
- 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 and preparation of model RfP document for Smart Grid project. DP&D Division is the nodal division in CEA dealing with development of smart grid in the country and also assists the technical committee of NSGM in technical examination and evaluation of Smart Grid Projects. Under ongoing NSGM, 3 DPRs for Smart Grid in Cities of Chandigarh, Amravati and Nagpur have been sanctioned at approved project cost of Rs.257.78 crores .Additionally, 10 smart Grid pilot projects are under implementation in the Country.
- To help the distribution utilities for

implementing Smart Grid projects in the Country, NSGM in consultation with CEA and other stake holders have finalized model RfP document for smart metering projects in the Country.

- Proposals received from Korean side for advanced metering infrastructure (AMI) project in cities of Kerala and UT of Chandigarh have been examined.
- A Committee under CE (DP&T) has been constituted by MoP to study the issue of Opex based solutions with special reference to cloud based/server based solutions through GOI capital grants.
- CE(DP&T) is a member of the Committee constituted by MoP to look into the issues regarding smart meter rollout in the Country.

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 on above parameters is requested from Distribution Companies across the country. The data received is analyzed and evaluated for the performance of Distribution Companies. Under the scheme for the year 2015-16, the recommendation was submitted to the Nodal officer for onwards submission to MOP.

The data for the performance in the year 2016-17 is being received from Distribution Companies and the analysis for recommendations for awards is under progress.

♦ 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. Under the scheme for the year 2015-16, the recommendation was submitted to the Nodal officer for onwards submission to MOP.

The data for the performance of Rural Distribution Franchisees in the year 2016-17 is being received from Distribution Companies and the analysis for recommendations for awards is under progress.

7.4 Research & Development Projects in the Distribution Sector

As a nodal division for examination of distribution sector 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 3rd December 2014 with the following scope of components in Urban Areas:

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

The components at (i) and (ii) above have an estimated outlay of Rs. 32,612 crore including a budgetary support of Rs. 25,354 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 12th and 13th Plans amounting to Rs. 44,011 crore including a budgetary support of Rs. 22,727 Crores has been subsumed in this scheme.
This outlay will be carried forward to the new scheme of IPDS in addition to the outlay indicated above.

The scheme of R-APDRP programme is to facilitate State Power Utilities to reduce the level of AT&C losses to 15%. The programme has two major components under which the investments through this scheme will lead to reduction in loss level. **Part–A (IT enablement and SCADA)** includes projects for establishment of Information Technology based energy accounting and audit system leading to finalization of verifiable base line AT&C loss levels in the project areas, and **Part-B (network strengthening)** for strengthening of distribution networks. The total outlay for the programme is Rs 51,577 crore, out of which the major outlay is Rs. 10,000 Crores for **Part-A** and Rs. 40,000 Crores for **Part-B** of the scheme.

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 31.03.2018) 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	3618	26637.17	4976.76 (18.68 %)	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	43	1912	961.15	10.23 (1.06 %)	Yet to be awarded

iii) Metering of Consumers, Feeders and Distribution transformers

State	Utility	Consumer Meter (No)			Feeder / DT / Boundary Meter (No)			Smart Meter (No)			Pre-Paid Meter (No)		
		Santioned Qty	Award Qty	Achieved	Santioned Qty	Award Qty	Achieved	Santioned Qty	Award Qty	Achieved	Santioned Qty	Award Qty	Achieved
32	54	8,531,109	8,602,673	1,886,089	205,281	109,773	5,691	156,970	500	0	155,485	40,855	2,007

iv) Solar Panels

Solar Panels (KWp)		
Sanctioned Qty	**Award Qty**	**Achieved**
38,316	**46,748**	**11,174**

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	5374.56	3525.17 (65.01 %)	Go-Live - 1376
Part-A RAPDRP(SCADA)	59	1251.13	445.90 (34.97 %)	59 awarded/52 Control Centres Commissioned and 25 SCADA completed
Part-B RAPDRP(Network Strengthening)	1227	30897.47	6491.23 (20.94 %)	1218 Awarded/ 1187 Completed
Total	---	37,523.16	10462.30 (27.88 %)	---

@ includes PMA charges

7.6 Association with the Central Team constituted by MHA for On-The-Spot Assessment of Damage Caused by Natural Calamities in Various States

- Officers from DPD division were associated as a member of the Central Team constituted under Team Leader JS(MHA)/ JS (Min of Agriculture) for on-the-spot assessment of Damages caused by natural calamities in various states and attended various Inter-Ministerial Group (IMG) meetings held in MHA / Ministry of Agriculture to finalize the recommendations of the Central Team regarding Calamity Relief Fund(CRF) / National Calamity Contingency Funds (NCCF).
- Report of the power sector damages for the State of Kerela, Tamil Nadu, Assam, Arunachal Pradesh & Chattisgarh caused by natural calamity were submitted to MHA.
- Inputs given in respect of distribution sector for the review of National Disaster Management Plan, 2015.

7.7 Amendment in existing Regulations

Review of (a) CEA (Construction of Electrical Plants and Electric Lines) Regulation, 2010 and, (b) CEA (Installation & Operation of Meters) regulation 2006 were taken up and under various stages of completion. Amendments in these regulations are in progress.

7.8 Works Related to Union Territories (UTs) & States

The following works pertaining to UTs were taken up & completed during 2017-18:

7.8.1 UT of Daman & Diu

- Technical clearance for the scheme for establishment of 66/11 KV, 2x20 MVA S/S at Panchal Industrial Area in Daman was accorded.
- Technical clearance of the scheme for normal development and release of service connections (ND&SC) for UT of Daman & Diu during 2017-18.
- Scheme for installation of 6.8 MW wind power plant at Diu, scheme for replacement of 4 No of old 66/11 KV, 10 MVA Power Transformers and scheme for erection of 66 KV D/C line from Kachigam S/S to Zari S/S in UT of Daman & Diu were examined.

7.8.2 UT of Andaman & Nicobar Islands

- Ministry of Power vide OM No. 21/2/2014-OM, dated 29th February, 2016 constituted a Committee with members from CEA, PGCIL & POSCO to study grid related issues in Andaman and Nicobar Islands due to new solar projects and feasibility of setting up of an Energy Management Center (EMC). The Committee submitted its report to MOP in May 2016. As directed by MoP, the committee finalized additional report on optimal energy mix in Port Blair, A&N Islands and submitted to MOP during 2017-18.
- Technical proposal of A&N Admn for establishing Hybrid Energy Island initiative for replacement of existing diesel Power Plant in Chatham under JICA funding was examined.
- To mitigate the power crisis in Port Blair, Hon'ble MoS for Power & MNRE took a meeting on 10.1.2018 with Hon'ble LG , other senior officers at A&N Islands and CEA. Based on the recommendation of the committee of CEA, NTPC & PGCIL, it was decided in the meeting that NTPC would construct a 50 MW LNG based power plant and 25 MW solar power plant and NLC Ltd. would construct a 25 MW solar power plant at Port Blair.

7.8.3 UT of Puducherry

- DPR for improvement in Distribution system in UT of Puducherry under JICA funding was examined and technical concurrence of CEA was conveyed.

7.8.4 UT of Lakshadweep

- Tender documents for procurement of Smart Meters for Kavaratti Islands, UT of Lakshadweep was examined.

7.8.5 Technical Appraisal of Distribution Schemes of States

- Distribution project proposal along with cost estimates as submitted by Govt. of Meghalaya under JICA proposal was examined.
- Examined the draft SFC memo on the scheme for setting up of 7 MW SPV projects with battery storage each in Leh and Kargil under J&K PMDP.

7.9 Rural Electrification

7.9.1 Status of Rural Electrification in the Country

During 2017-18**,** total number of 4149 (including uninhabited villages) un-electrified villages and 90081 partially electrified villages have been electrified, and electric connections to 5041996 BPL households have been provided under Deendayal Upadhyaya Gram Jyoti Yojna (DDUGJY)**.** Cumulatively, 597121 inhabited villages constituting 99.94 %, out of a total of 5,97,464 inhabited villages

in the country (as per 2011 census) have been electrified at the end of March 2018 leaving a balance of 343 (excluding uninhabited villages) villages for electrification.

As per the data furnished by State Govts, 646722 number of pumpsets/tubewells energized during 2017-18 and cumulatively, 21428411 pump sets/tube wells have been energized at the end of March 2018 in the Country. Overall status of Rural Electrification in the Country is shown under DDUGJY at Para 7.9.2.

The bar charts showing the Plan wise and State wise progress of Village Electrification and Pumpset Energisation as on 31.03.2018 are available at end of Chapter.

7.9.2 Deen Dayal Upadhyaya Gram Jyoti Yojna (DDUGJY)

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

(i) Separation of agriculture and non-agriculture feeders facilitating judicious rostering of supply to agricultural & non-agricultural consumers; and

(ii) Strengthening & augmentation of sub-transmission and 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 Gramin Vidyutikaran Yojana (RGGVY) for 12th and13th Plans.

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

Under the new scheme, 60% of the Project cost will be extended by Govt. of India as Grant in respect of States other than special category (85% for the Special Category States i.e. all North Eastern States including Sikkim, J&K, Himachal Pradesh, Uttarakhand). Minimum 10% (5% for Special Category States) shall be contributed through own sources by the State Govt./ State Power Utility and the balance 30% (10% for Special Category States) may be arranged through Loan or own sources by the 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 RE Components of DDUGJY (including DDG)
(as per MIS of DDUGJY as on 31.03.2018)

No. of Projects		Funds (Rs. Crore)		Un-electrified Villages (Nos.)		Intensive electrification of Villages (Nos.)		BPL HH Connections (Nos.)	
Covered	Closed	Sanction	Total Release	Scope	Cumulative Achievement	Scope	Cumulative Achievement	Scope	Cumulative Achievement
5934	531 (8.95 %)	108496.85	58963.46 (54.34 %)	129064	125895 (97.54 %)	780240	504644 (64.68 %)	39072502	30510196 (78.09 %)

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

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

Decentralized Distribution Generation can be from conventional or renewable sources such as Biomass, Biofuels, Biogas, Mini Hydro, Solar etc. for villages where grid connectivity is either not feasible or not cost effective. As per 12th and 13th plan of RGGVY, DDG has been extended to grid connected areas to supplement the availability of Power in areas where power supply is less than six hours a day.

Status of DDG projects sanctioned under RGGVY/DDUGJY as on 31.03.2018:

Under DDG Projects of DDUGJY, 4377 projects covering 3379 un electrified villages, 4583 villages/hamlets covered and Nos. of Households 203166 covered (including BPL Household connections of 162096) in 14 States (Andhra Pradesh, Assam, Arunachal Pradesh, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Odisha, Telangana, Uttar Pradesh, Uttarakhand & Manipur) at an estimated cost of Rs. 1368.90 crores (release Rs.488.60 crores) have been sanctioned by the Monitoring Committee and out of which 2548 (58.21 %) projects have been commissioned.

7.10 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 is 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/SERCs, the data of Reliability Indices viz System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI) and RI for feeders (%) for all the distribution

companies/licensees covering all cities and towns up to the District Headquarter and also for rural areas for 2015-16 (revised) are compiled in the formats of CEA and published on website of CEA during July 2017. The data compilation for same for 2016-17 is under progress.

Further, to align with the requirement of Reliability Indices given in various Standards of Performance of SERCs, the formats for collection of RI data is modified and circulated to all Discoms/Power departments to be effective from 2017-18 and onwards.

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 31st 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 Suabhagya portal as on 31.03.2018) is given as below:

As on 30.03.2018, a total of 40,46,031 households have been electrified since the launch of the scheme on 11th October 2017 and 3,30,24,329 households (18.33 % of total 18,01,82,571 households) are balance for electrification. The statewise details are at **Annexure**. The balance households are targeted for completion by March 2019.

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

Hon'ble Prime Minister on 07.11.2015 announced a Rs 80,000 crore development package for Jammu and Kashmir, including 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.

CEA is regularly monitoring the progress through PMA/PIA and sending the compiled report to Ministry of Power on monthly basis. All these projects are at various stages of tendering and awards for implementation.

Annexure

Status of Households Electrification under Saubhagya Scheme(as on 31.03.2018)

State	Total Households	Electrified Households as on 10th Oct,2017	Household Electrified w.e.f 11th Oct,2017	Total Household Electrified,	Household Electrification (%)	Balance Un-electrified Households, Nos
Uttar Pradesh	303,42,104	155,73,943	10,13,392	165,87,335	54.67	13754769
Maharashtra	140,01,920	135,58,912	1,65,565	137,24,477	98.02	277443
West Bengal	146,59,597	141,68,789	1,94,153	143,62,942	97.98	296655
Bihar	124,86,613	86,17,983	4,42,442	90,60,425	72.56	3426188
Madhya Pradesh	106,23,591	77,10,762	11,28,491	88,39,253	83.20	1784338
Andhra Pradesh	113,62,846	112,80,763	81,402	113,62,165	99.99	681
Tamil Nadu	102,85,848	102,83,678	2,170	102,85,848	100.00	
Karnataka	93,83,498	87,27,711	59,134	87,86,845	93.64	596653
Rajasthan	91,82,572	70,00,719	2,12,322	72,13,041	78.55	1969531
Odisha	85,05,179	52,44,064	1,35,336	53,79,400	63.25	3125779
Kerala	71,04,123	71,04,123		71,04,123	100.00	
Gujarat	65,29,055	65,13,307	15,748	65,29,055	100.00	
Telangana	59,71,952	55,74,499	23,803	55,98,302	93.74	373650
Jharkhand	54,91,360	24,31,847	1,25,389	25,57,236	46.57	2934124
Assam	52,24,540	27,81,136	1,10,836	28,91,972	55.35	2332568
Chhattisgarh	49,73,713	43,04,608	1,54,562	44,59,170	89.65	514543
Punjab	36,89,584	36,89,584		36,89,584	100.00	
Haryana	34,24,992	27,42,810	1,71,561	29,14,371	85.09	510621
Uttarakhand	17,37,928	15,37,625	4,960	15,42,585	88.76	195343
Himachal Pradesh	14,71,502	14,56,888	1,943	14,58,831	99.14	12671
Jammu & Kashmir	12,73,430	10,07,155		10,07,155	79.09	266275
Tripura	7,31,404	5,24,308	1,882	5,26,190	71.94	205214
Meghalaya	4,63,022	3,23,755		3,23,755	69.92	139267
Manipur	3,81,181	2,78,773	467	2,79,240	73.26	101941
Arunachal Pradesh	2,31,968	1,50,781		1,50,781	65.00	81187
Nagaland	2,78,128	1,69,693	473	1,70,166	61.18	107962
Goa	1,28,208	1,28,208		1,28,208	100.00	
Mizoram	1,10,386	99,430		99,430	90.07	10956
Puducherry	95,046	94,704		94,704	99.64	342
Sikkim	37,281	31,653		31,653	84.90	5628
Total	1801,82,571	1431,12,211	40,46,031	1471,58,242	81.67	**3,30,24,329**

(Source-Saubhagya Portal)

7.11 Conduct 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 and the reports of the Mock Test Exercise were sent to MOP, CPWD & NDMC.

7.12 Assistance to BEE / REC / EESL

a) Assisted BEE on technical issues in PAT-II scheme launched for Discoms

b) Assisted REC in examination of SBD of DDUGJY/IPDS.

c) Examined DPR of EESL for 2nd line of Credit for US $ 500 million from ADB.

7.13 CERT-Distribution

Ministry of Power constituted CERT-Distribution under Chief Engineer(DPD) CEA to advise Discoms on cyber security issues.

A Cyber Crisis Management Plan (CCMP) for cyber security in distribution sector was prepared and circulated to all distribution companies to adopt and prepare their respective Crisis Management Plans.

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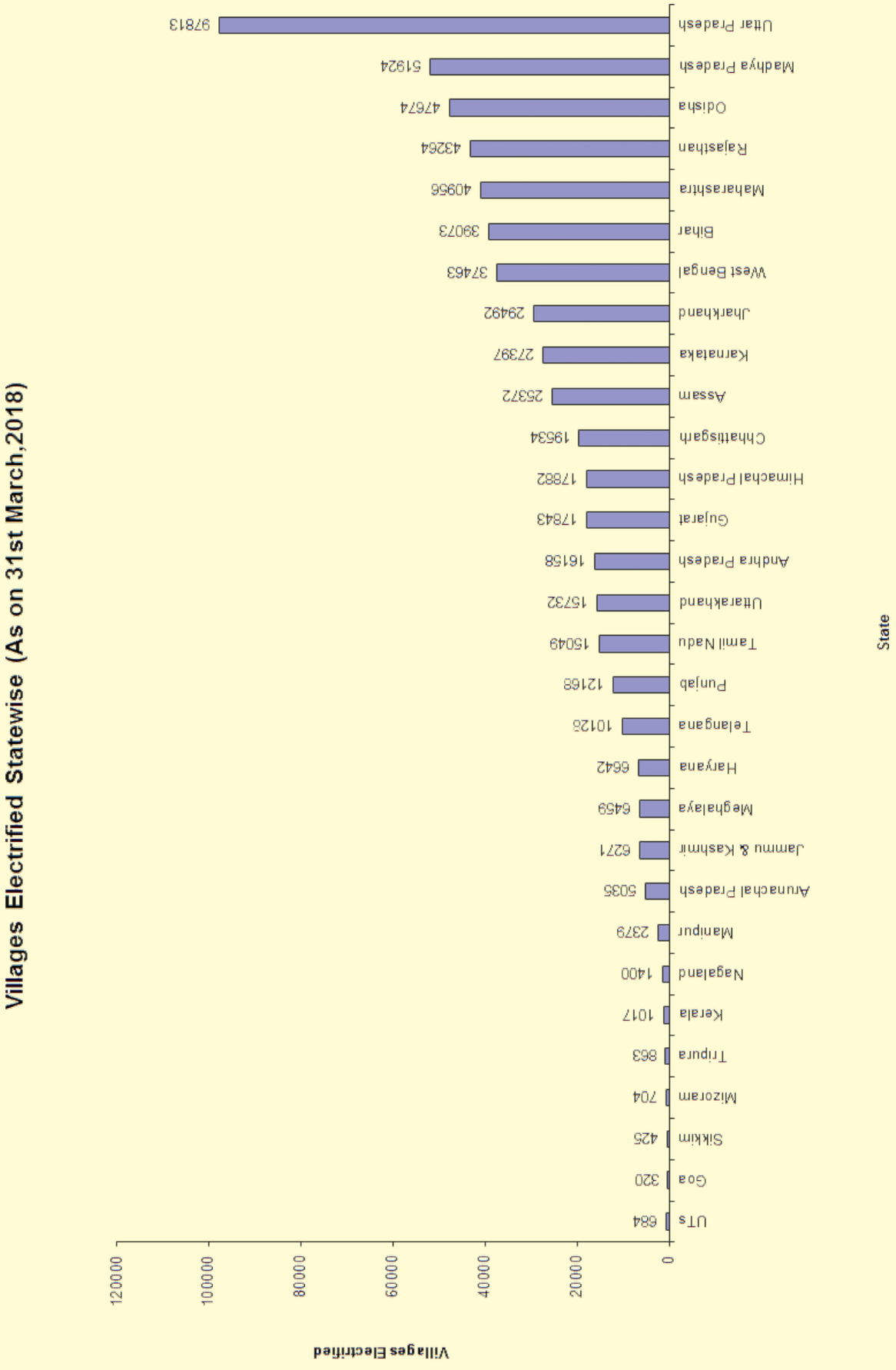
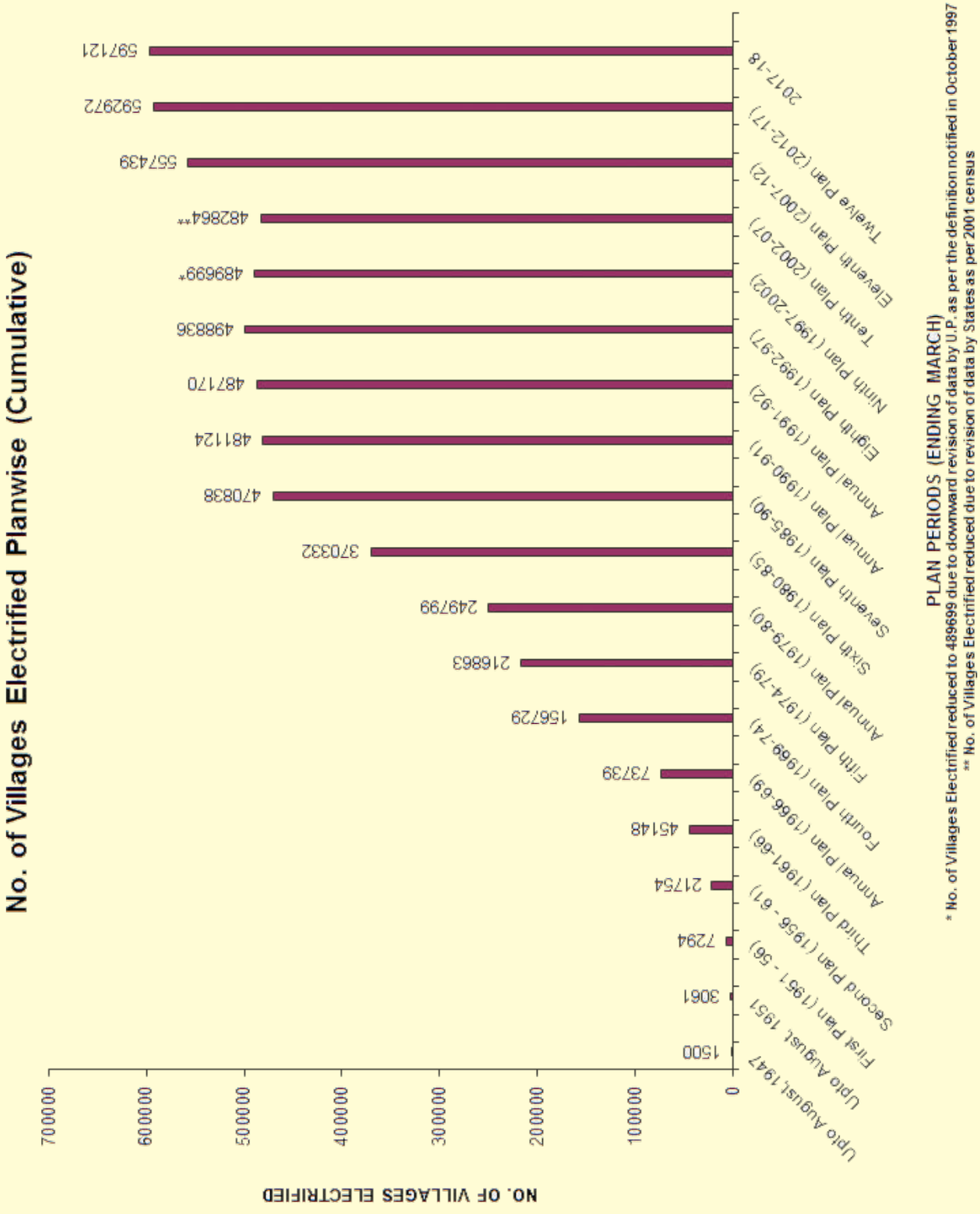
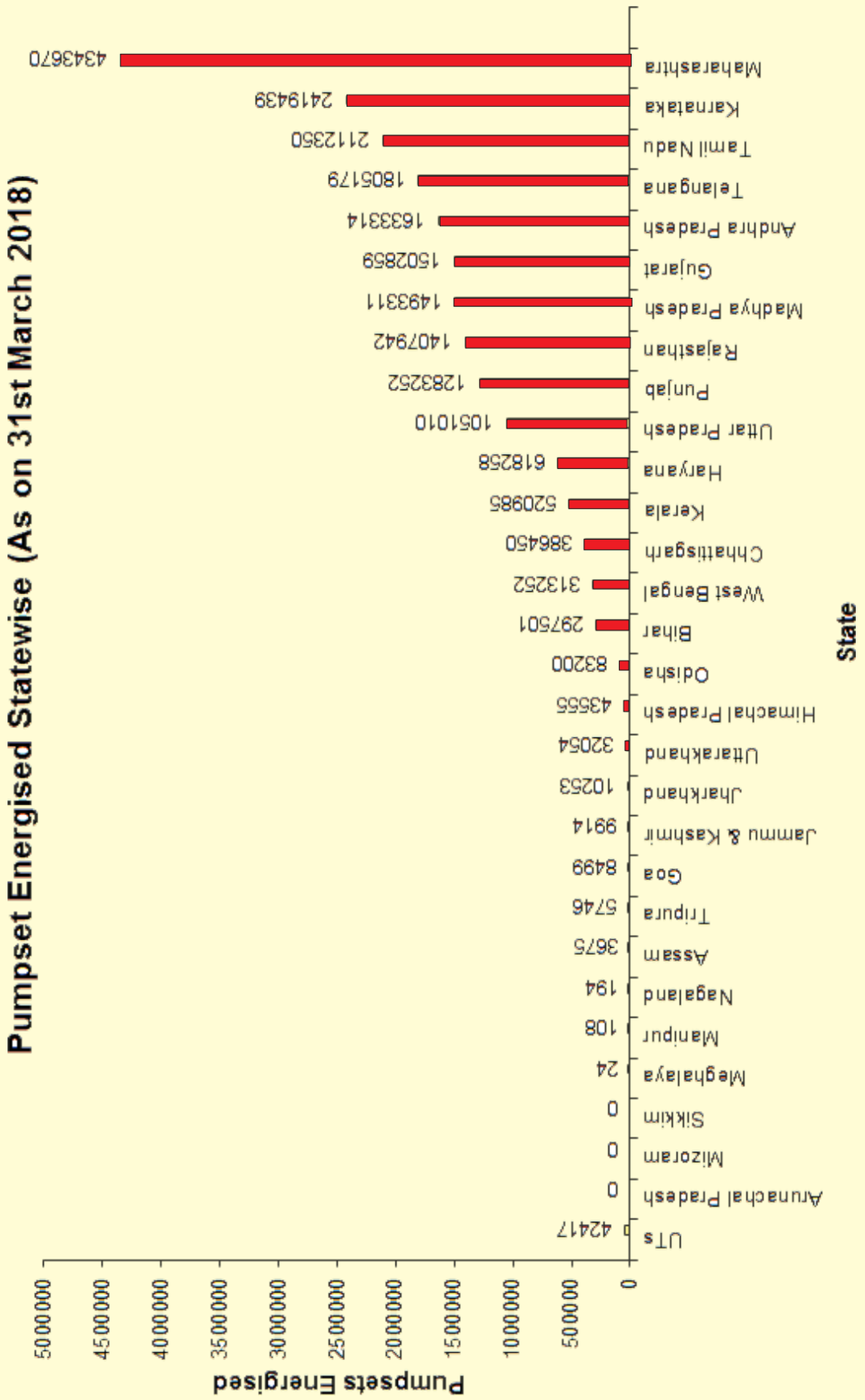
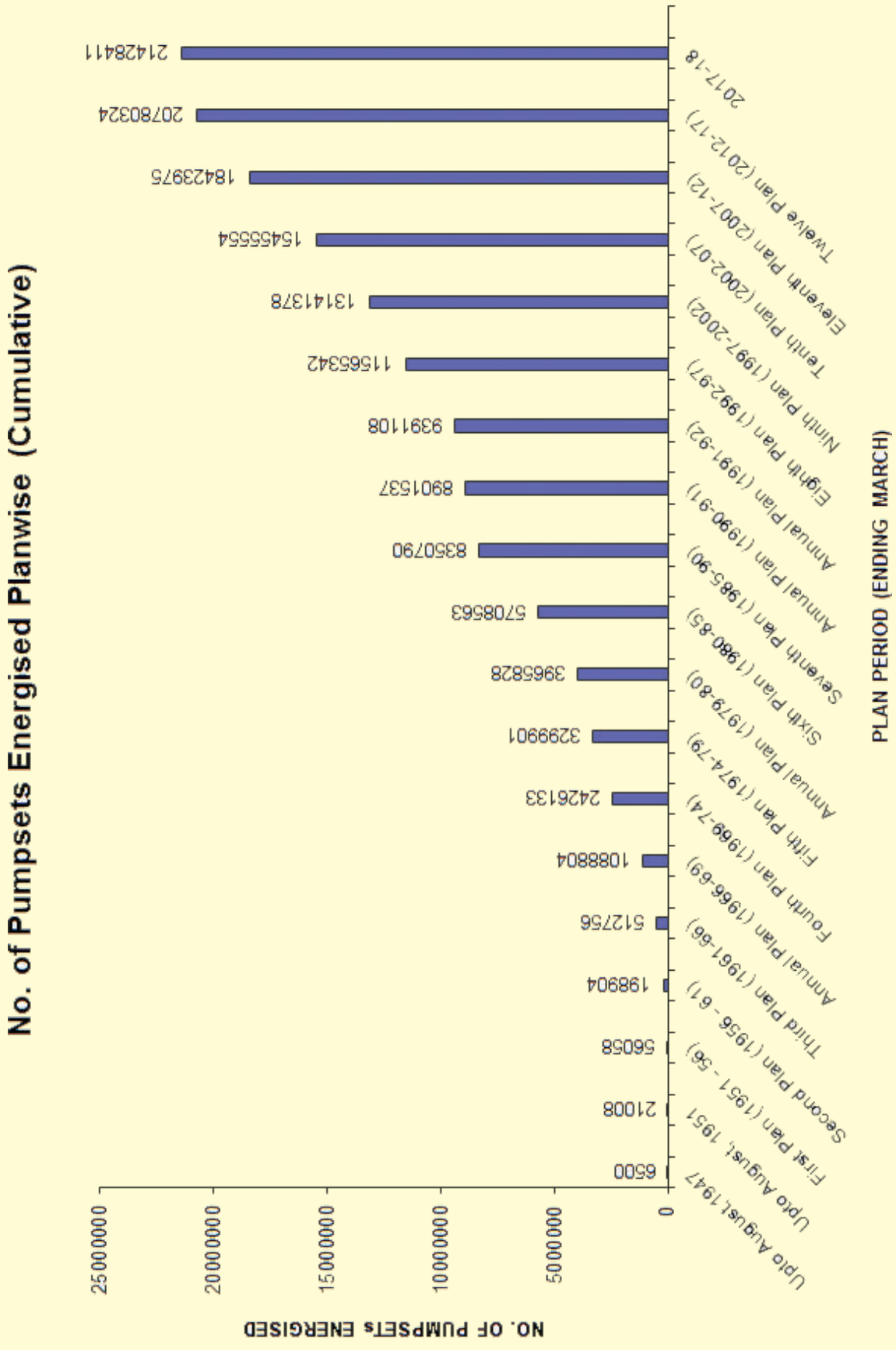

Villages Electrified Statewise (As on 31st March,2018)
Villages Electrified
0
20000
40000
60000
80000
100000
120000
State
UTs 684
Goa 320
Sikkim 425
Mizoram 704
Tripura 863
Kerala 1017
Nagaland 1400
Manipur 2379
Arunachal Pradesh 5035
Jammu & Kashmir 6271
Meghalaya 6459
Haryana 6642
Telangana 10126
Punjab 12168
Tamil Nadu 15049
Uttarakhand 15732
Andhra Pradesh 16158
Gujarat 17843
Himachal Pradesh 17882
Chhattisgarh 19534
Assam 25372
Karnataka 27397
Jharkhand 29492
West Bengal 37463
Bihar 39073
Maharashtra 40956
Rajasthan 43264
Odisha 47674
Madhya Pradesh 51924
Uttar Pradesh 97813


No. of Villages Electrified Planwise (Cumulative)
NO. OF VILLAGES ELECTRIFIED
PLAN PERIODS (ENDING MARCH)
Upto August 1947
First Plan (1951 - 56)
Second Plan (1956 - 61)
Third Plan (1961-66)
Annual Plan (1966-69)
Fourth Plan (1969-74)
Fifth Plan (1974-79)
Annual Plan (1979-80)
Sixth Plan (1980-85)
Seventh Plan (1985-90)
Annual Plan (1990-91)
Annual Plan (1991-92)
Eighth Plan (1992-97)
Ninth Plan (1997-2002)
Tenth Plan (2002-07)
Eleventh Plan (2007-12)
Twelve Plan (2012-17)
2017-18
1500
3061
7294
21754
45148
73739
156729
216863
249799
370332
470838
481124
487170
498836
489699*
482864**
557439
592972
597121
0
100000
200000
300000
400000
500000
600000
700000
* No. of Villages Electrified reduced to 489699 due to downward revision of data by U.P. as per the definition notified in October 1997
** No. of Villages Electrified reduced due to revision of data by States as per 2001 census


Pumpset Energised Statewise (As on 31st March 2018)
Pumpsets Energised
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
State
UTs 42417
Arunachal Pradesh 0
Mizoram 0
Sikkim 0
Meghalaya 24
Manipur 108
Nagaland 194
Assam 3675
Tripura 5746
Goa 8499
Jammu & Kashmir 9914
Jharkhand 10253
Uttarakhand 32054
Himachal Pradesh 43555
Odisha 83200
Bihar 297501
West Bengal 313252
Chhattisgarh 386450
Kerala 520985
Haryana 618258
Uttar Pradesh 1051010
Punjab 1283252
Rajasthan 1407942
Madhya Pradesh 1493311
Gujarat 1502859
Andhra Pradesh 1633314
Telangana 1805179
Tamil Nadu 2112350
Karnataka 2419439
Maharashtra 4343670


No. of Pumpsets Energised Planwise (Cumulative)
NO. OF PUMPSETs ENERGISED
PLAN PERIOD (ENDING MARCH)
25000000
20000000
15000000
10000000
5000000
0
6500
21008
56058
198904
512756
1088804
2426133
3299901
3965828
5708563
8350790
8901537
9391108
11565342
13141378
15455554
18423975
20780324
21428411
Upto August, 1947
Upto August, 1951
First Plan (1951 - 56)
Second plan (1956 - 61)
Third Plan (1961-66)
Annual Plan (1966-69)
Fourth Plan (1969-74)
Fifth Plan (1974-79)
Annual Plan (1979-80)
Sixth Plan (1980-85)
Seventh Plan (1985-90)
Annual Plan (1990-91)
Annual Plan (1991-92)
Eighth Plan (1992-97)
Ninth Plan (1997-2002)
Tenth Plan (2002-07)
Eleventh Plan (2007-12)
Twelve Plan (2012-17)
2017-18

CHAPTER – 8

DESIGN & ENGINEERING SERVICES

8.1 Design & Engineering of Hydro Electric Projects

During the year 2017-2018, the design and engineering consultancy of electro-mechanical works of the following HE Projects were carried out:

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 –II HEP	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

a) 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 10 nos.) under Survey & Investigation (S&I) at pre-DPR stage aggregating to about 5738 MW were examined & commented upon. A list of these hydro-electric projects has been indicated below:

A. List of DPRs of new HEPs examined for E&M aspects during the year 2017-18

S. No.	Name of the Project	State	Installed Capacity (MW)
a)	**Hydro Projects in India**		
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
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**		
23.	Pancheshwar MPP	Nepal	5040

B. List of new HEPs under S&I stage which were examined for E&M aspects during the year 2017-18

S. No.	Name of the Project	State	Installed Capacity (MW)
1.	Pauk HEP	Arunachal Pradesh	145
2.	Myntdu Leshka (Stage – II) HEP	Meghalaya	210
3.	Oju Subansiri	Arunachal Pradesh	(8x231.25 MW + 28 MW)
4.	New Milling HEP	Arunachal Pradesh	90
5.	Nakhtan HEP	H.P.	460
6.	Sunni Dam	H.P.	355
7.	Sirkari Bhyol Rupsiabagar	Uttarakhand	120
8.	Goriganga-III A	Uttarakhand	150
9.	Bokang Bailing	Uttarakhand	330
10.	Sharavathy HEP	Karnataka	2000

b) Preparation/Revision of Electro-Mechanical Chapter, Drawings and related Bill of Quantities for the following projects:

i) Kirthai-II HEP (6x140+2x35+2x10 MW), J&K

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. Switzerland
2. Serbia
3. Armenia
4. Tajikistan
5. Croatia
6. Vietnam
7. Russia
8. Afghanistan
9. Morocco
10. Colombia
11. Kyoto Protocol
12. China
13. Romania
14. Sri Lanka

8.4 Scrutiny of Innovative Proposals/ Schemes

Various Innovative Proposals / Schemes received in this office were examined and commented upon. Some of the proposals received are as listed below:

i.) Technical paper on "How Great are 3D Effects in Slope Stability Analysis".

ii.) Grievance Petition of Shri Girja Shankar Prasad for Production of Electricity without use of fuel.

iii.) Grievance Petition of Sh. Naresh Jambhare No. PMOPG/E/2017/ 0409352 dated 30.07.2017 forwarded to CEA on 02.08.2017.

iv.) Innovative proposal on a system for converting Electrical Power into rotational energy power through driving vehicles.

v.) Innovative scheme regarding twin generators on single turbine common shaft.

vi.) Email Petition of Sh. K NATARAJAN on new invention of energy generation by pumping of water.

vii.) Grievance Petition of Sh. Rabindra Nath Mandal dated 27.09.2017 forwarded to CEA on 04.10.2017.

viii.) Article on "Tapping Hydropower potential"-Queries from Power Today Magazine.

8.5 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.

8.6 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.

8.7 Design and Consultancy Assignments (Civil Aspects) for Thermal/Hydro/Transmission Projects during 2017-18

TCD Division of CEA carried out the following specific works in respect of thermal/hydro/power transmission projects during 2017-18:

8.7.1 Thermal Power Projects

(a) Wet-limestone based FGD Plant Retrofit

Draft Specification of Civil works portion of Wet-limestone based FGD retrofitting of thermal power plant was prepared.

(b) Buxar Thermal Power Plant

Draft PIB memo in respect of Investment approval for main plant construction was examined and necessary inputs were provided.

8.7.2 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 (6X170 MW), Bhutan

- Designs/drawings of Cable supporting structure, Test Cradle for Power House EOT Cranes, GIS hall EOT Crane were examined and necessary advice was communicated to Project Authorities.

8.7.3 Transmission Line & Sub-Station Projects

(a) Compendium of Approved Design of Transmission Line Tower Foundation was prepared.

8.8 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) which includes number of Transmission Lines and Substations of 220kV and 132kV voltage levels.

(i) Examination of Tower Structural drawings for leg extension of 4.5m of 'DC' & 'DD' type towers for 132 kV D/C Bandipora – Badampora transmission line for PDD, J&K.

(ii) Examination of drawings and details for 132 kV Multi circuit tower to be erected at 220/132/33 kV Grid Station Ramban .

(b) Damodar Valley Corporation:

Testing of 33 kV M/C 'C' type tower designed by CEA for DVC at CPRI, Bengaluru.

(c) 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/ CBIP/ IEEMA.

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	1,03,298
2014-15	1,14,007
2015-16	1,47,298

Source: *PFC Report on the Performance of the 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. Even in the post reform period, the managerial and financial inefficiency in the state sector power utilities, has adversely affected capacity addition and system improvement programmes.

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.13785.97 Crore up to 31st March,2018. 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, 2017) contains information on retail electricity tariff applicable in various States / Utilities effective during the year 2016-17.

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, 2017 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 Dibang MPP (2880 MW) in Arunachal Pradesh -M/s NHPC.
- DPR of Mawphu HEP Stage-II (85 MW) in Meghalaya - M/s NEEPCO.
- DPR of Renuka Dam Project (40 MW) in Himachal Pradesh-M/s HPPCL.
- DPR of Sawalkot HEP (1856 MW) in J&K - M/s JKPDCL.
- DPR of Tel Multipurpose Project (18 MW) in Odisha – Govt. of Odisha.
- DPR of Reoli Dogli (430 MW) in Himachal Pradesh-M/s L&T Himachal Hydropower Ltd.
- DPR of Thana Plaun HEP (191 MW) in Himachal Pradesh - M/s HPPCL
- DPR of Attunli HEP(680MW) in Arunachal Pradesh - M/s AHEPCL
- RCE of Kishanganga HEP (330MW) - M/s NHPC Ltd.
- RCE of Tehri pumped storage plant HEP (1000MW) in Uttarakhand-M/s THDC
- RCE of Subansiri HEP (2000 MW) in Arunachal Pradesh -M/s NHPC

ii. **Tariff for power stations of NPCIL for the period 1.4.2017 to 31.3.2022 -**

- Tarapur Atomic Power Station Unit 1 & 2 and Unit 3 & 4
- Rajasthan Atomic Power Station Unit 2,3 & 4 and Unit 5 & 6
- Madras Atomic Power Station Unit 1&2
- Narora Atomic Power Station Unit 1 & 2
- Kaiga Atomic Power Station Unit 1,2,3 & 4

iii. **Standing Committee on Energy** –

- Examination of the subject "Electricity Policy-A Review".
- Final Action taken on the recommendation contained in the 29th Report of the Standing Committee.
- Selection of subjects for detailed examination during the year 2017.
- Examination of the subject "Evaluation of Power Transmission System / Stressed Assets / Non-Performing Assets in Power Sector"

iv. **Examination of PIB Proposals -**

- Naitwar Mori HEP (60 MW) in Uttarakhand - M/s SJVNL.
- PIB Memo for investment approval of Devasri HEP (252 MW) in Uttarakhand - M/s SJVNL.
- PIB Memo of Buxar TPP (1320 MW) in Bihar - M/s SJVNL.

v. Financial options for Pancheshwar Multipurpose Project.

vi. Proposal to grant exemption from transmission charges and losses to hydro capacity under construction -Assessment of financial impact.

vii. Guidelines for Tariff Based Competitive Bidding Process for procurement of power from grid connected wind power project.

viii. Stressed Assets in Power Sector.

ix. Draft EFC Memorandum in respect of grid and decentralized Solar PV applications scheme.

x. Representations of various associations related to textile sector-reg. subsidy for power loom workers on power tariff.

xi. Request of Indian Energy Exchange (IEX) for increase in threshold for foreign investment in Power Exchange.

xii. FICCI's Submission on Revival of Hydro-Power Development.

xiii. Waiver of inter-state transmission charges and losses on transmission of the electricity generated from solar and wind sources of energy under Para 6.4(6) of the revised Tariff Policy as per Order No. 23/12/2016-R&R dt. 30.09.2016 of MoP.

xiv. Levy of service tax on activities integral to Generation & Distribution of Electricity.

xv. Preparation of terms of references (TORs) by the programme implementing Ministries/Departments for carrying out impact evaluation of their programmes.

xvi. Proposal for revival of hydro power sector in New Hydro Policy 2017.

xvii. Explore possibility of Cheyyur UMPP.

xviii. Power potential studies for Sapta Kosi High Dam Multipurpose Project in Nepal.

xix. Impact of closure of generating units due to non-installation of Flue Gas Desulphurization (FGD) equipments.

xx. Reference from M/s. Lanco for amendment in short term guidelines used in DEEP e-bidding portal.

xxi. Simplification of Tariff Categories and rationalization of retail tariff.

xxii. Power Tariff fixation of Noa Dihing dam project in Arunanchal Pradesh.

xxiii. Fixation of tariff for Mangdechhu HEP (720 MW) in Bhutan.

xxiv. Rationalisation of fuel cost for cost competitive thermal power generation in India.

9.4 Standard Bidding Documents and Competitive Bidding Guidelines

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

With a view 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 Legal Consultants. The draft Bidding document for "Procurement of Power on a Long-Term basis for Ultra Mega Power Project sourcing coal from domestic Captive Coal Blocks" has been prepared and submitted during 2015-16. Subsequently, the draft bidding document for "Procurement of Power on a Long-Term basis for Ultra Mega Power Project based on imported coal" has also been prepared and submitted by the Committee. This year, the Committee has finalized bid document for Medium-Term procurement of power for

three (3) years through an aggregator.

(b) Tariff Based Competitive Bidding Guidelines for Transmission Service

Ministry of Power (MoP) had vide letter dated 31.08.2015 constituted a Committee headed by Member (E&C), CEA, to finalize the changes and revise the Standard Bidding Documents (SBDs) for transmission projects notified by MoP in October, 2008, mainly due to implementation of the transmission charge sharing Regulations (introduction of point of connection transmission charge), introduction of reverse auction through e-bidding, etc. The Committee has prepared the draft 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 REC Transmission Projects Company Limited (RECTPCL). These documents were uploaded on CEA's website for comments of stakeholders. For wider discussion, meetings were held with Designated ISTS Customers (DICs), STUs and transmission developers on 23rd January, 2018 and 13th April, 2018. These documents are under finalization.

9.5 Financial and Operational turnaround of Power Distribution Companies

Ministry of Power had vide Office Memorandum (OM) dated 20th November 2015 announced UDAY (Ujwal DISCOM Assurance Yojana), a Scheme for the financial and operational turnaround of Power Distribution Companies (DISCOMs). The objective of the scheme is to improve the operational and financial efficiency of the State DISCOMs. One of the primary steps envisaged in the scheme for financial turnaround was that a substantial debt of the state owned DISCOMs would be taken over by the States.

As per the UDAY scheme, for improving operational efficiencies, the participating States and utilities would have to follow the specified timeline of the targeted activities i.e. compulsory feeder and Distribution Transformer (DT) metering, consumer indexing & GIS mapping of losses, upgrade or change transformers, meters etc., smart metering, Demand Side Management (DSM), quarterly tariff revision, campaign to check power theft and assure increased power supply in areas where the AT&C losses reduce.

The outcome of operational improvements is measured through following indicators:

(i) Reduction of AT&C loss to 15% in 2018-19 as per the loss reduction trajectory to be finalized by Ministry of Power and States, and

(ii) Reduction in gap between Average Cost of Supply (ACS) & Average Revenue Realized (ARR) to zero by 2018-19 as finalized by MoP and States.

A Committee has been constituted by MoP vide OM dated 19.01.2016, under the Chairmanship of Secretary, MoP, to ensure close monitoring of performance under UDAY to prevent any slippage. Chairperson, CEA is also a Member of this Monitoring Committee of UDAY.

By 31stMarch, 2018, 32 States/UTs have signed MOUs and joined the UDAY. Out of this, 16 States are participating under UDAY for improvement of both operational and financial efficiency whereas another 11 States & 05 UTs are participating for improving operational efficiency only.

The achievement made under UDAY for operational improvement is as under:

- ***Reduction of AT&C loss***: As against All India base year AT&C loss of 20.95% (31.03.2016), the target for 2016-17 was 18.38% whereas actual achievement was 20.31%.
- ***Reduction in ACS (Average Cost of Supply)-ARR (Average Revenue Realized) gap***: As against All India base year ACS- ARR gap of Rs. 0.59 per unit (31.03.2016), the target for 2016-17 was Rs. 0.38 per unit whereas actual achievement was Rs. 0.41 per unit.

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 the President's Address to both the Houses of the Parliament during the Budget Session, material for the 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 2017-18, the information for 115 IPPs with an installed capacity of 86,129 MW, having tied and untied capacity of 63,609 MW & 19,273 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 during the years 2015-16 to 2017-18, is shown in the **Table A** hereinafter.

9.10 The Electricity Act, 2003 and subsequent developments

9.10.1 Electricity (Amendment) Bill, 2014

The Electricity Act, 2003 was enacted on 10th 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 19th December, 2014. 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.

Table A : Investment Expenditure in Power Sector in India

(Figures in Rs. Crore)

Sector/Segment	2015-16	2016-17	2017-18 (Provisional)
CENTRAL Sector	**53395.27**	**51143.46**	**7150.77**
(i) THERMAL	26015.42	24172.04	5241.71
(ii) HYDRO	4631.25	4390.52	1909.06
(iii) TRANSMISSION	22748.60	22580.90	-
(iv) DISTRIBUTION	-	-	-
STATE Sector	**86951.35**	**37977.12**	**4752.50**
(i) THERMAL	19683.43	15537.13	4572.87
(ii) HYDRO	2762.92	1844.73	179.63
(iii) TRANSMISSION	16640.08	16332.35	-
(iv) DISTRIBUTION	47900.92	4262.91	-
PRIVATE Sector	**27043.79**	**13060.82**	**574.98**
(i) THERMAL	21758.72	11030.55	472.59
(ii) HYDRO	3216.35	815.98	102.39
(iii) TRANSMISSION	-	-	-
(iv) DISTRIBUTION	2068.72	1214.29	-
GRAND TOTAL Sector wise	**167390.41**	**102181.40**	**12478.25**
(i) THERMAL	67457.57	50739.72	10287.17
(ii) HYDRO	10574.52	7051.23	2191.08
(iii) TRANSMISSION	39388.68	38913.25	-
(iv) DISTRIBUTION	49969.64	5477.20	-
GRAND TOTAL Segment wise	**167390.41**	**102181.40**	**12478.25**

Note:

- These figures are as reported by the utilities, which are likely to change with the truing up of the figures 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 Oct./Nov. 2017.

- To promote hydro power and reduction in regulatory assets.
- Insertion of a new Section 109A relating to "Review of performance of Appropriate Commissions" through a Committee to be constituted for reviewing the performance of the said Commissions.

9.10.2 Framing of the CEA Regulations and Amendments notified under the Electricity Act, 2003

The principal Regulations and Amendments which have been framed and notified by the Central Electricity Authority under the Electricity Act, 2003, are listed below:

Sl. No.	Title of the Regulations	Date of publication in Gazette of India
(i)	Central Electricity Authority (Installation & Operation of Meters) Regulations, 2006	22.03.2006
(ii)	Central Electricity Authority (Procedure for Transaction of Business) Regulations, 2006	22.08.2006
(iii)	Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007	09.03.2007
(iv)	Central Electricity Authority (Furnishing of Statistics, Returns & Information) Regulations, 2007	19.04.2007
(v)	Central Electricity Authority (Grid Standards) Regulations, 2010	26.06.2010
(vi)	Central Electricity Authority (Installation and Operation of meters) (Amendment) Regulations, 2010	26.06.2010
(vii)	Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations, 2010	24.09.2010
(viii)	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)
(ix)	Central Electricity Authority (Safety requirements for Construction, Operation and Maintenance of Electrical Plants and Electric Lines) Regulations , 2011	14.02.2011
(x)	Central Electricity Authority (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013	07.10.2013
(xi)	Central Electricity Authority (Technical Standards for Connectivity to the Grid) (Amendment) Regulations, 2013	15.10.2013
(xii)	Central Electricity Authority (Installation and Operation of Meters) (Amendment) Regulations, 2014	26.11.2014
(xiii)	Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) (Amendment) Regulations, 2015	06.04.2015
(xiv)	Central Electricity Authority (Measures relating to Safety and Electricity Supply) (Amendment) Regulations, 2015	13.04.2015
(xv)	Central Electricity Authority (Measures relating to Safety and Electricity Supply) (Amendment) Regulations, 2018	01.03.2018

9.11 Status of Power Sector Reforms

Central Electricity Authority has been monitoring the reforms of power sector undertaken by the State Governments/UTs as envisaged under Electricity Act, 2003, by way of collation of pertinent data from the States/UTs. Status of the reforms as per the information/data furnished by States/UTs is as under:

9.11.1 Restructuring of State Electricity Boards/Electricity Departments / Power Departments

All the States having State Electricity Boards (SEBs) prior to enactment of Electricity Act, 2003, unbundled their SEBs under Section 131 of the Act.

The Electricity Act, 2003 is silent about State Power Departments. However, State of Tripura has created Tripura State

Electricity Corporation Limited (TSECL) as a single Corporation to look after generation, transmission and distribution, trading and SLDC operations. Manipur has also unbundled and corporatized its Electricity Department into two (2) State owned functionally independent entities - (i) Manipur State Power Company Limited (MSPCL) as State transmission and generation utility and (ii) Manipur State Power Distribution Company Limited (MSPDCL) as distribution licensee. In the States of Goa, Sikkim, Arunachal Pradesh, Mizoram and Nagaland, all matters relating to generation, transmission and distribution of Electricity are managed by the respective Power Departments/ Energy Department.

In addition, six Union Territories viz. Chandigarh, Puducherry, Lakshadweep, Andaman & Nicobar Island, Daman & Diu and Dadra & Nagar Haveli, are having their own Power Department.

9.11.2 Constitution of Electricity Regulatory Commissions (ERCs)

All the States have constituted their respective State Electricity Regulatory Commission (SERC). The States of Manipur & Mizoram have constituted a Joint ERC. All the SERCs are functional.

A separate Joint Electricity Regulatory Commission (JERC) has been constituted by the Central Government for Union Territories including the State of Goa. The nomenclature of JERC for UTs has been changed to "JERC for Goa and Union Territories".

9.11.3 Constitution of Special Courts

So far, 27 States viz. Assam, Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Manipur, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Telangana, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand, West Bengal and Delhi have set up Special Courts for expeditious disposal of cases relating to the theft of electricity.

9.11.4 Constitution of Consumer Grievances Redressal Forums

Consumer Grievances Redressal Forums (CGRF) have been constituted by various distribution licensees for redressal of grievances of consumers in 28 States, namely Assam, Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Manipur, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Telangana, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand, West Bengal and Delhi. Ombudsmen have also been appointed in these 28 States to look into the non-redressal of grievances by the CGRF.

9.12 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 125 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).

9.13 Assistance to Ministry of Power

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

hereunder -

- Amendments proposed in Electricity Rules, 2005.
- Inclusion of National Power Committee in Amendment of Electricity Act, 2003.
- Gazette Notification for appointment of Estate Offices under Public Premises (Eviction of Unauthorized Occupants) Act, 1971 for PGCIL.
- VIP reference regarding waiver of Inter-state transmission charges for Small Hydro projects.
- Note for Committee of Secretaries on notifying Technical Regulations to address the regulatory gap in India.
- Proposal for acquisition of SJVNL by NTPC.
- Draft Cabinet Note on Industrial Policy, 2018.
- Request of M/s. Adani Power Ltd. for approval of competent authority to build independent transmission system for evacuation of power from the proposed 2x800MW Godda thermal project in Jharkhand to Bangladesh.
- Reference from Ministry of Commerce & Industry regarding preparation, adoption and application of Standards and Technical Regulations(TRs) to fulfill certain key public policy objectives.
- Note regarding under-recovery in Energy charges for projects under Case-I bidding.
- Application under Section 86(i)(b) for approval of the source of power i.e, 4000MW of power from Odisha Integrated Power Ltd. (UMPP Project) expected to be available w.e.f. 2021-2022.
- Supply of power for the proposed pit head power plant in Odisha by NLCIL.
- Material for preparation of Chapter on Climate, Sustainable Development and Energy for the Economic Survey 2017-18.
- 2017 Ministerial Meeting of the International Energy Agency(IEA) with respect to priority areas earmarked for the Joint Program of work during 2018-2021.
- Levy of Additional charge of 1% on account of TCS being violative of extant laws.
- Issues to be considered in 15th Finance Commission.

9.14 Legal Assistance/Advice to Utilities

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

- Permanent closure of Badarpur Thermal Power Station.
- Legal opinion for finding out a solution to effect recoveries of amount due from M/s. Suryachakra Power Corporation.
- Reference from Association of Power Producers (APP) regarding "Regulatory overburden of Rs. 8400 Crore on account of faulty Indexation of Coal and Coal Transportation Charges of Railways".
- Reference from Ministry of Commerce on implementation of SEZ Act,2005.
- Consideration of open access to Southern Railways as deemed distribution license by TANGEDCO.

- Proposal of NHPC to amend CEA (Technical Standards for construction of Electrical plants and Electric lines) Regulations, 2010 and CEA (Technical Standards for connectivity to the Grid) Amendment Regulations, 2013 with respect to change in power factor of generating units.
- Recommendations of Punchhi Commission on Center-State relations to be discussed in the 13th Standing Committee of the Inter-state Council.
- Reference on flexible operation of NTPC station and other multi-station companies for optimizing Energy Charge Rate (ECR).
- Phasing out of Unit Nos. 1 to 10 of Patratu Thermal Power Station.
- Publication of Reliability Index by CEA in compliance with National Electricity Policy.
- Recommendation for change in status from IPP to CPP for unit 1 of 4x600 MW power plant of M/s. Vedanta Ltd.
- Reference from Association of Power Producers (APP) for allowing various surcharges as pass through under Change in Law.
- Allocation from Inter-state Generating Stations (ISGS) towards Auxiliary power under O&M for all AC Sub-stations in different States.

9.15 References on Policy & 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 CERC (Grant of Connectivity and General Network Access to the inter-state transmission system and other related matters) Regulations, 2017.
- Draft CERC (Cross Border Trade of Electricity) Regulations, 2017.
- Proposal/Request of NTPC for status of a 'Distribution Licensee' to provide electricity to their own charging stations for E-Vehicles.
- Reference from Commerce Secretary regarding the follow up action on the issue of strengthening the regulatory and standards framework across various sectors.
- Background Note for the Standing Committee on Energy on the subject – "Role of Regulators in Electricity Sector".
- Amendment to Tariff Policy.
- Issues for discussion with Regulators during the meeting of Hon'ble Minister of State (IC) for Power & NRE with Forum of Regulators (FOR).
- Draft Roadmap for Implementation of the SAARC framework agreement on Energy Co-operation.
- Uploading of updated/consolidated status of pending court cases in respect of CEA in the Legal Information Management & Briefing System (LIMBS) Portal developed by the Ministry of Law & Justice.
- Draft Electricity Regulations of Ministry of Energy & Public Utilities,

Republic of Mauritius.

- Assessment of effectiveness of provisions of revised Tariff Policy, 2016.
- Proposal from National Solar Energy Federation of India for amendment in Ministry of Commerce & Industry and Department of Revenue Notifications dated 16.02.2016 regarding Guidelines for Power Generation, Transmission and Distribution in Special Economic Zones (SEZs).
- Inputs for the Standing Committee on Energy on the subjects viz., Demands for Grants, Contribution of Central Electricity Authority in the balanced development of Electricity Sector.
- Draft National Energy Policy formulated by NITI Aayog.
- Drafting of Clarification to be issued for no requirement of license by the Charging Stations for E-Vehicles.

9.16 Implementation issues related to Regulations / Standards of CEA/ CERC/SERCs

- Reference from Ministry of Commerce and Industry regarding formulation of Regulations/ Standards and high cost of electricity for SEZ.
- Publication of the Central Electricity Authority (Measures relating to Safety and Electricity Supply) (Amendment) Regulations, 2018 in the Gazette of India.
- Inputs for Committee on Subordinate Legislation, Rajya Sabha, on issue of CERC Regulations for Renewables.
- Reference from Ministry of Steel on suggestions for optimizing input cost for steel making viz. "Recognition of waste heat/gas based power generation as cogeneration facilities in the integrated Steel plant in category of renewable power", "Granting of deemed licensee status to SAIL, on similar lines with Railways", etc.
- Uploading of CEA Regulations/ Notifications in India Code Portal developed by the Ministry of Law & Justice.
- Request from Government of Andhra Pradesh regarding grant of waiver of ISTS charges and losses to Renewable Energy Projects (solar and wind) using ISTS network in terms of Clause 6.4 (6) of the Tariff Policy, 2016.
- Reference from Principal Secretary (Energy), Govt. of Rajasthan on CERC (Sharing of ISTS Charges and Losses), Regulations.
- Proposal of NTPC regarding "Restriction in procurement under Short Term Open Access (STOA) by defaulting entities as provided to transmission licensee".
- Second Amendment of CEA (Measures Relating to Safety and Electricity Supply) Regulations, 2010.
- Reference from M/s. ITC Limited regarding Inter State Open Access (ISOA) for 46 MW Wind Energy Project, for meeting the captive power requirements of ITC units located across the unified State of Andhra Pradesh.

9.17 Nomination to the Important Committees

(i) Member (E&C), CEA nominated as the Chairman with Chief Engineer (F&CA), CEA, as one of the Members of the Committee constituted by Ministry of Power (MoP) to develop provisions for Joint Bids between RE and non RE players for integrated

power needs.

(ii) Nomination of Member (E&C), CEA, as a Member of the Committee constituted by MoP on Policy Planning and Regulatory/Tariff related issues of Charging Infrastructure for Electric Vehicles.

(iii) Member (E&C), CEA nominated as the Chairman with Chief Engineer (F&CA), CEA, as one of the Members of the Committee constituted by MoP to formulate long term strategy for giving concessional power for value addition of Raw Material (Alumina and others). The Committee has submitted its Report to MoP in December 2017.

(iv) An Inter-Ministerial Group was constituted by MoP for analyzing Stressed Projects in Power Sector and making policy recommendations. In this regard a Financial Sub Group was constituted headed by Member (E&C), CEA and Chief Engineer (F&CA) was co-opted as Member of this subgroup. This Subgroup had submitted its Report to MoP in September 2017.

(v) CEA has constituted a Standing Committee for periodic review of Tariff Policy with Member (E&C), CEA nominated as the Chairman of this Committee and Chief Engineer (F&CA) as the Convener.

(vi) MoP has constituted a Committee for implementation of Time of Day (ToD) Tariff under the Chairmanship of Addl. Secretary, MoP. Chief Engineer (F&CA), CEA has been nominated as a member of this Committee.

(vii) Chief Engineer (F&CA), CEA has been nominated as the Chairman of the Drafting Committee constituted by MoP for carrying out necessary drafting for the proposed amendments in the Tariff Policy.

(viii) MoP has constituted a Committee for drafting of the proposed Amendments in Electricity Act, 2003. Chief Engineer (Legal), CEA has been nominated as a member of this Committee.

(ix) Chief Engineer (F&CA), CEA has been nominated as a member of the Tariff Negotiation Committee constituted by MoP for Mangdechhu HEP, Bhutan.

(x) Chief Engineer (Legal), CEA has been nominated as a member of the Committee constituted by MoP for the proposed Amendments in Electricity Rules,2005.

(xi) MoP has constituted a Committee on Efficient Regulation of Electricity Derivatives. Director (F&CA), CEA has been nominated as a member of this Committee.

(xii) Nomination of Sh. Pankaj Kumar Verma, Assistant Director (RA) and Ms. Bhoomika Banga, Assistant Director (F&CA) to deliver a Country Presentation and represent India in the workshop organized by the SAARC in collaboration with Indian Energy Exchange at New Delhi.

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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 1206306.25 Million Units during the year 2017-18. This represents a growth of about 3.98% over the same period during previous year 2016-17 as per details given below:

Power Generation during 2017-18

Category	Programme (MU)	Actual (MU)	Shortfall (-)/ Excess(+)	% of Programme	Growth (%) with respect to previous year Actual Gen.
Thermal	1042028	1037059.10	-4968.90	99.52	4.31
Nuclear	40972	38346.12	-2625.88	93.59	1.13
Hydro	141400	126122.70	-15277.3	89.20	3.06
Bhutan Imp	5000	4778.33	-221.67	95.57	-14.94
TOTAL	**1229400**	**1206306.25**	**-23093.75**	**98.12**	**3.98**

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 2017-18 are as under:

- Gross annual generation of the country was 1206.31 BU.
- The annual growth in the energy generation during the year was 3.98%.
- Thermal, Nuclear, Hydro and Import from Bhutan achieved a growth rate of 4.31%, 1.13%, 3.06% and -14.94% respectively. The electricity generation during the year 2017-18 from coal based thermal power stations was 951.75 BU showing a growth rate of 4.57% against 5.58% over same period last year.
- In North region the growth in thermal generation was 8.48% with respect to last year highest amongst all other regions.
- The national average PLF for themal stations was 60.72% and **83** Stations with an aggregate installed capacity of 104629.5MW, achieved PLF above national average.

  06 number of thermal power stations with an aggregate installed capacity of 7320 MW achieved above 90% PLF.

The sector wise Generation and PLF during 2017-18 is given below:

Category / Sectors	Programme (MU)	Actual (MU)	PLF (%)
CENTRAL SECTOR			
THERMAL	339749	356130.05	72.38
NUCLEAR	40972	38346.12	64.56
HYDRO	55028	55036.09	
TOTAL	**435749**	**449512.26**	
STATE SECTOR			
THERMAL	339494	320736.93	56.90
HYDRO	73005	56988.95	
TOTAL	**412499**	**377725.88**	
PVT. SECTOR IPP			
THERMAL*	344239	341387.76	55.09
HYDRO	11917	12581.78	
TOTAL	**356156**	**353969.54**	
PVT. SECTOR UTL.			
THERMAL	18546	18804.36	60.42
HYDRO	1450	1515.88	
TOTAL	**19996**	**20320.24**	
TOTAL PVT	**376152**	**374289.78**	
BHUTAN IMP	5000	4778.33	
ALL INDIA REGION			
THERMAL	1042028	1037059.10	60.72
NUCLEAR	40972	38346.12	64.56
HYDRO	141400	126122.70	
BHUTAN IMP	5000	4778.33	
TOTAL	**1229400**	**1206306.25**	

***Includes import from some of the Captive Plants**

10.2 Plant Load Factor of Thermal Power Stations

During the year 2017-18 the average PLF of Thermal Power Stations was 60.72 % and for Nuclear Power Stations was 64.56%.

83 thermal power plants achieved PLF higher than the All India average PLF of 60.72% as per details given in the table below:

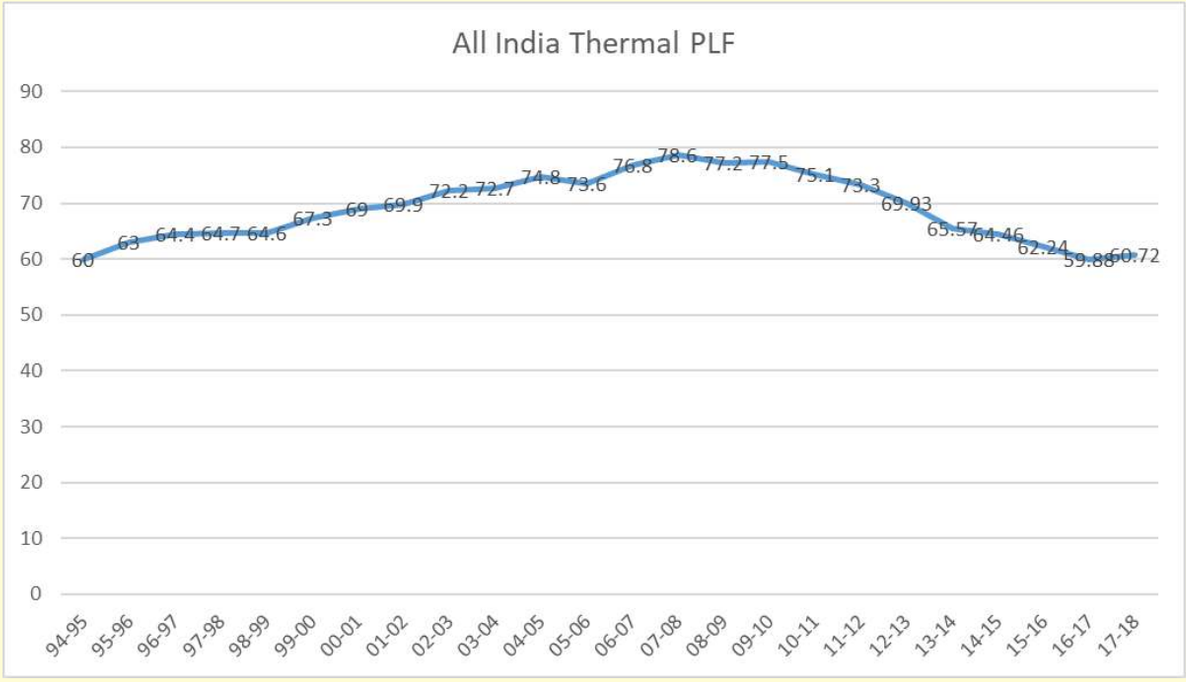
List of Thermal Power Stations which have achieved PLF above National Average of 60.72 % during the year 2017-18

S. No.	NAME OF THE STATION	Installed Capacity (MW)	SECTOR	State	PLF (%)
1	AMARKANTAK EXT TPS	450	STATE	MADHYA PRADESH	93.94
2	TALCHER (OLD) TPS	460	CENTRAL	ORISSA	93.82
3	DSPM TPS	500	STATE	CHHATTISGARH	92.31
4	BUDGE BUDGE TPS	750	PVT	WEST BENGAL	91.83
5	SASAN UMTPP	3960	PVT	MADHYA PRADESH	91.65
6	SINGARENI TPP	1200	STATE	TELANGANA	91.09
7	VINDHYACHAL STPS	4760	CENTRAL	MADHYA PRADESH	89.92
8	KORBA STPS	2600	CENTRAL	CHHATTISGARH	89.91
9	RIHAND STPS	3000	CENTRAL	UTTAR PRADESH	89.54
10	BHILAI TPS	500	CENTRAL	CHHATTISGARH	88.53
11	NEYVELI (EXT) TPS	420	CENTRAL	TAMIL NADU	88.26
12	SIPAT STPS	2980	CENTRAL	CHHATTISGARH	88.14
13	TALCHER STPS	3000	CENTRAL	ORISSA	87.43
14	RAMAGUNDEM - B TPS	62.5	STATE	TELANGANA	86.73
15	HALDIA TPP	600	PVT	WEST BENGAL	86.11
16	CHAKABURA TPP	30	PVT	CHHATTISGARH	85.49
17	TANDA TPS	440	CENTRAL	UTTAR PRADESH	85.05
18	PAINAMPURAM TPP	1320	PVT	ANDHRA PRADESH	85.04
19	BANDAKHAR TPP	300	PVT	CHHATTISGARH	84.62
20	SINGRAULI STPS	2000	CENTRAL	UTTAR PRADESH	84.37
21	SABARMATI (D-F STATIONS)	362	PVT	GUJARAT	83.21
22	RAMAGUNDEM STPS	2600	CENTRAL	TELANGANA	82.84
23	KOTHAGUDEM TPS (NEW)	1000	STATE	TELANGANA	81.41
24	BAKRESWAR TPS	1050	STATE	WEST BENGAL	81.40
25	DAHANU TPS	500	PVT	MAHARASHTRA	80.69
26	KASAIPALLI TPP	270	PVT	CHHATTISGARH	80.56
27	BARH II	1320	CENTRAL	BIHAR	80.19
28	ANPARA C TPS	1200	PVT	UTTAR PRADESH	79.88
29	MAITHON RB TPP	1050	PVT	JHARKHAND	79.86
30	NEYVELI TPS-II	1470	CENTRAL	TAMIL NADU	79.70
31	KAHALGAON TPS	2340	CENTRAL	BIHAR	79.60
32	KORBA-WEST TPS	1340	STATE	CHHATTISGARH	79.09
33	PATHADI TPP	600	PVT	CHHATTISGARH	78.76
34	SGPL TPP	1320	PVT	ANDHRA PRADESH	77.58
35	IB VALLEY TPS	420	STATE	ORISSA	77.20

36	JOJOBERA TPS	240	PVT	JHARKHAND	76.98
37	KAKATIYA TPS	1100	STATE	TELANGANA	76.72
38	MUNDRA UMTPP	4000	PVT	GUJARAT	75.67
39	BARSINGSAR LIGNITE	250	CENTRAL	RAJASTHAN	75.29
40	SURAT LIG. TPS	500	PVT	GUJARAT	74.70
41	RAJPURA TPP	1400	PVT	PUNJAB	74.28
42	DURGAPUR STEEL TPS	1000	CENTRAL	WEST BENGAL	74.24
43	RAYALASEEMA TPS	1650	STATE	ANDHRA PRADESH	73.95
44	TORANGALLU TPS(SBU-I)	260	PVT	KARNATAKA	73.54
45	ROSA TPP Ph-I	1200	PVT	UTTAR PRADESH	73.43
46	RATIJA TPS	100	PVT	CHHATTISGARH	73.20
47	UNCHAHAR TPS	1550	CENTRAL	UTTAR PRADESH	73.14
48	FARAKKA STPS	2100	CENTRAL	WEST BENGAL	72.61
49	JALIPA KAPURDI TPP	1080	PVT	RAJASTHAN	72.47
50	ANPARA TPS	2630	STATE	UTTAR PRADESH	72.13
51	RAICHUR TPS	1720	STATE	KARNATAKA	71.91
52	CHHABRA TPP	1660	STATE	RAJASTHAN	71.37
53	GMR WARORA TPS	600	PVT	MAHARASHTRA	71.27
54	PARAS TPS	555	STATE	MAHARASHTRA	71.15
55	HARDUAGANJ TPS	720	STATE	UTTAR PRADESH	70.32
56	Dr. N.TATA RAO TPS	1760	STATE	ANDHRA PRADESH	70.19
57	GANDHI NAGAR TPS	870	STATE	GUJARAT	67.80
58	KODARMA TPP	1000	CENTRAL	JHARKHAND	67.48
59	SIMHADRI	2000	CENTRAL	ANDHRA PRADESH	67.20
60	SANTALDIH TPS	980	STATE	WEST BENGAL	67.16
61	BOKARO TPS `A` EXP	500	CENTRAL	JHARKHAND	66.76
62	NIGRI TPP	1320	PVT	MADHYA PRADESH	66.49
63	KOTA TPS	1240	STATE	RAJASTHAN	66.40
64	CHANDRAPURA(DVC) TPS	1120	CENTRAL	JHARKHAND	66.15
65	YAMUNA NAGAR TPS	600	STATE	HARYANA	65.60
66	MARWA TPS	1000	STATE	CHHATTISGARH	65.30
67	UKAI TPS	1350	STATE	GUJARAT	64.92
68	PARICHHA TPS	1140	STATE	UTTAR PRADESH	64.36
69	NEYVELI TPS- I	600	CENTRAL	TAMIL NADU	64.30
70	SANJAY GANDHI TPS	1340	STATE	MADHYA PRADESH	64.26
71	JSW RATNAGIRI TPP	1200	PVT	MAHARASHTRA	64.03
72	KALISINDH TPS	1200	STATE	RAJASTHAN	63.65
73	MAHATMA GANDHI TPS	1320	PVT	HARYANA	63.35
74	BUTIBORI TPP	600	PVT	MAHARASHTRA	62.91
75	NORTH CHENNAI TPS	1830	STATE	TAMIL NADU	62.77
76	DADRI (NCTPP)	1820	CENTRAL	UTTAR PRADESH	62.30
77	BARADARHA TPS	1200	PVT	CHHATTISGARH	62.18
78	AKRIMOTA LIG TPS	250	STATE	GUJARAT	61.97

79	TUTICORIN (JV) TPP	1000	CENTRAL	TAMIL NADU	61.79
80	MAHADEV PRASAD STPP	540	PVT	JHARKHAND	61.52
81	KOTHAGUDEM TPS	720	STATE	TELANGANA	61.38
82	MEJIA TPS	2340	CENTRAL	WEST BENGAL	60.88
83	TIRORA TPS	3300	PVT	MAHARASHTRA	60.87
	TOTAL CAPACITY:	**104629.5**			

The trend in All India PLF of coal and Lignite based thermal power stations from 1994-95 onwards is shown below:



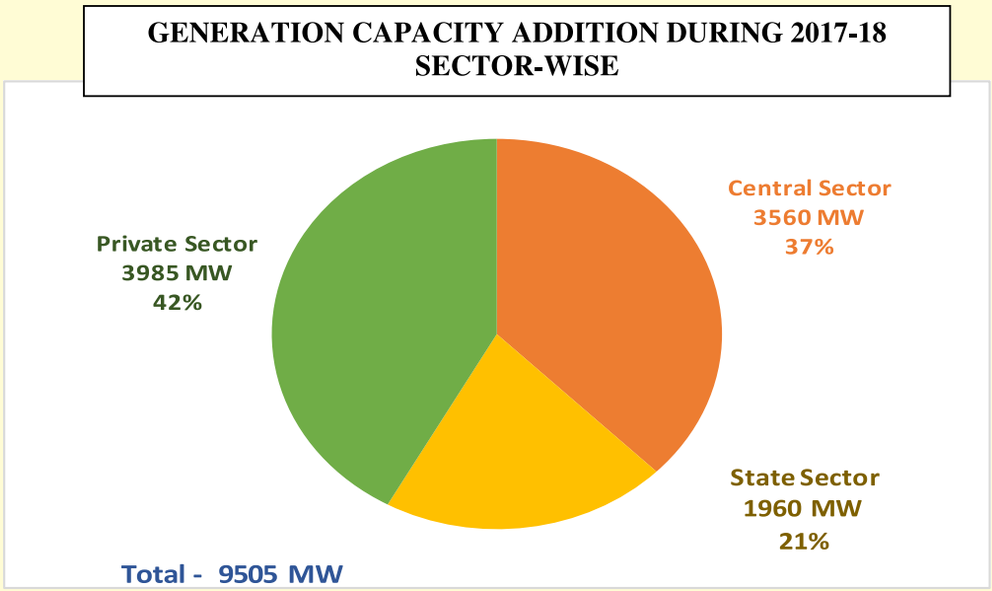
All India Sector-wise/Organization-wise target, actual generation and PLF (%) for the year 2017-18 is at **Annexure-10A.**

10.3 Generating Capacity Addition

During the year 2017-18, a total of 9505 MW generation capacity was added (excluding Renewable Energy Sources). The capacity addition during the last 10 years Sector-wise and mode-wise are given below:

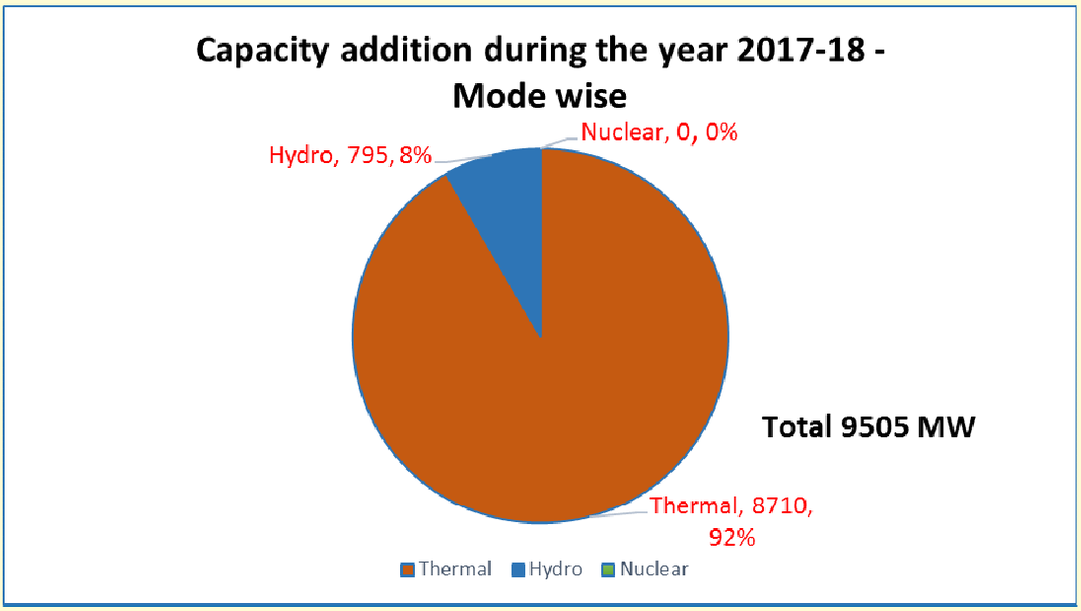
Capacity addition during the last 10 years – Sector-wise

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



Capacity addition during the last 10 years – Mode-wise

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



10.4 Installed Electricity Generating Capacity

The Total All India Installed Electricity Generating Capacity as on 31.03.2018 is 344002.39 MW comprising of Thermal 222906.59 MW, Hydro 45293.42 MW, Nuclear 6780.00 MW and 69022.39 MW from Renewable Energy Sources (RES). The details are shown in the Table given below:

All India Installed Electricity Generating Capacity- Sector-wise

Type	Central Sector (MW)	State Sector (MW)	Private Sector (MW)	Total (MW)
THERMAL	64192.91	72113.38	86600.30	222906.59
HYDRO	12041.42	29858.00	3394.00	45293.42
NUCLEAR	6780.00	0.00	0.00	6780.00
RES	1502.30	2003.37	65516.72	69022.39
Total	**84516.63**	**103974.75**	**155511.02**	**344002.39**

The State-wise/ Region-wise/ Sector-wise and prime mover wise summary of installed capacity under utilities is at **Annexure-10B**.

The mode-wise growth of installed generating capacity in the country is shown in the Table below:

Growth of Installed generating capacity in the country- Mode wise

Year	Thermal	Nuclear	Hydro	RES*	Total
Dec.1947	854	-	508	-	1362
Dec.,1955	1755	-	940	-	2695
March, 1961	2736	-	1917	-	4653
March, 1966	4903	-	4124	-	9027
March, 1974	9058	640	6966	-	16664
March, 1980	16424	640	11384	-	28448
March, 1985	27030	1095	14460	-	42585
March, 1990	43764	1565	18307	-	63636
March, 1991	45768	1565	18753	-	66086
March, 1992	48086	1785	19194	-	69065
March, 1996	60083	2225	20986	-	83294
March, 1997	61012	2225	21658	900	85795
March, 1998	64005	2225	21904	968	89102
March, 1999	67566	2225	22479	1024	93294
March, 2000	70193	2680	23857	1155	97885
March, 2001	72343	2860	25153	1270	101626
March, 2002	74429	2720	26269	1628	105046
March, 2003	76762	2720	26767	1628	107877
March, 2004	77969	2720	29507	2488	112684
March, 2005	80902	2770	30942	3812	118426
March, 2006	82410	3360	32326	6191	124287
March, 2007	86015	3900	34654	7760	132329
March, 2008	91907	4120	35909	11125	143061
March, 2009	93725	4120	36878	13242	147965

March, 2010	102454	4560	36863	15521	159398
March, 2011	112824	4780	37567	18455	173626
March, 2012	131603	4780	38990	24504	199877
March, 2013	151531	4780	39491	27542	223344
March, 2014	168255	4780	40531	34988	248554
March, 2015	188898	5780	41267	38959	274904
March, 2016	210675	5780	42783	45924	305163
March, 2017	218330	6780	44478	57244	326833
March, 2018	222907	6780	45293	69022	344002

***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 North Eastern (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, 1342 MW (above 25 MW capacity) have been harnessed so far while projects amounting to 2854 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*	*375*	*0*
Nagaland	*1574*	*1452*	*75*	*0*
Ar. Pradesh	*50328*	*50064*	*405*	*2854*
Mizoram	*2196*	*2131*	*60*	*0*
Total(NER):	***58971***	***58356***	***1342***	***2854***

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*	*95*
Nagaland	*186*	*0*	*0*	*0*	*0*	*1191*
Ar. Pradesh	*16952*	*0*	*6329*	*3707*	*9462*	*10355*
Mizoram	*0*	*0*	*0*	*0*	*0*	*2071*
Total(NER)	***17594***	***85***	***6599***	***3917***	***10082***	***15883***

11.2 Survey & Investigation(S&I) 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 (DPR). 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 are as under :

S. No.	Name of Project	Basin	Agency	State	Present Status
1	Tawang-I (600 MW)	Tawang	NHPC	Arunachal Pradesh	Concurrence accorded by CEA on 10.10.2011. Environment clearance accorded on 10.06.2011. Forest clearance awaited.
2	Tawang-II (800 MW)	Tawang	NHPC	Arunachal Pradesh	Concurrence accorded by CEA on 22.09.2011. Environment clearance accorded on 10.06.2011. Stage-I Forest clearance accorded on 08.01.2014 and Stage-II Forest clearance awaited.
3	Nyamjungchu (780 MW)	Tawang	NJCHPL	Arunachal Pradesh	Concurrence accorded by CEA on 24.03.2011. Environment clearance accorded on 19.04.2012. Stage-I Forest clearance accorded on 09.04.2012 & Stage-II Forest clearance awaited.
4	Naying (1000 MW)	Siang	D.S. Construction Ltd	Arunachal Pradesh	Concurrence accorded by CEA on 11.09.2013. Environment & Forest clearance awaited. Impacted by Siang Basin Study.
5	Siang Lower (2700 MW)	Siang	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 16.02.2010. Environment & Forest clearance awaited. Impacted by Siang Basin Study.
6	Hirong (500 MW)	Siang	Jaiprakash Associates Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 10.04.2013. Environment & Forest clearance awaited. Impacted by Siang Basin Study.
7	Dibang (2880MW)	Dibang	NHPC	Arunachal Pradesh	Concurrence accorded by CEA on 18.09.2017. Environment clearance accorded on 19.05.15. Stage-I Forest clearance accorded on 15.04. Revised DPR with 10 m reduced dam height as recommended by MoEF being prepared by NHPC.
8	Kalai-II (1200 MW)	Lohit	Kalai Power Pvt. Ltd. (Reliance Power Ltd.)	Arunachal Pradesh	Concurrence accorded by CEA on 27.03.2015. Environment & Forest clearance awaited.
9	Demwe (Lower) (1750 MW)	Lohit	Athena Energy Venture (P) Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 20.11.2009. Environment clearance obtained in Feb., 2010. Stage-I & Stage-II Forest clearance accorded on 01.03.2012 & 03.05.2013 respectively. Case challenging Forest clearance has been filed with NGT.

10	Etalin (3097 MW)	Dibang	Jindal Power Ltd. (JV with HPDCAPL) - Etalin H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 12.07.2013. Environment & Forest clearance awaited.
11	Attunli (680 MW)	Dibang	Jindal Power Ltd. (JV with HPDCAPL) -Attunli H.E. Power Co. Ltd.	Arunachal Pradesh	Concurrence accorded by CEA on 15.03.2018. Both EC and FC are yet to be obtained by developer.
12	Subansiri Middle (Kamala) (1800 MW)	Subansiri	Kamala HECL (Jindal Power Ltd.)	Arunachal Pradesh	Returned on 29.01.2018. 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.
13	Hutong- II (1200 MW)	Lohit	Mountain Fall India Pvt. Ltd.	Arunachal Pradesh	DPR returned in May, 2012. DPR to be revised considering the project as Storage scheme.
14	Kalai-I (1352 MW)	Lohit	Mountain Fall India Pvt. Ltd.	Arunachal Pradesh	DPR returned in May, 2012. DPR to be revised considering the project as Storage scheme.
15	Demwe (Upper) (1080 MW)	Lohit	Athena Energy Venture (P) Ltd.	Arunachal Pradesh	DPR returned by CEA in March, 2015 for resubmission after finalization of dam type.
16	Oju (1878 MW)	Subansiri	Navayuga Engg. Co. Ltd.	Arunachal Pradesh	Under S&I.
17	Subansiri Upper (2000 MW)	Subansiri	KSK Energy Ventures Pvt. Ltd.	Arunachal Pradesh	Under S&I.
18	Bhareli-II (Kameng-II) (600 MW)		Mountain Falls Ltd.	Arunachal Pradesh	S&I held up.
19	Kameng Dam(600MW)		KSK Energy Ventures Ltd.	Arunachal Pradesh	S&I held up.
20	Naba (1000 MW)	Subansiri	Abir Infrastructure Pvt. Ltd.	Arunachal Pradesh	S&I held up.
21	Niare (800 MW)	Subansiri	Coastal Infrastructure Pvt. Ltd.	Arunachal Pradesh	S&I held up.
22	Dengser (552 MW)	Subansiri	Coastal Infrastructure Pvt. Ltd.	Arunachal Pradesh	S&I held up.

23	Nalo (635 MW)	Subansiri	Indus Hydro Power Pvt. Ltd.	Arunachal Pradesh	S&I held up.
24	Siang Upper St.I (6000 MW)	Siang	JV of NHPC & NEEPCO	Arunachal Pradesh	S&I held up.
25	Siang Upper St.II (3750 MW)	Siang	NEEPCO	Arunachal Pradesh	S&I held up.
26	Emini (500 MW)	Dibang	Emini Hydro Power Pvt. Ltd. (Reliance Energy Ltd.)	Arunachal Pradesh	S&I held up.
27	Kimi (535 MW)	Kameng		Arunachal Pradesh	Yet to be alloted.
28	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.
29	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, downstream of confluence of river Bichom with Kameng. The TEC was accorded by CEA on 11.10.1991. 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 (March 2015 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 almost completed. Erection of Radial Gates of Bichom Dam completed. All Units Boxed up. Leakage observed in penstocks during water filling. The

project is scheduled for commissioning in year 2018-19.

(ii) Pare HEP (2x55 = 110 MW), Arunachal Pradesh

The Pare H E Project is located in the Papum Pare District of Arunachal Pradesh on river Dikrong which is tributary of river Brahmaputra. The CEA concurrence was accorded on 24th Sept., 2007. The CCEA clearance was accorded on 4.12.2008 at an estimated cost of Rs. 573.99 crores. The project would generate annual energy of 506.42 GWh. The proposed revised cost of the project is Rs. 1337.76 crores (January, 2016 price level).

The project envisages construction of concrete gravity Dam, HRT, diversion tunnel and surface power house having Vertical Francis turbine for 2 units of 55 MW each.

Civil works have been awarded on 31.8.2009 to M/s H.C.C. HM works have been awarded to M/s Precision Infratech Ltd, Ahmedabad and EM work has been awarded to M/s Andritz Hydro Pvt. Ltd. & M/s Areva T&D India Ltd.

All major Civil works related to commissioning of project almost completed. Erection of Radial Gates of Dam (2 nos.) is in progress. One gate erected. All Units Boxed up. Leakage observed in Diversion Tunnel during water filling.

The project is scheduled for commissioning in year 2018-19.

(A) NHPC Projects (Hydro)

(I) Subansiri Lower HEP (8x250 = 2000 MW), Arunachal Pradesh

The project is located in the districts of 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. 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) was constituted vide MoP's OM dated 13.01.2015. 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 Jan / Feb'2016.

Matter related to Subansiri Lower HEP was being heard by Hon'ble National Green Tribunal (NGT), Kolkata. The 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 13.01.2005. 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."

Subsequently, MoEF&CC has constituted a Committee consisting of three expert members vide order dated 27.11.2017. The Committee has to give its report within 3 months from date of issue of order. The Committee held its first meeting on 21.12.2017 and 22.12.2017 at New Delhi with NHPC and members of POC of Govt. of India and second meeting on 16.01.2018 at New Delhi with representatives from CEA, CWC, GSI & CSMRS.

In the meantime, the Applicant (Sh. Aabhijeet Sharma) raised objection in NGT, Kolkata on the constitution of committee by Ministry of Environment, Forest & Climate Change (MoEF &CC). The matter was heard by NGT, Kolkata on 10.01.2018.

NGT directed the MoEF to consider those objections and place on record their contention on the wisdom in the continuing with the committee and directed to file an affidavit before next date of hearing.

Signing of MOA with Govt. of Assam is still pending. 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 commissioning in year 2022-23 (Subject to re-start of works).

11.4.2 Private Sector Projects

(I) Gongri HEP (2x72 = 144 MW), Arunachal Pradesh, M/s Dirang Energy Pvt. Ltd.

Gongri H.E. Project is located in West Kameng District of Arunachal Pradesh. The project is under execution by M/s Dirang Energy Pvt. Ltd.(M/s DEPL). Estimated cost of the project is Rs. 1436.27 crores at May-2012 price level.

The Project envisages construction of a Barrage, Modified horseshoe type HRT, Surge Shaft, Pressure Shaft and a surface power house having Francis turbine for 2 units of 72MW each.

EPC contract for all works have been awarded to M/s Patel Engineering Ltd. in December, 2011. Works could be started only in May/June, 2014 after obtaining consent to establish from State Pollution Control Board in May, 2014.
Civil works of barrage & Power house were in progress. Construction works stalled since October, 2016 due to fund constraints with the developer.

The project is likely to be commissioned in year 2021-22 (subject to restart of works).

11.5 Status of Various Hydro Power Projects in North-Eastern Region Appraised by CEA

11.5.1 Central Sector Projects

(A) Sanctioned Projects

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

Kameng H.E. Project was accorded TEC by CEA on 30.04.1991. The CCEA clearance was accorded on 02.12.2004. The approved cost of the project is Rs. 2496.90 crores (at March, 2004 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.

Revised cost estimates at March, 2015 price level submitted by NEEPCO was vetted by CEA amounting to Rs. 4724.67 crores as Hard Cost and Total Cost as Rs. 6179.96 crores vide CEA letter dated 18.03.2016.

(ii) 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 Present day Hard cost of Rs. 877.06 Crs 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 14.1.2011 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 Crs. (iii) Subordinate loan from Govt. of India amounting to Rs. 291.96 Crs. and (iv) Grant from DoNER amounting to Rs.300 Crs.

Revised cost estimates of the project at December, 2014 price level submitted by NEEPCO was vetted by CEA vide letter dated 19.02.2016 amounting to Rs.1294.75 crores as Hard Cost.

Revised cost estimates at December, 2015 price level submitted by NEEPCO was vetted by CEA amounting to Rs. 1263.33 crores as Hard Cost vide CEA letter dated 20.01.2017.

(iii) Pare HEP(2x55=110MW), Arunachal Pradesh, NEEPCO.

Pare HEP was accorded concurrence by CEA on 24th Sept. 2007 for an estimated present day 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 4.12.2008 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.

Revised cost estimates at December, 2014 price level submitted by NEEPCO was vetted by CEA vide letter dated 30.10.2015 amounting to Rs. 1163.02 crores as Hard Cost and Total Cost as Rs. 1262.27 crores vide letter dated 28.12.2015.

Revised cost estimates at January,2016 price level submitted by NEEPCO was vetted by CEA vide letter dated 26.09.2016 amounting to Rs. 1192.00 crores as Hard Cost and Total Cost as Rs. 1337.76 crores vide letter dated 30.11.2016.

(iv) 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 Rs. 705.58 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.

After CCEA approval the project was taken up for construction however, construction works of project works are stopped since December, 2011 due to agitation by various activists fearing dam safety and downstream impacts of dam. Case in Hon'ble NGT, Kolkata Bench. Likely commissioning of the project is 4 years after restart of works.

Memorandum of Changes (MoC) has been approved by CEA on dated 15.03.2018. Revised cost estimates at April,2017 price level has been taken up for examination on 21.03.2018.

(B) CEA concurred Projects, yet to be taken under construction.

(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 at an estimated cost of Rs.78.62 crores including IDC of Rs.46.95 crores (April 1999 price level). The environmental clearance was granted by MoEF on 4.2.99 and forest clearance on 3.1.97.

The project is now proposed to be executed by a Joint Venture between NHPC and Government of Manipur with revised capacity of 66 MW. CEA accorded concurrence on 15.11.2006 to the revised proposal with reduced capacity of 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. The "Loktak Downstream Hydroelectric Corporation Limited (LDHCL)" has also been incorporated on 23.10.2009.

Concurrence was transferred from NHPC to LDHCL on 06.08.2012. The validity of concurrence was extended by CEA upto 14.11.14 vide letter dated 24.01.13

Environment clearance was accorded by MOEF on 16.01.2013. In- principle forest clearance stage-I was accorded by MOEF on dated 03.03.11 and Forest clearance Stage-II accorded on 22.12.2014.

The revised DPR was submitted on 25.3.2015 for fresh concurrence. The DPR 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 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 = 2880 MW) – Arunachal Pradesh

Dibang MPP was accorded concurrence by CEA with IC of 3000 MW on 23.1.2008. The estimated present day cost of the project at Nov., 2007 price level including IDC and FC without provision for external roads and bridges is Rs.15886.39 crores and with external roads and bridges is Rs. 16425.65 crores.

E&F clearance: Environment clearance was accorded on19.5.2015.

MoEF & CC accorded Forest Clearance Stage – I on 15.4.2015, with reduction of Dam height by 10 m in order to reduce the submergence area. FAC has recommended the proposal with 10 m reduction in Dam height, necessitating fresh DPR and fresh TEC by CEA.

The fresh DPR was submitted by NHPC in September,2016. The DPR has been concurred by CEA on 18.09.2017 at estimated present day cost of Rs. 25732.79 Crores (July, 2016 price level) including Power Component of Rs. 17510.84 Crs., Flood Moderation component Rs. 4627.8 Crs., IDC of Rs. 3557.22 Crs. and FC of Rs. 36.93 Crores.

11.5.2 State Sector – CEA concurred Projects, yet to be taken under construction.

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

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

EC & FC are yet to be obtained.

11.5.3 Private Sector- CEA concurred Projects, yet to be taken under construction.

i) Demwe Lower HE Project (5x342 + 1x40=1750 MW), Arunachal Pradesh by M/s ADPL

Demwe Lower HE Project was accorded concurrence by CEA on 20.11.2009 for an estimated cost of Rs. 13144.91 Crores (Completion Cost).

MoEF 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).

EC & FC yet to be obtained. TOR was approved for IC of 2700 MW on 03.08.10. Public hearing could not be conducted due to local protest.

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 has accorded environmental clearance to the project on 23.7.2012. Forest clearance (Stage-I) was accorded by MoEF on 7th Feb, 2012. FC Stage – II is awaited.

iv) Nafra H.E. Project (2x60=120 MW) - Arunachal Pradesh by M/s SEW Nafra Power Corporation Private Limited

Nafra H.E. Project was accorded concurrence by CEA on 11th 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.

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 accorded environmental clearance on 19.04.2012. Forest clearance (Stage-I) was accorded by MoEF on 9.4.2012. Stage – II clearance awaited

vi) Tato-II H.E Project (4x175= 700MW) in Arunachal Pradesh by M/s THPPL

Tato-II H.E. Project was accorded concurrence by CEA on 22nd May, 2012 at an Estimated completed cost of Rs. 5616.20 Crores.

MoEF accorded environmental clearance on 27.6.2011. Forest clearance Stage-I is awaited.

vii) Hirong HE Project (4x125=500 MW) in Arunachal Pradesh by M/s JAPL

Hirong H.E. Project was accorded concurrence by CEA on 10th April , 2013 at an estimated completed cost of Rs. 5532.63 Crores. EC & FC are yet to be obtained.

viii) Etalin HE Project (10x307 +1x9.6 + 1x7.4 = 3097 MW) in Arunachal Pradesh by M/s EHEPCL

Etalin H.E. Project was accorded concurrence by CEA on 12th July , 2013 at an Estimated completed cost of Rs. 25296.95 Crores.

EC recommended by EAC on 31.01.17. Letter will be issued after FC-I. FC-I & FC-II yet to be obtained.

ix) Talong Londa HE Project (3x75 = 225 MW) in Arunachal Pradesh by GMR

Talong Londa H.E. Project was accorded concurrence by CEA on 16th Aug , 2013 at an estimated completed cost of Rs. 2172.88 Crores.

EC accorded on 07.08.2015. FC-I & FC-II yet to be obtained.

x) Naying HE Project (4x250 =1000 MW) in Arunachal Pradesh by NDSCPL

Naying H.E. Project was accorded concurrence by CEA on 11th Sept , 2013 at an estimated completed cost of Rs. 9301.11 Crores.
EC & FC yet to be obtained.

xi) Siyom HE Project (6x166.67=1000 MW) in Arunachal Pradesh by SHPPL

Siyom H.E. Project was accorded concurrence by CEA on 17th Dec , 2013 at an estimated completed cost of Rs. 12100.00 Crores.

EC accorded on 31.01.08. FC yet to be obtained.

xii) Kalai–II HE Project (6x200=1200 MW) in Arunachal Pradesh by KPPL

Kalai – II H.E. Project was accorded concurrence by CEA on 27th March , 2015 at an estimated completed cost of Rs. 14199.64 Crores.

EC has been accorded on 20.05.2015. FC-I&II are yet to be obtained.

xiii) Kynshi–I HE Project (2x135=270 MW) in Meghalya by M/s AKPPL

Kynshi –I H.E. Project was accorded

concurrence by CEA on 31st March, 2015 at an estimated completed cost of Rs. 3154.37 Crores.
EC & FC 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. FC-I accorded on 27.10.15. FC-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. FC-I accorded on 27.10.15. FC-II yet to be obtained.

xvi) Attunli HE Project (4x170 = 680 MW) 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.

EC & FC yet to be obtained.

11.6 Thermal Power Development Activities in North Eastern Region - Proposed Thermal Power Projects in North Eastern Region

The following thermal schemes are proposed in North Eastern region:

(i) Margherita TPP – 2x800 MW by M/s. APGCL in Assam

M/s. Assam Power Generation Corporation (APGCL) has a proposal to set up a 2x800 MW Thermal Power Project at Margherita in Assam. DPR for the project is under preparation and coal linkage is yet to be tied-up.

(ii) Amguri TPP - 100 MW by M/s. APGCL in Assam

M/s APGCL had a proposal to set up a Gas Based Thermal Power Plant in Assam. Implementation of this proposed 100MW Gas Based Power Project is stalled due to fuel tie up issues. M/s APGCL has now initiated setting up of 80 MW Solar Power Park at the available land under their possession. However, 30 Acres of land is kept reserved for development of the Gas Based Power Project

11.7 Development of Transmission System in N.E. Region

11.7.1 Examination of Detailed Project Reports (DPRs) for transmission system of Hydro Power Projects as part of concurrence by CEA

Following DPRs were examined

I) Attunli HEP (680 MW) in Arunachal Pradesh by M/s Attunli Hydro Electric Power Company Limited

ii) Tagurshit HEP (3x24.67=74MW) in Arunachal Pradesh by M/s L&T Arunachal Hydropower Lmited

iii) Dibang Multipurpose Project in Arunachal Pradesh (12x240W) by NHPC

iv) Umngot HEP (210 MW) in Meghalaya by MEPGCL

v) Mago Chu (3x32=96 MW) HEP , in Arunachal Pradesh by M/s SEW Mago Chu Power Corporation Limited

11.7.2 Grant of prior approval of

Government to transmission proposals under Section 68 of Electricity Act, 2003 during 2017-18.

- North Eastern Region Strengthening Scheme (NERSS-VI) (Modified)

11.7.3 Grant of authorization to transmission proposals for Section 164 of Electricity Act, 2003 during 2017-18.

- To M/s Kohima - Mariani Transmission Limited (KMTL) for "North Eastern Region Strengthening Scheme (NERSS-VI)

11.8 Hydro Power Generation Performance

Hydro Power generation in the North Eastern Region during the year 2017-18 was 5666.08 MU against a target of 5401 MU, which is 4.91 % more.

11.9 R&M Schemes (Hydro) of North Eastern Region

Eleven (11) existing hydro schemes of North Eastern Region with an aggregate installed capacity of 539 MW have been identified for R&M works to accrue a benefit of 292 MW. The R&M activities of eight (8) schemes have already been completed at an actual expenditure of about Rs. 277 Crores to accrue a benefit of 121 MW. The remaining three (3) schemes having an aggregate installed capacity of 180 MW are under various stages of implementation and are likely to accrue a benefit of 171 MW at an estimated cost of about Rs. 663 Crores. The scheme-wise status of the R&M works of the hydro schemes of North Eastern Region **as on 31.03.2018** is given hereunder :

S. No.	Name of Scheme, Agency, State	Installed Cap.(MW)	Actual Cost (Rs. Crs.)	Benefits (MW)	Status
A.	**Schemes Completed**				
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)	18.55	15(Res.)	R&M works completed in 2011-12
6.	Umium St.II, MePGCL, Meghalaya	2x9	90.46	18(LE) + 2 (U)	R&M works completed in 2011-12
7.	Kopili, NEEPCO, Assam	2x50	50.92	-	R&M works completed in 2014-15
8.	Khandong, NEEPCO, Assam	1x25	29.18	25(LE)	R&M works completed in 2014-15
	Sub Total(A):	**359**	**294.79**	**121**	
B.	**Ongoing – Under Implementation**				
9.	Kyrdemkulai (Umium St.III), MePGCL, Meghalaya	2x30	344	60(LE) + 6(U)	DPR for life extension is under preparation. R&M works planned for completion in 2021-22

10.	Gumti, TPGL, Tripura	3x5	58.61	-	DPR for life extension is under preparation. R&M works planned for completion in 2021-22
11.	Loktak, NHPC, Manipur	3x35	260.47	105 (LE)	DPR for life extension is under examination. R&M works planned for completion in 2022-23.
	Sub Total(B):	**180**	**663.08**	**171**	
	Total(A+B):	**539**	**957.87**	**292**	

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

11.10 Installed Capacity in the N.E. Region

The total installed capacity in the Region as on 31.03.2018 is as under:

Sector	Installed Capacity (MW)
Hydro	1342.00
Thermal	2292.07
RES	282.56
Nuclear	-
Total	**3916.63**

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 of an organization and the same is required to be developed to produce a quality product/ service at a reasonable price. To attain this objective, the technical, managerial and behavioral competencies of the human resources are developed and enhanced through training. Keeping this objective in view, HRD Division, CEA has been organizing various training programmes in technical, managerial, IT, health and other areas to keep the personnel abreast of the latest technological breakthrough and bringing about attitudinal changes in consonance with the need of rapidly changing era of globalization. HRD Division has also been making efforts to keep stock of the infrastructure available for the development of human resources in the power sector. CEA has been following up with the utilities/ organizations on the status of implementation of the National Training Policy for the power sector. To fulfill its statutory duty under Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations 2010, CEA has been sending teams to power sector institutes for their evaluation in terms of infrastructure, utilization & 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.

It has been the endeavor of CEA management to impart at least one-week training annually to each employee of CEA.

12.2 Preparation of Training Policy/ Cadre Training Policy for Central Power Engineering Service (CPES) officers of CEA

Training Policy for technical Group A & B officers of CEA is being prepared in line with the draft National Training Policy for Power Sector. This Policy broadly covers the training needs as well as field exposure for officers of all levels in the Central Electricity Authority (CEA). The objective of this training programme is to enable officers of CEA to sharpen their skills and improve their effectiveness in discharging the tasks and responsibilities, covering the following broad areas :

- Providing practical exposure to the officers in the area of the power sector construction, operation & maintenance (O&M) for further enhancing the technical competencies.
- Enabling the officers to draw plan, advise and monitor power sector projects with the strong background knowledge/experience of the sector.
- Enhancing the managerial competencies of the officers.
- Familiarizing the officers with the best practices in the application of advanced technologies.

12.3 Induction Training programme

Induction Training programme has been organized for the 30 nos. Assistant Directors of the CEA during the year 2017-18. This training programme was conducted for 34 weeks from January,2018 to August, 2018. Under this training programme the officers have undergone classroom training at National Power Training Institute, Faridabad,

On-Job Training at various organizations like NTPC Dadri, BBMB Nangal, PGCIL Agra, etc. and plant visits to Thermal, Hydel, Solar & Wind power plants and power distribution sub-stations etc. This training has given the officers an immense theoretical and practical exposure to the latest technology and trends in the power sector.

12.4 Refresher Training programme

Various refresher training programmes for CEA officers were conducted at professional institutes of national and international repute like CBIP, ISTM, CIGRE and ESCI.

The officers/officials were deputed for various in-service refresher training programmes, technical courses, workshops, seminars, conferences etc., at ISTM, CBIP, NPTI, ESCI, CIGRE, CPU, IEEE etc**.**

The Man-days for all programmes conducted in 2017-18 were 669.

12.5 In-house training programme-

Presentations were given by various industries/ organizations to keep the CEA officers abreast of latest technologies. The details are as under -

1. Presentation on "Technology Innovations taking place in the Transmission sector (Including global best practices)" by M/s. Sterlite Power Transmission Limited in October 2017
2. Presentation on "Use of Vibration Recorder to counter Aeolian vibration on transmission lines" by M/s. Telegence Powercomm Pvt. Ltd in November 2017**.**
3. Presentation on "Solutions for Remote Monitoring of Energy Meters" by M/s. Wise Things Solutions Pvt. Ltd., in November-2017.
4. Presentation on "New Technology AdvX^{TM} – for Air Preheaters – in Thermal Power Plants" by M/s LJUNSTRÖM., in November 2016.
5. Presentation on "Anticorrosion/ erosion resistant coating of absorbers, ducts, chimney etc. in Flue Gas Desulphurization in Thermal Power Plants" by M/s Arudra Engineers Pvt Ltd., in February 2018.
6. Presentation on "Floating Solar Technology – an innovation" by M/s Yellow Tropus Pvt. Ltd., in February 2018.
7. Presentation on "On-line condition monitoring of Hydro Power Generating Systems" by M/s Logic Plus Plus India Pvt. Ltd., in February 2018.
8. Presentation on "Implementation of Smart Security Seals and Software as a Service for Power Sector" by M/s Secure Seals Pvt Ltd., in March 2018.

12.6 Foreign Visits/Training programmes for CEA Officers

Foreign training programmes were planned, processed and conducted during the year 2017 -18 for CEA engineers to give them exposure to technological trends/ bench marking followed in developed countries. A total of 38 nos. officers of CEA at various levels visited foreign nations and the details of officers who visited foreign countries during the year 2017 -18 are given in **Annexure 12A**.

12.7 Training Under Apprentice Act, 2015

17 Graduate (Engineering), and 2 Diploma apprentices have undergone training in CEA under the Apprentice Act, 2015 during the year 2017-18.

12.8 Recognition of Training Institutes

For ensuring the development of the training infrastructure in the Power Sector and the implementation of statutory requirements of training as per Central Electricity Authority (Measures relating to the Safety and Electric Supply) Regulations 2010, Power Training Institutes/Centres of various SEBs/Utilities are visited by CEA officers, appraised, graded and then issued recognition on meeting the prescribed norms. The following seven (7) nos. Training Institutes/Centres were inspected and recommended for recognition/ renewal of recognition to Ministry of Power during the year 2017-18:

S.No	Name of the Institute/Centre
1.	Distribution Training Institute, CESC, Kolkata
2.	Regional Training Centre, MSETCL, Padhge, Maharastra
3.	Power Generating Training Institute, Korba TPS, Chattisgarh SEB, Korba (East) Chhatisgarh
4.	Regional Training Centre, MSETCL, Bableshwar, Maharashtra
5.	Rosa Learning and Development Centre, Shahjahanpur, UP
6.	MERC Training Academy, Chennai
7.	Swami Vivekananda Institute of Power Training and Applied Science Research, Pokhariput, Odisha

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Annexure 2A

Plant-wise details of the Coal receipt and consumption during 2017-18

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
Northern									
1	ANPARA C TPS	1200	4899	0	1	0	0	4900	5051
2	ANPARA TPS	2630	11332	0	0	0	0	11332	11297
3	BADARPUR TPS	705	1103	0	0	0	0	1103	1129
4	BARKHERA TPS	90	99	0	0	0	0	99	154
5	CHHABRA TPP	1660	1356	2994	0	0	0	4350	3736
6	DADRI (NCTPP)	1820	6156	0	0	0	0	6156	6568
7	GH TPS (LEH.MOH.)	920	1494	0	0	0	0	1494	1795
8	GND TPS(BHATINDA)	440	123	0	0	0	0	123	174
9	GOINDWAL SAHIB TPP	540	151	0	740	0	0	891	931
10	HARDUAGANJ TPS	605	2088	0	0	0	0	2088	2354
11	INDIRA GANDHI STPP	1500	4630	0	0	0	0	4630	5073
12	KALISINDH TPS	1200	191	3501	0	0	0	3692	3788
13	KAWAI TPS	1320	80	0	637	1662	0	2379	2562
14	KHAMBARKHERA TPS	90	91	0	0	0	0	91	147
15	KOTA TPS	1240	4163	336	0	0	0	4499	4935
16	KUNDARKI TPS	90	112	0	0	0	0	112	145
17	LALITPUR TPS	1980	0	0	5311	0	0	5311	5213
18	MAHATMA GANDHI TPS	1320	3619	0	0	0	0	3619	4400

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
19	MAQSOODPUR TPS	90	85	0	0	0	0	85	138
20	OBRA TPS	1188	3498	0	0	0	0	3498	3283
21	PANIPAT TPS	920	1287	0	0	0	0	1287	1714
22	PANKI TPS	210	175	0	0	0	0	175	305
23	PARICHHA TPS	1140	4178	0	0	0	0	4178	4324
24	PRAYAGRAJ TPP	1980	3154	0	620	0	0	3774	3583
25	RAJGHAT TPS	135	0	0	0	0	0	0	0
26	RAJIV GANDHI TPS	1200	2720	0	0	0	0	2720	3216
27	RAJPURA TPP	1400	4128	0	0	514	0	4642	4714
28	RIHAND STPS	3000	14363	0	0	0	0	14363	14336
29	ROPAR TPS	1260	1120	0	0	0	1	1121	1522
30	ROSA TPP Ph-I	1200	3877	0	256	0	0	4133	4848
31	SINGRAULI STPS	2000	10034	0	0	0	0	10034	10033
32	SURATGARH TPS	1500	2596	132	0	0	0	2728	3059
33	TALWANDI SABO TPP	1980	4748	0	0	826	0	5574	5830
34	TANDA TPS	440	1820	0	0	0	0	1820	2108
35	UNCHAHAR TPS	1550	4277	0	410	0	0	4687	4706
36	UTRAULA TPS	90	118	0	0	0	0	118	150
37	YAMUNA NAGAR TPS	600	1816	0	0	0	0	1816	2292
Total of Northern		**41233**	**105681**	**6963**	**7975**	**3002**	**1**	**123622**	**129613**

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
Western									
38	AKALTARA TPS	1200	0	0	2758	35	161	2954	3623
39	AMARAVATI TPS	1350	2689	0	0	108	0	2797	2837
40	AMARKANTAK EXT TPS	210	985	0	0	0	0	985	957
41	ANUPPUR TPP	1200	4020	0	31	0	0	4051	4175
42	AVANTHA BHANDAR	600	106	0	508	0	0	614	433
43	BALCO TPS	600	973	0	644	0	0	1617	1640
44	BANDAKHAR TPP	300	926	0	689	0	74	1689	1688
45	BARADARHA TPS	1200	1770	0	2923	0	0	4693	4649
46	BHILAI TPS	500	2249	0	0	0	0	2249	2322
47	BHUSAWAL TPS	1210	5085	0	0	0	0	5085	5106
48	BINA TPS	500	1226	0	246	0	0	1472	1597
49	BUTIBORI TPP	600	1266	0	655	83	0	2004	2065
50	CHANDRAPUR(MAHARASHTRA) STPS	2920	9890	0	557	0	0	10447	10657
51	DAHANU TPS	500	1649	0	0	434	0	2083	2170
52	DHARIWAL TPP	600	1064	0	220	0	0	1284	1319
53	DSPM TPS	500	2446	0	0	0	0	2446	2549
54	GANDHI NAGAR TPS	630	2122	0	0	208	0	2330	2493
55	GMR WARORA TPS	600	1625	0	586	0	0	2211	2274
56	JSW RATNAGIRI TPP	1200	0	0	0	2535	0	2535	2862

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
57	KHAPARKHEDA TPS	1340	4943	0	0	0	0	4943	5235
58	KORADI TPS	2400	6580	0	0	0	0	6580	6895
59	KORBA-II	440	1772	0	0	0	0	1772	1730
60	KORBA STPS	2600	12928	0	0	0	0	12928	13111
61	KORBA-WEST TPS	1340	6447	0	0	0	0	6447	6505
62	MAHAN TPP	600	0	0	1872	0	0	1872	1921
63	MARWA TPS	1000	3831	0	0	0	0	3831	3726
64	MAUDA TPS	2320	4659	0	909	0	0	5568	5655
65	MUNDRA TPS	4620	0	0	0	10966	0	10966	11196
66	MUNDRA UMTPP	4000	0	0	0	11138	0	11138	10799
67	NASIK TPS	630	2211	0	0	0	0	2211	2288
68	NAWAPARA TPP	600	1032	0	1075	0	36	2143	2204
69	NIGRI TPP	1320	0	2799	1573	0	0	4372	4437
70	OP JINDAL TPS	1000	0	0	3111	0	0	3111	3175
71	PARAS TPS	500	2177	0	0	0	0	2177	2293
72	PARLI TPS	1170	2149	0	0	0	0	2149	2231
73	PATHADI TPP	600	2188	0	449	0	0	2637	2605
74	RAIKHEDA TPP	1370	342	276	227	0	0	845	877
75	SABARMATI (C STATION)	422	1042	0	0	426	0	1468	1532
76	SALAYA TPP	1200	0	0	0	1169	0	1169	1286

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
77	SANJAY GANDHI TPS	1340	5127	0	0	0	0	5127	5143
78	SASAN UMTPP	3960	0	18130	0	0	0	18130	17983
79	SATPURA TPS	1330	3273	0	0	0	0	3273	3561
80	SEIONI TPP	600	892	0	155	0	0	1047	1055
81	SHRI SINGHAJI TPP	1200	2605	0	0	0	0	2605	2604
82	SIKKA REP. TPS	500	0	0	0	1325	0	1325	1335
83	SIPAT STPS	2980	13923	0	0	0	0	13923	14055
84	SOLAPUR	660	606	55	93	0	0	754	776
85	TAMNAR TPP	2400	2678	0	2384	59	0	5121	5132
86	TIRORA TPS	3300	8936	0	811	1233	0	10980	11007
87	TROMBAY TPS	1250	0	0	0	2485	0	2485	2452
88	UCHPINDA TPP	1080	183	0	0	0	0	183	186
89	UKAI TPS	1110	3698	0	0	394	0	4092	4285
90	VINDHYACHAL STPS	4760	25025	0	0	0	0	25025	24489
91	WANAKBORI TPS	1470	4099	0	0	211	0	4310	5077
92	WARDHA WARORA TPP	540	738	0	79	0	0	817	786
Total of Western		**74372**	**164175**	**21260**	**22555**	**32809**	**271**	**241070**	**245043**

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
Southern									
93	BELLARY TPS	1700	2380	0	0	0	0	2380	2460
94	DAMODARAM SANJEEVAIAH TPS	1600	2490	0	0	379	0	2869	2921
95	Dr. N.TATA RAO TPS	1760	8164	0	0	0	0	8164	8536
96	ENNORE TPS	900	0	0	0	0	0	0	0
97	ITPCL TPP	1200	0	0	0	3013	0	3013	3114
98	KAKATIYA TPS	1100	4142	0	0	0	0	4142	4561
99	KOTHAGUDEM TPS	720	4375	0	0	0	0	4375	4077
100	KOTHAGUDEM TPS (NEW)	1000	5532	0	0	0	0	5532	5321
101	KUDGI STPP	1600	2046	125	0	0	0	2171	2124
102	METTUR TPS	840	3365	0	0	300	0	3665	3680
103	METTUR TPS - II	600	1384	0	0	229	0	1613	1577
104	MUTHIARA TPP	1200	0	0	0	2386	0	2386	2430
105	NORTH CHENNAI TPS	1830	6557	0	0	891	0	7448	7469
106	PAINAMPURAM TPP	1320	2466	0	0	2866	0	5332	5281
107	RAICHUR TPS	1720	7363	0	0	0	0	7363	6932
108	RAMAGUNDEM - B TPS	63	108	0	0	0	0	108	339
109	RAMAGUNDEM STPS	2600	12025	0	0	0	0	12025	11906
110	RAYALASEEMA TPS	1050	4888	0	0	0	0	4888	4992
111	SGPL TPP	1320	0	0	4	4304	0	4308	4183

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
112	SIMHADRI	2000	8417	0	0	0	0	8417	8642
113	SIMHAPURI TPS	600	0	0	0	70	0	70	13
114	SINGARENI TPP	1200	5931	0	0	0	0	5931	5743
115	THAMMINAPATNAM TPS	300	0	0	0	359	0	359	396
116	TORANGALLU TPS(SBU-I)	260	0	0	0	354	0	354	354
117	TORANGALLU TPS(SBU-II)	600	0	0	0	1076	0	1076	1044
118	TUTICORIN (JV) TPP	1000	3082	0	0	432	0	3514	3529
119	TUTICORIN TPS	1050	3228	0	0	293	0	3521	4060
120	UDUPI TPP	1200	0	0	0	2493	0	2493	2613
121	VALLUR TPP	1500	5252	0	0	303	0	5555	5221
122	VIZAG TPP	1040	2621	0	0	85	0	2706	2618
123	YERMARUS TPP	1600	608	0	0	0	0	608	559
Total of Southern		**36473**	**96424**	**125**	**4**	**19833**	**0**	**116386**	**116695**
Eastern									
124	BAKRESWAR TPS	1050	3945	0	370	7	0	4322	4336
125	BANDEL TPS	450	1222	0	46	0	0	1268	1421
126	BARAUNI TPS	210	0	0	0	0	0	0	0
127	BARH II	1320	3898	1981	0	17	0	5896	5995
128	BOKARO `B` TPS	710	1994	0	0	0	0	1994	2038
129	BUDGE BUDGE TPS	750	1514	1230	738	18	0	3500	3586

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
130	CHANDRAPURA(DVC) TPS	630	2108	0	0	0	0	2108	2417
131	DERANG TPP	1200	844	0	2354	0	0	3198	2972
132	D.P.L. TPS	660	1530	0	0	0	0	1530	1585
133	DURGAPUR STEEL TPS	1000	4151	0	0	0	0	4151	4088
134	DURGAPUR TPS	210	643	0	0	0	0	643	656
135	FARAKKA STPS	2100	8186	0	0	301	0	8487	8803
136	HALDIA TPP	600	2482	0	372	78	0	2932	3065
137	IB VALLEY TPS	420	2584	0	0	0	0	2584	2588
138	JOJOBERA TPS	240	0	0	75	0	681	756	782
139	KAHALGAON TPS	2340	12401	0	0	0	0	12401	12485
140	KAMALANGA TPS	1050	2257	0	1163	344	162	3926	3926
141	KODARMA TPP	1000	3320	0	0	0	0	3320	3493
142	KOLAGHAT TPS	1260	3085	0	230	0	0	3315	3747
143	MAHADEV PRASAD STPP	540	0	0	1842	0	0	1842	1961
144	MAITHON RB TPP	1050	3803	0	408	0	0	4211	4218
145	MEJIA TPS	2340	7879	0	0	0	0	7879	7933
146	MUZAFFARPUR TPS	610	1312	0	0	0	0	1312	1401
147	PATRATU TPS	770	0	0	0	0	0	0	0
148	NABI NAGAR TPP	500	606	0	0	0	0	606	599
149	RAGHUNATHPUR TPP	1200	1162	0	260	0	0	1422	1422

Region	Name of the Plant	Capacity (MW)	Receipt					Total Receipt	Total Consumption
			CIL/SCCL	Captive	E-Auction	Import	Others		
150	SAGARDIGHI TPS	1600	3314	0	406	3	0	3723	3918
151	SANTALDIH TPS	500	1523	0	159	0	0	1682	1828
152	SOUTHERN REPL. TPS	135	201	0	7	0	0	208	211
153	STERLITE TPP	1200	1550	0	0	0	0	1550	1392
154	TALCHER (OLD) TPS	460	3070	0	0	0	0	3070	3150
155	TALCHER STPS	3000	18469	0	0	0	0	18469	18299
156	TENUGHAT TPS	420	743	0	0	0	0	743	1413
157	TITAGARH TPS	240	0	0	0	0	0	0	0
Total of Eastern Region		**31765**	**99796**	**3211**	**8430**	**768**	**843**	**113048**	**115728**
North Eastern			0	0	0	0	0	0	0
158	BONGAIGAON TPP	500	888	0	0	0	0	888	918
Total of North Eastern		**500**	**888**	**0**	**0**	**0**	**0**	**888**	**918**
Total All INDIA		**184343**	**466964**	**31559**	**38964**	**56412**	**1115**	**595014**	**607997**

ANNEXURE-3A
(Item no. 3.2)

Detail of the inter-regional capacity up to the end of 2017-18

(Transmission capacity in MW)

Detail of the inter-regional Transmission Lines	As on 31.03.2018
EAST-NORTH	
Dehri-Sahupuri 220 kV S/c	130
Muzaffarpur-Gorakhpur 400 kV D/c (with Series Cap+TCSC)	2,000
Patna – Balia 400kV D/c (Quad)	1,600
Biharshariff – Balia 400kV D/c(Quad)	1,600
Barh – Balia 400kV D/c (Quad)	1,600
Gaya - Balia 765kV S/c	2,100
Sasaram-Allahabad/Varanasi 400kV D/C line (Sasaram HVDC back to back has been bypassed)	1,000
Sasaram - Fatehpur 765kV2x S/c	4,200
Barh-II-Gorakhpur 400kV D/c (Quad) line	1,600
Gaya-Varanasi 765 kV S/c line	2,100
LILO of Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole at new pooling station in Alipurduar and addition of second 3000 MW module	3,000
Biharsharif-Varanasi 400kV D/c line (Quad)	1,600
Sub-total	**22,530**
EAST-WEST	
Budhipadar-Korba 220 kV 3 ckts.	390
Rourkela-Raipur 400 kV D/c with series comp.+TCSC	1,400
Ranchi –Sipat 400 kV D/c with series comp.	1,200
Rourkela-Raipur 400 kV D/c (2^{nd}) with series comp.	1,400
Ranchi - Dharamjayagarh - WR Pooiling Station 765kV S/c line	2,100
Ranchi - Dharamjaygarh 765kV 2nd S/c	2,100
Jharsuguda-Dharamjaygarh 765kV D/c line	4,200
Sub-total	**12,790**
WEST- NORTH	
Auriya-Malanpur 220 KV D/c	260
Kota - Ujjain 220 KV D/c	260

Detail of the inter-regional Transmission Lines	As on 31.03.2018
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
Sub-total	**25,320**
EAST- SOUTH	
Balimela-Upper Sileru 220kV S/c	130
Gazuwaka HVDC back-to-back	1,000
Talcher-Kolar HVDC bipole	2,000
Upgradation of Talcher-Kolar HVDC Bipole	500
Angul - Srikakulum	4,200
Sub-total	**7,830**
WEST- SOUTH	
Chandrapur HVDC back-to-back	1,000
Kolhapur-Belgaum 220kV D/c	260
Ponda – Nagajhari 220kV D/c	260
Raichur - Sholapur 765kV S/c line (PG)	2,100
Raichur - Sholapur 765kV S/c line (Pvt. Sector)	2,100
Narendra - Kolhapur 765kV D/c (ch at 400kV)	2,200
Wardha - Hyderabad 765kV D/c line	4,200
Sub-total	**12,120**
EAST- NORTH EAST	
Birpara-Salakati 220kV D/c	260
Malda - Bongaigaon 400 kV D/c	1,000
Siliguri - Bongaigaon 400 kV D/c (Quad) line	1,600
Sub-total	**2,860**
NORTH EAST-NORTH	
Biswanath Chariali - Agra +/- 800 kV, 3000 MW HVDC Bi-pole	3000
Sub-total	**3,000**
TOTAL	**86,450**

ANNEXURE-3B
(Item no. 3.3.2)

ISSUES PERTAINING TO TRANSMISSION SYSTEM PLANNING TAKEN UP DURING 2017-18

A. 39th Standing Committee Meeting on Power System Planning in Northern Region.

1. Review of intra state transmission scheme for evacuation of power from western part of Rajasthan.
2. Delinking of up-gradation of Tehri Pooling Station–Meerut 765kV 2xS/c lines (operated at 400 kV) at its rated voltage with the commissioning of Tehri PSS generation scheme.
3. Two number of 132kV bays at PGCIL's Balia (765) S/S.
4. Requirement of 1 (one) no. additional 220kV bay at 400/220kV substation at Roorkee (Puhana), POWERGRID.
5. Requirement of 2 (two) nos. of additional 220kV bay at 400/220kV S/s at Patran.
6. Requirement of 4 nos. of 220kV bays and augmentation by 1x500MVA, 400/220kV transformer at 400kV Substation at Sonepat (Jajji), POWERGRID.
7. 220kV bays at Prithla 400/220kV sub-station being implemented through TBCB route.
8. Two nos. of 220kV bays at 400/220kV substation Abdullapur (PG), Yamunanagar for HVPNL.
9. Connectivity to Dhaulasidh Hydro Electric Power Project (66MW) of M/s SJVNL in Himachal Pradesh.
10. 400/220kV substations at Rajghat (Maharanibagh-II) and Karampura in NCT of Delhi
11. UT of Chandigarh's proposal regarding handing over of 220/66kV substation at Kishangarh (Manimajra) to PGCIL and to treat it as ISTS point.
12. Loading at Raebareli 220/132 kV Substation
13. Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer Rajasthan.
14. Grant of Long Term Access (Revised) to NTPC Ltd. for its Tanda TPS Stage-II (2x660 MW) for 395.42 MW to NR Beneficiaries
15. Establishment of 220/66kV, 2x160MVA GIS Substation at Hallo Majra, Chandigarh.
16. Development of Transmission scheme for Solar Power Parks in Bhadla, Rajasthan
17. Reconductoring of Badarpur–Ballabhgarh 220kV D/C line
18. Connectivity (6x660 MW) and LTA (4x660MW) Application of Barethi STPS of NTPC Ltd.
19. Operational Feedback (NR Region)
20. Power evacuation plan for Nakhtan HEP (4x115 MW)
21. Creation of 220kV substation at Deoli Ahir (Mohindergarh) and associated transmission system
22. Issues related to transmission system for evacuation of power for Bajoli Holi HEP (180MW) of M/s GMR Energy Ltd. in Himachal Pradesh.
23. Agenda proposed by PTCUL for consideration of Transmission Network up to 400kV S/s Srinagar of UITP Scheme developed by PTCUL as part of System Strengthening of Northern Region and modifications in the UITP scheme for Alakhnanda Basin.
24. Evacuation of New Generation Project in 13th Plan (2017-2022) in Uttar Pradesh
25. Study to limit high Short Circuit level of various Substations in NR (Phase 2)
26. Reactive Power Compensation Requirement Studies in Northern Region and High voltage at Kurukshetra.
27. Installation of 400kV and 220kV Shunt Bus Reactors in Rajasthan

28. Early Commissioning of 400kV D/C Samba-Amargarh Transmission Line, 400/220 kV GIS Substation at Amargarh and LILO of both circuits of 400kV Uri- Wagoora at Amargath under NRSS-XXIX Transmission Limited Project.
29. Transmission system for connectivity to Bilhaur TPS (2x660MW) of NTPC
30. Prime Minister Development Package for the state of J&K (PMDP-2015) / PMRRP-2015
31. Modification in scope of Intra-State transmission schemes under Green Energy Corridor planned for evacuation of Renewable energy addition in Renewable rich states.
32. Strengthening of Intra-State Transmission System - Operational Constraints
33. Connectivity & LTA to GHAVP Nuclear power plant (2x700MW) of M/s NPCIL in Haryana
34. Power Evacauation of the projects in Chenab Basin and establishment of 400/132kV Substation at Kishtwar
35. Down Stream network by State utilities from ISTS Station
36. 400kV bays at 400kV substation Bhinmal and Sikar
37. Evacuation of power from 1x800 MW supercritical unit- 9 at PTPS, Panipat
38. Interconnection of Manimajra and Hallomajra 220/66kV substations of UT Chandigarh
39. Connectivity of Railways' TSS with ISTS Network for Delhi – Bharuch route
40. Connectivity of Railways' TSS with ISTS Network for Ludhiana-Delhi-Sonnagar Route.
41. Second 400kV high capacity India – Nepal cross border corridor viz. New Butwal (Nepal) – Gorakhpur (New)
42. UITP Scheme by PTCUL and Grant of Connectivity and LTA to various generators in Uttarakhand (Agenda by CTU).
43. Connectivity to Luhri Hydro Electric Power Project (210 MW) of SJVN Ltd. in Himachal Pradesh (Agenda by CTU)
44. Capacity enhancement of Rihand- Dadri HVDC from 1500MW to 2500MW
45. Converting Fixed Line Reactors into Switchable Line Reactors in Over Compensated lines
46. Ownership of newly installed 63MVAr Reactor, GIS bay & 4x105MVA ICT BBMB Dehar Power House
47. Creation of 400/220kV Substation at Etawah
48. 765kV D/c interconnection of Lalitpur TPS with Bina(PG)
49. Connectivity of UPPTCL Moradnagar-II (new), 400/220 kV, 2x240 MVA substation by shifting of 400,220 kV lines from Moradnagar 400 kV UPPTCL S/S to Moradnagar –II
50. Connectivity of 400/220/33 kV 2x500, 3x60 MVA Indirapuram (Ghaziabad) substation
51. Augmentation of transformation capacity at Gorakhpur, Lucknow and Fatehpur
52. Upgradation of existing 220/132 kV Sahupuri Substation to 400/220 kV, 2x500 MVA.
53. Compilation of ICT augmentations and 220 kV line bays agreed in the meeting
54. Various LTA/ Connectivity applications discussed in 10th Connectivity/Long-Term Access meeting of Northern Region held along with 39th SCM of NR.

B. 42nd Meeting of Standing Committee on Power System Planning in Western Region

1. Early commissioning of TBCB schemes of M/s Adani Transmission Ltd.
2. Provision of Bus Reactors at High Voltage Nodes in Western Region
3. Second 400 kV D/C transmission line for BALCO Complex and 400 kV Grid connectivity for the proposed new smelter plant of 0.51 MTPA at Balco Complex

4. LILO of SSP–Dhule 400 kV D/C at Shivaji Nagar (Balsane) 400 kV S/s
5. Additional feed to Goa: interconnection of Xeldam (GED) and Xeldam (New) 400/220 kV sub-stations
6. Progress of dedicated transmission lines of IPPs which are connected through interim arrangement – Extension of Essar Power (Mahan) interim connectivity
7. Connectivity of Railways' TSS with ISTS Network
8. Transmission System for Solar Power Parks in Madhya Pradesh
9. Additional ISTS feed to Navi Mumbai 400/220 kV substation of POWERGRID
10. Interim arrangement of Koradi II–Wardha 400 kV D/C quad line and power evacuation beyond Warora
11. High fault level at 400 kV Korba STPS (NTPC)
12. Reviewing the intra state transmission system and 220 kV interconnection with Vapi – II DNH
13. Charging of 400 kV Solapur PG – Karad line on 220 kV Level for resolving low voltage problems in Solapur District
14. Progress of downstream network whose terminating bays are under construction by POWERGRID
15. Requirement of Transformer Augmentation in Western Region
16. Provision of Bus Reactor at Champa Pool Split Section –A
17. Transmission System associated with DGEN TPS (4x300MW) under implementation by DGEN Transmission Co. Ltd.
18. Charging of 2x330 MVAR Line Reactors of Dharamjaygarh – Jharsuguda 765kV 2nd D/c line as Bus Reactor at 765/400 kV Dharamjaygarh Substation
19. Interconnection of MSETCL lines with PGCIL lines or S/s
20. Declaration of 132 kV Nepanagar (Madhya Pradesh)–Dharni (Maharashtra) line as ISTS line
21. Advancement in schedule of 2 no. of 220 kV line bays at Khandwa (PG) 400/220 kV S/s associated with 1 x 500 MVA, 400/220 kV, 3rd ICT
22. Provision of 400/220 kV, 2x500 MVA ICT at Kakrapar Nuclear Power Station
23. Installation of 2x50MVA, 220/33kV transformer with 10 Nos. 33kV feeder bays at 220kV Jabalpur substation
24. Retention of LILO of 400kV Khandwa- Rajgarh at Khargone
25. Signing of Transmission Service Agreement (TSA) by Long Term Transmission Customers (LTTC) for the transmission scheme "Additional 400 kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool"
26. Extension of Essar Power Gujarat Ltd (EPGL) - Bhachau 400 kV D/c (Triple) line of POWERGRID upto Bhogat substation
27. Operational feedback of NLDC period from Jul'2017 to Sep'2017
28. 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 bay ICT bay at M/s CGPL Switchyard
29. Implementation of the future GIS bay along-with the planned GIS bay in the same diameter in view of complexities involved with interfacing different manufacturer make GIS bay modules
30. Converting Fixed Line Reactors into Switchable Line Reactors in Kankroli – Zerda line at Kankroli end
31. Submission of data for Geospatial Energy Portal being developed by ISRO

C. 19th Meeting of the Standing Committee on Power System Planning in Eastern Region

1. Termination of 400kV lines at Jeerat (WBSETCL) S/s under the ERSS-XV and ERSS-XVIII schemes.
2. Creation of 220kV level at the under construction 400/132kV Motihari (TBCB).
3. Modifications/ additions in bay equipment of Maithon 400/220 kV substation of POWERGRID and generation switchyard of Maithon-RB.
4. Revised dedicated transmission system for Lanco Babandh Power Pvt. Ltd. (2x660 MW).
5. Evacuation of power from Patratu (3x800MW) TPS.
6. Perspective transmission plan of JUSNL up to 2021-22.
7. Transmission system for evacuation of power from Buxar Thermal Power Project (1320 MW).
8. Connectivity of Railway TSS with ISTS network for Mughal Sarai – Howrah route.
9. Modification in - Common Transmission System for Phase-II generation project in Odisha.
10. Termination of 220kV side of 400/220kV, 500MVA ICT-4 at Biharsharif (POWERGRID) substation under ERSS-XX.
11. Baharampur (India) – Bheramara (Bangladesh) 2nd 400kV D/c line.
12. High Capacity India-Bangladesh AC Corridor and Formation of 400kV nodes in NER-ER Corridor.
13. Additional power supply to Nepal through Muzaffarpur-Dhalkebar transmission line.
14. Modification in - Transmission System for Transfer of power from generation projects in Sikkim to NR/WR (Part-B1).
15. Interim connectivity to generation projects through LILO arrangement
16. Status of downstream 220kV or 132kV network by STUs from the various commissioned and under-construction ISTS substations.
17. Connectivity and LTA application of Odisha Integrated Power Ltd. (Odisha UMPP) and transmission system for power evacuation.
18. Additional feed to southern Odisha to improve power supply reliability and enable maximum utilisation of Guzuwaka Back-to-Back HVDC.
19. Proposal for stepwise completion of Rajarhat – New Purnea 400kV D/c line under ERSS-V scheme.
20. Programme for 11th/12th Plan augmentation of DVC System- Submission of revised plan for approval.
21. Installation of bus reactors at 400kV level at substations of STU.
22. Constraint in transportation of ICT to Farakka (NTPC) under ERSS-XII.
23. Conversion of 50MVAR (3x16.67MVAR) bus reactor at Farakka to switchable line reactor under the ERSS-XV due to space constraints in termination of Farakka – Baharampur 400kV D/c (Twin HTLS) line.
24. Modification in transmission system required for power evacuation from Sikkim IPPs and Operationalization of LTA.
25. Connectivity granted to Vedanta Ltd. (erstwhile Sterlite Energy Ltd).

26. Dropping of Banka (PG) – Deoghar 132kV D/c line which was proposed in 16th SCM-ER meeting.
27. Upgradation of 132kV bus arrangement at 400/220/132kV Malda S/s of POWERGRID
28. Modification under 13th Plan scheme: Agenda by BSPTCL.
29. To provide one additional 400/220kV, 500MVA ICT at Patna (POWERGRID)
30. Bus and Bay strengthening at Purnea (POWERGRID) S/s.
31. Limiting fault current level at 400kV bus at Farakka TPS (NTPC).
32. Commissioning of Rajarhat S/s and terminating lines proposed under ERSS-V scheme
33. Evacuation system for Talcher-III (2x660MW) project of NTPC
34. Approval for construction of 2 nos. 400/220kV substation at Bhadrak and Paradip by OPTCL with revised connectivity
35. Approval for connectivity of 400/220kV sub-station at Narendrapur to 400/220kV Jaynagar/ Jeypore (PG) with a 400kV D/c line in place of 400kV Angul –Narendrapur – Gazuwaka D/c line
36. Proposed evacuation plan of 3x800MW Power Plant of M/s OTPCL (Odisha Thermal Power Corporation Ltd.) at Kamakshyanagar, Odisha: Agenda by OPTCL
37. Evacuation of power from 2x660MW project of OPGC
38. Connectivity of Railways TSS with ISTS network for Ludhiana-DelhiSonenagar routes
39. Additional outlets from Darlipalli STPP and North Karanpura STPP for mining activities
40. Interim arrangement for power evacuation from Nabinagar TPP (3X660MW)
41. Revision in capacity of 4th 220/132kV ICT at Rangpo S/s under ERSS-XX
42. Bus splitting of POWERGRID sub-stations
43. LILO Connection of 132kV Sonenagar-Rihand (UP, NR) Circuit-I at NPGC, Nabinagar for providing startup power to NPGC
44. OPGW and Communication System for new ISTS system.

D. 41st Meeting of the Standing Committee on Power System Planning in Southern Region

1. Transmission system for evacuation of power from Uppur TPS (2x800 MW) of TNEB in Tamil Nadu
2. Evacuation scheme for SEPC (1X525 MW).
3. Provision of exclusive 220kV feeder to CPRI, Hyderabad for their online 350 MVA short circuit test facility
4. Establishment of Konthagai 400/230kV, 2x500 ICT S/S with following Connectivity:

400kV Connectivity:

a) LILO of one of the Kaythar - Karaikudi 400kV D/C quad line at Konthagai.

b) 400kV D/C line from the proposed Virudhnagar 765/400kV substation to Konthagai.

230kV Connectivity:

a) LILO of Pasumalai-Anupankulam 230kV line at Konthagai

b) LILO of Samayanllur-alagarkoil 230kV line at Konthagai

c) 230kV S/C line to the sanctioned K.Pudur 230kV S/S from Konthagai.

d) 230kV S/C line to the proposed Thummakundu 230/110kV S/S from Konthagai.

5. Implementation of Kadaladi – Kamuthi 400kV D/C lineby TANTRANSCO
6. Commissioning of 400/110kV 2nd ICT at Alamathy 400/230-110kV substation in Chennai
7. Establishment of Koyambedu 400/230 kV substation
8. Establishment of Manalmedu 400/230/110kV substation.
9. Establishment of Neyveli 400/230 kV Substation - By Upgradation of the Neyveli (TNEB) 230 kV SS.
10. Enhancement of transformation capacity of 400/230kV transformer from 2 x 315 MVA to 2 X 500 MVA and that of 400/110 kV transformer from 2 x 200 MVA to 3 X 200 MVA at K.R.Thoppur (Salem-TNEB) 400/230 kV SS
11. LILO of 220 kV Nannur (AP) – Regumanugadda (TL) 220kV S/C line at 220/11 kV Brahmanakotkur (AP)
12. Extension of 398.7 MW of power supply to Chintalapudi Lift Irrigation Scheme at 220 kV and 132 kV level in three stages in West Godavari district
13. Replacement of Twin Moose conductor with high capacity conductor on existing VTS-IV – Sattenapalli 400kV D/C line (in place of proposed 2nd 400kV VTS-IV- Sattenapalli D/C line with Quad Moose conductor).
14. Cochin East (Pallikkara) - Aluva 220kV D/Cline (In the scope of KSEB)
15. 400kV Udupi (UPCL)-Kasargode D/C line and Kasargode-Kozhikode 400 kV D/C line alongwith Kasargode 400/220 kV, 2x500MVA substation under ISTS
16. Installation of 400kV 2x125 MVAR bus reactor at UPCL switchyard
17. Establishing 2 X 500 MVA, 400/220 kV sub-station at Huliyurdurga in Tumkur district
18. Establishing 400/220kV, 4x167 MVA sub-station near Hebbanahalli substation.
19. Additional reactors of 1x125 MVAR (400kV) each at Talaguppa amd Devangere 400/220kV Substations
20. Upgradation of existing 220kV Substation to 400/220kV GIS Substation (2x500MVA) at Peenya in Bengaluru city
21. Revised proposal for connectivity of Telangana STPP (2x800 MW),

    (a) LILO of both circuits of 400kV Mamidipalli-Dindi D/C line at upcoming 400kV Maheshwaram SS and

    (b) Dichpally - Nirmal 400kV D/C line (with Quad Moose ACSR Conductor).
22. Augmentation of Power Transformer at existing 400/220/132 kV Malkaram SS and 400/220 kV Shankarpally SS with 400/220 kV, 500 MVA transformer (4th ICT)
23. Establishment of 400/220kV Asupaka S/S with 2x315 MVA and LILO of one circuit of 400kV Kalpaka –Khammam D/C Line at Asupaka
24. Sita Rama Lift Irrigation Scheme – Erection of Substations for extension of power supply to (a) Pump House – 1 (6x25 MW) at B.G. Kothur (V) Ashwapuram(M) (b)Pump House - 2 (6x40 MW) at V.K. Ramavaram (V) Mulakalapally (M) and (c) Pump House 3 (5x40+2x30MW) at Kamalapuram(V) Chandrugonda(M) in Bhadradri Kothagudem District.
25. Extension of Power supply under Phase-III, J.Chokka Rao Devadula Godavari Lift Irrigation Scheme – Construction of 220/11kV Substation Devannapet at Warangal Urban District and 220 kV D/C line (with Single Moose ACSR conductor from 400/220KV Oglapur (PGCIL) SS to proposed 220/11kV Devannapet LI SS
26. Additional 400/220kV, 1x500 MVA ICT at Gazuwaka substation as ISTS.

ANNEXURE – 3C
(Item 3.4.2)

Details of the Schemes notified through Tariff Based Competitive Bidding (TBCB)

(a) Schemes under implementation by the Transmission Service Providers:

1. Transmission system associated with IPPs of Nagapattinam / Cuddalore Area- Package A.
2. Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-A)
3. Transmission System associated with Gadarwara STPS (2x800 MW) of NTPC (Part-B)
4. Transmission System Strengthening associated with Vindhyachal- V
5. Strengthening of Transmission system beyond Vemagiri
6. 765 kV System Strengthening Scheme in Eastern Region. ERSS-XVIII
7. Eastern Region Strengthening Scheme XXI (ERSS-XXI)
8. New WR-NR 765 kV Inter-Regional Corridor
9. Northern Regional System Strengthening Scheme, NRSS-XXIX
10. Common Transmission system for phase-II generation projects in Orissa and immediate evacuation system for OPGC project (Orissa)
11. Creation of new 400 kV GIS substations in Gurgaon area and Palwal as a part of ISTS
12. Connectivity system for Khargone TPP (2x660MW)
13. NER System Strengthening Scheme II
14. (A)Additional 400kV Feed to Goa and
    (B) Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool
15. Additional inter regional AC link for import into southern region i.e Warora-Warangal and Chilakaluripeta – Hyderabad – Kurnool 765 kV link
16. System strengthening in northern region (NRSS XXXVI) along with LILO of Sikar-Neemrana 400 kV D/C line at Babai(RVPNL)
17. Additional system strengthening for Sipat STPS
18. Additional system strengthening for Chhattisgarh (B)
19. System strengthening for IPPs in Chhattisgarh and other generation projects in western region
20. Immediate evacuation for North Karanpura (3x660MW) generation project of NTPC(ERSS XIX)
21. Transmission System for Ultra Mega Solar Park in Fatehgarh, Distt. Jaisalmer Rajasthan
22. Transmission system strengthening in Indian system for transfer of power from new HEP's in Butan
23. North Eastern Region Strengthening Scheme (NERSS-VI)

(b) Schemes under bidding process by the Bid Process Coordinators*:*

1. Connectivity and Long Term Access (LTA) to HPPCL 450 MW from Shongtong Karcham HEP

2. Transmission System for “Connectivity System for LancoVidarbha Thermal Power Pvt. Ltd. (LVTPPL) and Inter State Transmission system strengthening in Chhatarpur area in Madhya Pradesh”

(c) Schemes commissioned by the Transmission Service Providers:

1. Transmission system for Strengthening in SR for Import of Power from ER.
2. ATS of Unchahar TPS
3. NR System strengthening Scheme-NRSS-XXXI(Part-A)
4. System strengthening for WR
5. System strengthening common for WR and NR
6. Scheme for enabling import of NER/ER surplus by NR
7. Part ATS for RAPP U-7&8 in Rajasthan
8. Eastern Region System Strengthening Scheme-VII
9. Connectivity lines for Maheshwaram 765/400 kV S/S
10. Northern Region System Strengthening Scheme, NRSS-XXXI (Part-B)
11. Transmission System required for evacuation of power from Kudgi TPS (3x800 MW in Phase-I) of NTPC Ltd.
12. Transmission System for Patran 400kV S/S
13. Transmission System Associated with Krishnapattnam UMPP- Synchronous interconnection between SR and WR (Part-B)
14. Eastern Region System Strengthening Scheme-VI

ANNEXURE – 3D

(Item 3.4.3)

Issues Pertaining to Transmission System Planning taken up in Empowered Committee on Transmission during 2017-18

37th Meeting of the Empowered Committee on Transmission

1. Notification / approval of transmission schemes approved in 36th Empowered Committee (EC) on Transmission by MoP

2. De-notification of the Scheme ATS for Tanda Expansion TPS (2x660) MW

3. Issues raised by STUs in Standing Committees due to implementation of schemes through TBCB

4. Status of transmission schemes under bidding process - briefing by BPCs

5. New inter-state transmission schemes

6. Change / modification in the scope of works of transmission schemes under TBCB

7. Issues related to the providing of information to bidders for terminal bays at POWERGRID sub-stations:

8. Cost of the Project as per the Cost Committee

9. Constitution of the Bid Evaluation Committees (BEC's) for the new transmission schemes

10. Apportionment of transmission charges among individual transmission elements of Power Grid N M Transmission Limited (PNMTL) which was approved as an integrated system to be executed through TBCB.

11. Compensation to CTU for providing technical inputs to BPC.

ANNEXURE-3E
(Item No. 3.4.4)

The cost committee constituted for this purpose has estimated the cost of the following transmission schemes:

Sl. No.	Independent Transmission Projects	Estimated Cost of the Project as per Cost Committee (in Rs. Crore)
1.	Additional 400kV Feed to Goa and Additional System for Power Evacuation from Generation Projects pooled at Raigarh (Tamnar) Pool	1531.00
2.	Connectivity and Long Term Access (LTA) to HPPCL 450 MW from Shongtong Karcham HEP	272.00
3.	Transmission system for Ultra Mega Solar Park in Fatehgarh, distt. Jaisalmer, Rajasthan	624.00
4.	Transmission System For Eastern Region Strengthening Scheme –XXI (ERSS-XXI)	1348.56
5.	Transmission System For New WR- NR 765 kv Inter-Regional	1076.21

ANNEXURE – 3F
(Item 3.11.1)

Progress under Green Energy Corridor during 2017-18

A. Inter State Transmission Schemes

S.No.	GEC ISTS Scheme	Estimated Cost (Rs. Crore)	NIT Status	Target comm. Schedule
1	GEC- Part A (KfW Tranche-I)	1479 (9 packages)	All Awarded	2017-18
2	GEC- Part B (KfW Tranche-II)	3705 (22 Packages)		2017-18
3	GEC- Part C (KfW Tranche-III)	2247 (16 Packages)		July'18
4	GEC- Part D (ADB)	3938 (24 Packages)		Dec'18
	Total (Transmission Schemes)	**11,369**		
5	Control Infrastructure ➢ Dynamic Compensation: Rs 1204 Cr ➢ Real time monitoring: Rs. 473 Cr. ➢ Energy Storage: Rs. 2000 Cr.	3677		
6	REMC (in 11 locations)	409 (Revised)	All awarded	Dec'18 – May 19
	Aggregate	**15455 (revised)**		

B. Intra – State Transmission Schemes

	Name of the State	Current Estimated Cost (Rs. Crore)	NIT Status	Award Status	Target comm. Schedule
1	Tamil Nadu (for tranche – I)	1555.18	Done for all 5 packages (Rs. 1555.18 Cr)	Done for all 5 packages DPR Cost: Rs. 1555.18 Cr. Award Cost : Rs 1733.83 Cr	2018-19
2	Rajasthan (for tranche – I) (**Package 5-11 withdrawn. Only 4 packages left**)	793.96	NIT published for 4 packages (Rs 532 Cr.)	Done for 6 packages. However, 2 of the awarded packages withdrawn. So, DPR Cost of awarded 4 packages: Rs. 532 Cr Award Cost: Rs. 439.92 Cr.	2019-20
3	Andhra Pradesh	1289	NIT for 4 packages published out of 6 packages (Rs 1010.76 Cr)	Done for 3 packages. However, it includes only Lot 2 of Package 2. DPR Cost: Rs. 844 Cr. Award Cost: Rs. 558.37 Cr.	2019-20
4	Himachal Pradesh	909.86	Done for 11 packages out of 17 packages (Rs 600.56 Cr.)	Done for 6 packages. (HPPTCL) and sub-packages of 3 packages by HPSEBL. DPR Cost: Rs. 312.89 Cr. Award Cost: Rs. 220.12 Cr.	2019-20
5	Gujarat	1962.12	NIT for 25 packages out of 28 packages done. (Rs. 1857.42 Cr.)	Done for 19 packages DPR Cost: Rs. 1317.51 Cr. Award Cost: Rs. 1051.5 Cr.	2019-20
6	Karnataka	906	NIT for 6 packages done out of 7 packages (Rs. 369.08 Cr.)	Done for 6 packages DPR Cost: Rs. 369.08 Cr. Award Cost : Rs 472.37 Cr.	2019-20
7	Madhya Pradesh	2026.92	NIT for 8 packages issued out of 8 packages (Rs. 1690.34)	Done for 7 packages DPR Cost: Rs.1690.34 Cr Award Cost : Rs 1311.23 Cr.	2019-20

8	Maharashtra	250.9	NIT for package part of package 1 and package 2 published (Rs.130.15 Cr.)	Awarded for 1 package DPR and Award Cost : Rs.3.6 Cr.	2019-20
9	Rajasthan (for tranche – III)	2100	Proposal yet to be submitted by RRVPNL for funding.	-	
10	Tamil Nadu (for tranche – III)	900	DPR not yet finalised	-	
	Total	**12693.94**	**7745.49**	**DPR*: 6624.6** **Awarded* : 5790.94**	

ANNEXURE-3G
Item no. 3.15.(a)(i)

Details of Failed transmission lines reported to CEA

Sl. No.	Name of Transmission line	Date of occurrence Of Failure	No. of towers failed	Name of Utility
1.	400 kV D/C Dadri - Panipath transmission line	26.02.2017	5	PGCIL
2	400 kV D/C Silchar-Purba Kanchan Bari transmission	2.04.2017	8	PGCIL
3.	765 kV D/C Wardha – Nizamabad transmission line	6.04.2017	1	PGCIL
4	400 kV D/C Koderma- Bokaro transmission line	13.5.2017	3	PGCIL
5.	400 kV D/C Farakka-Kahalgaon I & II transmission line	15.5.2017	4	PGCIL
6.	765 kV S/C Gaya- Varanasi- I transmission line	17.05.2017	5	PGCIL
7.	765 kV S/C Jabalpur- Bina transmission line	5.06.2017	5	M/s Sterlite (under TBCB)
8.	765 kV S/C Bina - Gwalior transmission line	5.06.2017	2	PGCIL
9.	765 kV S/C Bina- Indore transmission line	14.06.2017	6	PGCIL
10.	765 kV S/C Agra- Jatikara transmission line	14.06.2017	3	PGCIL
11.	400 kV S/C Singrauli- Lucknow transmission line	16.06.2017	1	PGCIL
12.	765 kV S/C Bhiwani- Jhatikra transmission line	19.06.2017	1	PGCIL
13.	400 kV D/C Tikrikalan- Bawana transmission line	14.05.2017	1	DTL
14.	+- 500 HVDC Mundra – Mohindergarh transmission line	24.07.2017	1	Adani Power

ANNEXURE-3H
Item no. 3.15.(b)(iii)

List of failures of Transformers and Reactors received in CEA in 2017-18

1.	80 MVAR, 400kV Shunt Reactor at Vizag substation of PGCIL
2.	16.67 MVAR, 400kV Shunt Reactor at Bhiwardi-Agra substation of PGCIL
3.	80 MVAR, 765kV Shunt Reactor at Satna substation of PGCIL
4.	315 MVA, 400kV ICT-II at Raigarh substation of PGCIL
5.	315 MVA, 400kV ICT-I at Jalandhar substation of PGCIL
6.	100MVA, 220/132/33kV Auto Transformer-III at Badrak Substation of OPTCL
7.	100 MVA, 220/110 kV Power Transformer at Bidnal substation of KPTCL
8.	160 MVA, 220/132/33kV Auto transformer-2 at New Bolangir substation of OPTCL
9.	100 MVA, 220/66-33/11kV Power Transformer at Okhla substation of DTL
10.	100MVA, 220/66-33/11kV Power Transformer at Geeta Colony substation of DTL
11.	100MVA, 220/66-33/11kV Power Transformer at Naraina substation of DTL
12.	50 MVA, 220/110/11kV Transformer at Esale, Sirsi substation of KPTCL
13.	100MVA, 220/33/11kV Power Transformer at Lodhi Road substation of DTL.

ANNEXURE-3I
(Item 3.26)

As on 31-Mar-2018

Transmission Lines Completed During FY- 2017-18

Voltage Level (kV)	Name of Transmission Lines	Circuit Type	Executing Agency	Line Length (cKM)	Month of Completion
1	2	3	4	5	6
765 kV					
CENTRAL SECTOR					
1	Darlipalli TPS - Jharsuguda (Sundergarh) PS line	D/C	PGCIL	41	APR-17
2	Gadarwara - Jabalpor Pool line (Balance Portion from LILO of Seoni - Bina to Jabalpur) (PWTL-TBCB)	D/C	PGCIL	187	MAY-17
3	Nizamabad - Hyderabad line (Part of Wardha - Hyderabad line)	D/C	PGCIL	486	JUL-17
4	Jabalpur PS - Orai Substation	D/C	PGCIL	714	AUG-17
5	Aurangabad (PG) - Padghe (PG) line	D/C	PGCIL	570	DEC-17
6	Chittorgarh - Ajmer line	D/C	PGCIL	422	DEC-17
7	LILO of Agra - Meerut at Aligarh	S/C	PGCIL	22	MAR-18
8	LILO of Kanpur - Jhatikara at Aligarh	S/C	PGCIL	22	MAR-18
9	LILO of one ckt. of Satna- Gwalior 765KV 2xS/C line at Orai	2xS/C	PGCIL	73	MAR-18
10	Orai - Aligarh line	D/C	PGCIL	664	MAR-18
			Total of CENTRAL SECTOR	**3201**	
STATE SECTOR					
11	Lalitpur TPS - Fatehabad (Agra (UP)) Ckt-II	S/C	UPPTCL	335	APR-17
			Total of STATE SECTOR	**335**	
PRIVATE SECTOR					
12	Hapur-Greater Noida line	S/C	WUPPTCL	66	MAY-17
13	Mainpuri-Hapur line	S/C	WUPPTCL	217	MAY-17
			Total of PRIVATE SECTOR	**283**	
			Total of 765 kV	**3819**	
400 kV					
CENTRAL SECTOR					
14	Kakarapar APP - Navsari line	D/C	PGCIL	77	MAY-17
15	Kakrapar APP - Vapi line	D/C	PGCIL	234	MAY-17
16	Lucknow - Kanpur line	D/C	PGCIL	320	MAY-17
17	Lara STPS - Champa Pooling Station line (Q)	D/C	PGCIL	224	JUN-17
18	Kishenpur - New Wanpoh line (132 KM D/C + 7 KM Multi Ckt)	MC+D/C	PGCIL	279	JUL-17
19	Loop out (Kurnool - Maheshwaram portion of LILO of Hyderabad - Kurnool at Maheshwaram	S/C	PGCIL	4	JUL-17
20	Mauda-II - Betul (Quad) line	D/C	PGCIL	393	JUL-17

21	RAPP - Kota line	D/C	PGCIL	90	JUL-17
22	LILO of Karcham Wangtoo - Abdullapur at Kala Amb (PKATL-TBCB)	D/C	PGCIL	2	AUG-17
23	Raghunathpur TPS -Ranchi (PG)	D/C	DVC	311	SEP-17
24	Allahabad - Kanpur line	D/C	PGCIL	481	SEP-17
25	Aurangabad - Boisar	D/C	PGCIL	690	SEP-17
26	Loop-In (Hyderabad-Maheshwaram) portion of LILO of Hyderabad-Kurnool 400kV S/C line at Maheswaram	D/C	PGCIL	3	SEP-17
27	Solapur STPP - Solapur line - II (Q)	D/C	PGCIL	25	SEP-17
28	LILO of Both ckt. of Mundra UMPP - Limbdi at Bachau (Triple)	D/C	PGCIL	45	OCT-17
29	LILO of one ckt. Gooty - Tumkur (Vasantnarsapur) at Tumkur line (Q) at Tumkur Pool	D/C	PGCIL	1	OCT-17
30	Chittorgarh (New) - Chittorgarh (RVPN) (Q)	D/C	PGCIL	97	NOV-17
31	Kurukshetra - Jind line (Q)	D/C	PGCIL	206	NOV-17
32	Ajmer (New) - Ajmer (RVPN) (Quad) line	D/C	PGCIL	131	DEC-17
33	Padghe (PG) - Padghe (Kudus) line (Q) line	D/C	PGCIL	32	DEC-17
34	Vapi (PG) - Kala - Kudus (balance Portion) line	D/C	PGCIL	149	DEC-17
35	Dulhasti - Kishenpur	D/C	PGCIL	115	JAN-18
36	LIIO of Both ckt. of Rourkela - Raigarh (2nd line) at Jharsaguda (Sundargarh)	M/C	PGCIL	130	JAN-18
37	Both ckts of IInd LILO D/C portion of Simhadri - Vijayawada 400kV line at Vimagiri-i (AP) shall be LILOed at Vimagiri-II (PG)	D/C	PGCIL	28	FEB-18
38	Both ckts of one LILO D/C portion of Simhadri - Vijayawada line at Vimagiri -I (AP) shall be LILOed at Vimagiri-II (PG) - (D/Cportion (1.8Km) and Multi Ckt. portion (13.2Km)	D/C	PGCIL	61	FEB-18
39	Extn. Kudankulam APP - Tirunveli (Q)	D/C	PGCIL	132	FEB-18
40	LILO of Bellary - Tumkur (Vasantnarsapur) line (Q) at Tumkur Pool.	D/C	PGCIL	220	FEB-18
41	LILO of Both Ckt Cuddapah - Hindupur line (Q) at NP Kunta S/S	D/C	PGCIL	18	FEB-18
42	LILO of Gooty - Tumkur (Vasantanarsapur) at Tumkur Pool (Ckt.-II)	D/C	PGCIL	2	FEB-18
43	LILO of Vindhyachal - Jabalpur line (Q) (II Ckt.) at Rewa PS	D/C	PGCIL	116	FEB-18
44	Nabinagar-II - Gaya (Q)	D/C	PGCIL	184	FEB-18
45	Orai - Orai line (Q)	D/C	PGCIL	84	FEB-18
46	Punatsangchu-I - Alipurduar	D/C	PGCIL	128	FEB-18
47	Sasaram - Deltonganj line	D/C	PGCIL	392	FEB-18
48	Tirunelveli PS - Tuitcorin PS (Quad) 1and2 line	D/C	PGCIL	48	MAR-18
49	Dehradun - Abdullapur line (Q)	D/C	PGCIL	179	MAR-18
50	Kameng - Balipara line	D/C	PGCIL	114	MAR-18

51	LILO of Neelamangla - Hoddy 400 kV S/C LINE at Yelahanka	D/C	PGCIL	20	MAR-18
			Total of CENTRAL SECTOR	**5765**	
STATE SECTOR					
52	Bhadla-Bikaner	D/C	RVPNL	379	APR-17
53	Bhilwara TPS -Ajmer	D/C	RVPNL	320	APR-17
54	LILO of both ckt of Mamidipally - Srisailam at Dindi S/s	D/C	TSTRANSCO	5	APR-17
55	Fatehabad (Agra (UP)) - Maath (Mathura) line	S/C	UPPTCL	142	APR-17
56	LILO of Patran - Rajla at Patran (PGCIL) s/s	D/C	PSTCL	3	MAY-17
57	Nandiwanaparthi - Shankarpally (part of Suryapet- Shankarpally line)	D/C	TSTRANSCO	222	MAY-17
58	Aligarh - Sikandarabad line	D/C	UPPTCL	190	MAY-17
59	Allahabad - Banda Line	D/C	UPPTCL	355	MAY-17
60	Rayalaseema TPP - Chittoor line	D/C	APTRANSCO	429	JUN-17
61	Vizag TPP(HNPCL) - Kamavarapukota	D/C	APTRANSCO	486	JUN-17
62	Kirori - Jind line (Ckt-I)	D/C	HVPNL	50	JUN-17
63	Bellary (PS) - New Madhugiri (near Tumakur)	D/C	KPTCL	450	JUN-17
64	Kanarpatti - Kayathar line	D/C	TANTRANSCO	25	JUN-17
65	Maheshwaram (PGCIL) - Maheshwaram (TSTRANSCO)	D/C	TSTRANSCO	3	JUN-17
66	Maheshwaram - Shankarpally S/s	D/C	TSTRANSCO	12	JUN-17
67	Agra(UP) - Agra (South)	D/C	UPPTCL	139	JUN-17
68	LILO of Agra - Muradnagar at Mathura	D/C	UPPTCL	64	JUN-17
69	LILO of NCTPS Stage-II - Alamathy line at Manali GIS	D/C	TANTRANSCO	66	JUL-17
70	Gr. Noida - Noida (Quad)	D/C	UPPTCL	91	JUL-17
71	Rasipalayam - Salem (Palavady)	D/C	TANTRANSCO	388	AUG-17
72	LILO of one ckt. of 400kV Khammam -Gajwel Line at 400kV Asupaka S/s	D/C	TSTRANSCO	34	AUG-17
73	D/C LILO of PPSP - Arambagh 400 kV D/C line at New PPSP 400 kV GIS	D/C	WBSETCL	1	AUG-17
74	Kharagpur - N. Chanditala	D/C	WBSETCL	277	SEP-17
75	LILO of one ckt. of Vadavi-Zerda line at Veloda (Sankhari) S/s	D/C	GETCO	31	DEC-17
76	Ramgarh (Jaisalmer)-Akal (Jaisalmer)	D/C	RVPNL	198	DEC-17
77	Kalivanthapattu - Ottiyambakkam (Sholinganallur)	D/C	TANTRANSCO	55	DEC-17
78	LILO of Vadinar - Hadala at Kalawad	D/C	GETCO	16	JAN-18
79	LILO of Guddadahalli (Munirabad) - Guttur (Davangeere) at Dhoni	D/C	KPTCL	54	JAN-18
80	Julurupadu (QM) - Suryapet S/s	D/C	TSTRANSCO	219	JAN-18
81	LILO of one ckt. of KTPS - Khammam line at KTPS-VI	D/C	TSTRANSCO	1	JAN-18
82	Jaipur STPP - Nirmal SS	D/C	TSTRANSCO	289	FEB-18
83	Julurupadu - KTPS (Stage-VII)	D/C	TSTRANSCO	78	FEB-18

84	LILO of Meja - Rewa Road at Masuli (Allahabad)	D/C	UPPTCL	65	MAR-18
85	LILO of both ckt. 400kV RTPP - Chittoor TMDC line at 400kV Kalikiri S/S	D/C	APTRANSCO	81	MAR-18
86	Wanakbori S/y -Wanakbori S/y (existing)	D/C	GETCO	2	MAR-18
87	LILO of Parbati - II HEP - Parbati-III Pooling station at Sainj	D/C	HPPTCL	1	MAR-18
88	Yermarus TPS - Bellary Pooling Station (BPS)	D/C	KPTCL	285	MAR-18
89	Bikaner -Sikar (PG)	D/C	RVPNL	420	MAR-18
90	Phagi (Jaipur south-765 kV)-Ajmer (Ckt. - I)	D/C	RVPNL	106	MAR-18
91	LILO in Ist and 2nd Ckt. of MTPS - III - Thiruvalam at Dharmapuri	D/C	TANTRANSCO	2	MAR-18
92	LILO of Chekkanurani - Kayather at Kinnimangalam	D/C	TANTRANSCO	12	MAR-18
			Total of STATE SECTOR	**6046**	
PRIVATE SECTOR					
93	Malerkotla - Amritsar line (NRSS-XXXI TL(B) - TBCB)	D/C	ESSEL	299	APR-17
94	Muzaffarpur - Darbhanga line (DMTCL - TBCB)	D/C	ESSEL	126	APR-17
95	Greater Noida-Noida Sec -148 line	D/C	WUPPTCL	94	MAY-17
96	LILO of Rishikesh -Kashipur line at Nehtaur s/s	D/C	WUPPTCL	15	MAY-17
97	JSW TPS - Bellary (PS)	D/C	JPL	19	JUN-17
98	Hapur-Ataur	D/C	WUPPTCL	106	JUN-17
99	Hapur-dasna	D/C	WUPPTCL	29	JUN-17
100	LILO of Moradabad - Muradnagar TL at Ataur s/s	D/C	WUPPTCL	30	JUN-17
101	LILO of Moradabad - Muradnagar TL at Hapur s/s	D/C	WUPPTCL	4	JUN-17
102	LILO of Rishikesh - Kashipur line at Nehtaur (Balance portion)	D/C	WUPPTCL	15	JUN-17
103	Mainpuri (765kV) - Aligarh line (Balance portion)	D/C	SEUPPTCL	54	JUL-17
104	LILO of Barh - Gorakhpur 400 kV D/C Line at Motihari (DMTCL -TBCB)	2xD/C	ESSEL	151	AUG-17
105	Nizamabad - Yeddumailaram (Shankarpalli) (MTL - TBCB)	D/C	SGL	279	AUG-17
106	OPGC - Jharsuguda (OGP-IITL - TBCB)	D/C	SGL	103	AUG-17
107	LILO of Orai-Mainpuri at Mainpuri (Balance Portion)	D/C	SEUPPTCL	90	SEP-17
108	LILO of one ckt. of Sikar- Neemrana line at Babai s/s (NRSS-XXXVITL - TBCB)	D/C	ESSEL	3	OCT-17
109	Ind - Barath (Power Plant (Shahjbahal) - Jharsuguda (Sundargarh)line	D/C	IBPIL	124	OCT-17
110	Sterlite TPP (Vedanta)- Jharsuguda (Sundergarh) (Balance portion from LILO-I point to Jharsuguda)	D/C	SEL	41	OCT-17

111	Ataur-Indirapuram line	D/C	WUPPTCL	31	OCT-17
112	Maheshwaram(PG) - Mehboob Nagar (MTL - TBCB)	D/C	SGL	197	DEC-17
113	LILO of Orai - Mainpur at Bah	D/C	SEUPPTCL	92	FEB-18
114	LILO of one ckt. of Khandwa - Rajgarh at Khargone TPP (KTL - TBCB)	D/C	SGL	14	FEB-18
115	LILO of Muradnagar -Muzzafarnagar at Ataur	D/C	WUPPTCL	15	FEB-18
116	Vindhyachal STPS - IV and V - Vindhyachal pool (Quad.) (C-WRTL-TBCB)	D/C	APL	57	MAR-18
117	LILO of Both ckt Uri - Wagoora at Amargarh (NRSS-XXIX TL - TBCB)	M/C	SGL	14	MAR-18
			Total of PRIVATE SECTOR	**2002**	
			Total of 400 kV	**13813**	
		230 kV			
STATE SECTOR					
118	PH Road - Koyambedu (UG Cable)	D/C	TANTRANSCO	3	MAY-17
119	Kamudhi - Kavanoor	D/C	TANTRANSCO	56	JUN-17
120	LILO of Alandur - Alagarkoil at Mondipatti 230 Kv S/S	D/C	TANTRANSCO	25	JUN-17
121	Rohini theatre take off structure to CMRL Koyambedu 230kV GIS S/s (230 kV UG cable)	S/C	TANTRANSCO	1	JUN-17
122	Koladi - PH Road (Alamathy - Koyembedu)	D/C	TANTRANSCO	27	JUL-17
123	Thiruverkadu - Ambattur 3rd Main road S/S (UG Cable)	D/C	TANTRANSCO	10	AUG-17
124	Vyasarpadi - Pulianthoppe (UG Cable)	D/C	TANTRANSCO	2	AUG-17
125	Karuvalur - Shenbagapudur line	S/C	TANTRANSCO	33	OCT-17
126	LILO of Ulundurpet - Villupuram line at Cuddalore	D/C	TANTRANSCO	69	OCT-17
127	Veeranam - Abishekapatty (PGCIL)	S/C	TANTRANSCO	31	DEC-17
128	Veeranam - Kodikurichi	S/C	TANTRANSCO	24	MAR-18
129	Veeranam - Kodikurichi line at Kundah	D/C	TANTRANSCO	24	MAR-18
			Total of STATE SECTOR	**305**	
			Total of 230 kV	**305**	
		220 kV			
CENTRAL SECTOR					
130	Khalsti- Leh (Part of Alusteng - Drass - Kargil - Khalsti-Leh)	S/C	PGCONSULTANCY	62	NOV-17
131	Kargil - Khalsti Line	S/C	PGCIL	97	FEB-18
132	Kishanganga - Amargarh line	D/C	PGCIL	85	FEB-18
			Total of CENTRAL SECTOR	**244**	
STATE SECTOR					
133	LILO of Atri-puri at Pandiabil S/s	D/C	OPTCL	3	APR-17
134	LILO of Mettur - Karimangalam at Dharmapuri S/s	D/C	TANTRANSCO	6	APR-17
135	Mylapore - Tharamani (UG Cable)	D/C	TANTRANSCO	25	APR-17
136	Maath (Mathura) -Chhata line	D/C	UPPTCL	68	APR-17

137	Sikandrabad (WUPPTCL) - Sikandrabad (ckt-I&II)	D/C	UPPTCL	50	APR-17
138	LILO of 2nd ckt Bhigwan - Walchandnagar at Loni Deokar s/s (Ckt. -II)	S/C on D/C	MSETCL	19	MAY-17
139	LILO on Both circuits of Waluj - Jalna at Taptitanda s/s	2xD/C	MSETCL	32	MAY-17
140	Warora - Wardha - II (Bhugaon)	D/C	MSETCL	165	MAY-17
141	LILO of Patran - Kakrala at Patran (PGCIL) s/s	D/C	PSTCL	24	MAY-17
142	Uravakonda - Borampalli	D/C	APTRANSCO	72	JUN-17
143	LILO of 1st ckt. Darbhanga-MTPS(Kanti) at Motipur	D/C	BSPTCL	72	JUN-17
144	LILO of 2nd ckt. Darbhanga-MTPS(Kanti) at Motipur	D/C	BSPTCL	56	JUN-17
145	LILO of 2nd ckt Pusouli (PG) - Ara (PG) at Pusouli (New).	D/C	BSPTCL	5	JUN-17
146	LILO of Motipur - Darbhanga ckt-II at Musahari	D/C	BSPTCL	41	JUN-17
147	Patna (PG) - Gourichak	D/C	BSPTCL	1	JUN-17
148	LILO of Chorania - Salejada at Bagodara S/s	D/C	GETCO	4	JUN-17
149	Chandrapur MIDC - Ballarshah (Ckt- II)	D/C	MSETCL	21	JUN-17
150	Indira Gandhi Nagar -Sitapur (Upgradation)	D/C	RVPNL	8	JUN-17
151	Nimbahera - Pratapgarh (Part of Pratapgarh - Chittorgarh line)	D/C	RVPNL	181	JUN-17
152	LILO of Arasur - Palladam at Tiruppur	D/C	TANTRANSCO	20	JUN-17
153	LILO of Chillakallu S/S - Narketpally line at Huzurnagar S/S	D/C	TSTRANSCO	24	JUN-17
154	LILO of Shadnagar - Yeddumailaram at Yeddumailaram	D/C	TSTRANSCO	12	JUN-17
155	Mamidipally S/s-M/s K.S.K. Photo Voltaic near Fabcity Ravirala (V)	D/C	TSTRANSCO	11	JUN-17
156	Veltur-Thimmajipet	D/C	TSTRANSCO	80	JUN-17
157	Hapur (765) - Hapur	S/C	UPPTCL	8	JUN-17
158	LILO of Moradabad - Nehtaur at Amroha	D/C	UPPTCL	45	JUN-17
159	400 kV Betul s/s - 220 kV Betul s/s	D/C	MPPTCL	4	JUL-17
160	Tondiarpet - Basin Bridge (UG Cable)	D/C	TANTRANSCO	4	JUL-17
161	Morti (220kV) - Ataur (400kV)	D/C	UPPTCL	13	JUL-17
162	LILO of 2nd Ckt. Damoh - Sagar line at Damoh S/s	D/C	MPPTCL	1	AUG-17
163	Balapur - Malegaon line Ckt.-I	D/C	MSETCL	71	AUG-17
164	Phaltan - Walchandnagar	D/C	MSETCL	114	AUG-17
165	LILO of Sankhari-Jangral at Veloda (Sankhari)	MC+D/C	GETCO	61	SEP-17
166	LILO of Tappar-Hadala line at Vondh S/s	D/C	GETCO	4	SEP-17
167	Jethana - Ajmer line	D/C	RVPNL	120	SEP-17
168	Jodhpur (New) - Jhalamand (TK)	D/C	RVPNL	40	SEP-17
169	Kalisindh TPS - Bhawanimandi	S/C	RVPNL	34	SEP-17
170	Dharmapuri (Palavady) - Gurubarapally	S/C	TANTRANSCO	58	SEP-17

171	LILO of Arasur - Karamadai at Shenbagapudur S/S	D/C	TANTRANSCO	75	SEP-17
172	LILO of Thiruvarur - Kadalangudi at Kumbakonam	D/C	TANTRANSCO	46	SEP-17
173	Jajji - Rai line	D/C	HVPNL	102	OCT-17
174	LILO of 2nd Ckt. of Bansagar - Satna line at Kotar	D/C	MPPTCL	11	OCT-17
175	LILO of one ckt. of Satna (MPPTCL) - Chhaterpur line at Satna (PGCIL)	D/C	MPPTCL	4	OCT-17
176	Shirpur Power Plant - Amalner line	D/C	MSETCL	70	OCT-17
177	Aligarh - Sikandra Rau line	D/C	UPPTCL	35	OCT-17
178	Jamnagar - Hadala	D/C	GETCO	139	NOV-17
179	LILO of both circuit Nyara-Thebda line at Kalawad S/s	M/C	GETCO	21	NOV-17
180	LILO of Haldarwa-Zaghadia Line to Jhanor	D/C	GETCO	14	NOV-17
181	LILO of both circuits of Madanpur - Baddi at Pinjore	M/C	HVPNL	23	NOV-17
182	Malegaon-Kalwan	D/C	MSETCL	98	NOV-17
183	LILO of Myvadi - Othakkalmandapam feeder at Anaikadavu 400 KV SS	D/C	TANTRANSCO	1	NOV-17
184	Bareilly (400) - Pilibhit	S/C	UPPTCL	39	NOV-17
185	LILO of Both ckt. of Biharsharif - Begusarai at BTPS Extn.	D/C	BSPTCL	4	DEC-17
186	LILO of one ckt of Akrimota - Nakhatrana line at Bhachunda	D/C	GETCO	53	DEC-17
187	Darbhanga - Samastipur (New)	D/C	BSPTCL	47	DEC-17
188	Motipur(BSPTCL) - Darbhanga(DMTCL)	D/C	BSPTCL	218	DEC-17
189	Chaibasa -Ramchandrapur	D/C	JUSNL	80	DEC-17
190	LILO of B.Bagewadi - Bijapur line at Kudgi 400kV STPP	M/C	KPTCL	80	DEC-17
191	Akola - Anjangaon line	D/C	MSETCL	106	DEC-17
192	LILO on Babhaleshwar - Alephata at UTSL C-Gen Plant line	D/C	MSETCL	10	DEC-17
193	LILO on existing Phaltan - Walchandnagar at CSSK Bhavaninagar line	D/C	MSETCL	2	DEC-17
194	LILO of Gadag - Lingapur at Gadag (Doni)	D/C	KPTCL	11	JAN-18
195	LILO of Somanahalli S/S-Yerandanahalli at Jigani 220kV s/s	MC+D/C	KPTCL	12	JAN-18
196	LILO of one ckt. 220KV Nakodar - Rehanajattan line at 220KV Hoshiarpur	D/C	PSTCL	52	JAN-18
197	Jaipur North (400 kV GSS) - Manoharpur (Turnkey) and extended to LILO of S/C VKIA-Kukus	D/C	RVPNL	80	JAN-18
198	Pratapgarh - Chittorgarh (Balance Portion)	D/C	RVPNL	61	JAN-18
199	Sarnath - Azamgarh - II	S/C	UPPTCL	60	JAN-18
200	LILO Urla - Khedamara (Bhilai) at Borjhara	M/C	CSPTCL	1	FEB-18
201	LILO of Bamnauli - Naraina at PPK-III	D/C	DTL	1	FEB-18

202	Vyankatpura - Waghodia (765kV PGCIL) line	D/C	GETCO	29	FEB-18
203	LILO of RTPS - Lingasugur at Mallat (Manvi)	D/C	KPTCL	6	FEB-18
204	Vasanthanarasapura - Antharasanahally	D/C	KPTCL	38	FEB-18
205	Pothencode - Kattakkada	D/C	KSEB	57	FEB-18
206	LILO of Indore - Indore - II (Jaitpura) line at Mangliya S/s	D/C	MPPTCL	1	FEB-18
207	LILO of one Ckt. Malanpur - Mehgaon line at CWRTL (Adani) S/s	D/C	MPPTCL	26	FEB-18
208	Aurangabad-II - Jalna MIDC (Negewadi)	D/C	MSETCL	77	FEB-18
209	Kalwa - Borivali	M/C	MSETCL	63	FEB-18
210	LILO of Katapalli - Bolangir at Bargarh (New)	D/C	OPTCL	1	FEB-18
211	LILO of GHTP - Talwandi Sabo at Maur	D/C	PSTCL	18	FEB-18
212	Mukatsar - Kotkapura Ckt.-I	S/C on D/C	PSTCL	39	FEB-18
213	Mukatsar - Malout	D/C	PSTCL	47	FEB-18
214	LILO of Howrah - Foundry Park at N. Chanditala.	M/C	WBSETCL	36	FEB-18
215	LILO of Jeerat - Kasba at Barasat	M/C	WBSETCL	10	FEB-18
216	LILO on Vita - Pandharpur line for Varkule - Malwadi Solar (M/s. Giriraj Solar)	D/C	MSETCL	19	MAR-18
217	LILO of one ckt Samaguri - Sarusajai line at Sonapur S/S	D/C	AEGCL	27	MAR-18
218	Darbhanga(DMTCL) - Supaul/Laukahi(BSPTCL)	D/C	BSPTCL	176	MAR-18
219	Magarwada (PG) - Magarwada	D/C	DANDD	2	MAR-18
220	Magarwada - Ringanwada	D/C	DANDD	12	MAR-18
221	LILO of both ckt. Tebhda - Rajkot line at Kalavad S/s	D/C	GETCO	21	MAR-18
222	LILO of Jamnagar - Jetpur line-II at Sikka	D/C	GETCO	117	MAR-18
223	LILO of one ckt. Vyankatpura - Achhalia line at Kawant	D/C	GETCO	167	MAR-18
224	Kairan-Chamera - II (PG)	D/C	HPPTCL	4	MAR-18
225	Amargarh (Delina) - Zainkote (2nd Ckt.)	S/C	JKPDD	43	MAR-18
226	LILO of Zainkote - Dalina at Amargarh	2xD/C	JKPDD	12	MAR-18
227	Gwalior (PG) - Gwalior (MP) - 2nd circuiting	D/C	MPPTCL	3	MAR-18
228	Morena (Adani) - Morena (MP)	D/C	MPPTCL	49	MAR-18
229	Chandrapur - II - Chandrapur MIDC (Tadali)	D/C	MSETCL	81	MAR-18
230	Kumbhargaon - Krishnoor line ckt.-II	D/C	MSETCL	16	MAR-18
231	LILO on 220 kV Deepnagar - Amalner at Viroda	D/C	MSETCL	20	MAR-18
232	Partur - Nagewadi line	D/C	MSETCL	126	MAR-18
233	Ludhiana - Doraha	D/C	PSTCL	28	MAR-18
234	Nabha -Bhawanigarh	S/C on D/C	PSTCL	40	MAR-18
235	Nakodar - Rehana	D/C	PSTCL	71	MAR-18
236	LILO of 1st ckt. Saharanpur - Khodri line at Sarsawa	D/C	UPPTCL	14	MAR-18

237	LILO of 1st ckt. Sarojni Nagar - Unnao at Kanpur Road	D/C	UPPTCL	9	MAR-18
238	LILO of Chinhat - Raebareli (PG) line at CG City Lko	D/C	UPPTCL	3	MAR-18
239	LILO of Gorakhpur (PG) - Basti at Bansi	D/C	UPPTCL	95	MAR-18
240	LILO of Gr. Noida (400) - Sec.129 at Noida Sector - 148	D/C	UPPTCL	1	MAR-18
241	Neebkarori - Mainpuri line	D/C	UPPTCL	70	MAR-18
242	Sitapur - Nighasan line	S/C	UPPTCL	109	MAR-18
			Total of STATE SECTOR	**4916**	
PRIVATE SECTOR					
243	Haldia TPP (IPCL) - New Haldia (WBSETCL)	D/C	IPCHL	5	MAY-17
244	Tashiding - Legship	D/C	SEPL	17	MAR-18
			Total of PRIVATE SECTOR	**22**	
			Total of 220 kV	**5182**	
			Grand Total	**23119**	

ANNEXURE-3J
(Item 3.26)

As on 31-Mar-2018

Sub-Stations Completed During FY - 2017-18

Sl No	Name of Sub Stations	Voltage Ratio (kV/kV)	Executing Agency	Capacity (MW/ MVA)	Month of Completion
1	2	3	4	5	6
800 kV					
CENTRAL SECTOR					
1	Champa and Kurukshetra HVDC S/S (Pole - II)	800	PGCIL	1500	JUN-17
2	Alipurduar and Agra (Extn) HVDC S/S (Pole -4)	800	PGCIL	1500	SEP-17
			TOTAL CENTRAL SECTOR	**3000**	
			TOTAL 800 kV	**3000**	
765 kV					
CENTRAL SECTOR					
3	Nizamabad s/s (ICT-II)	765/400	PGCIL	1500	APR-17
4	Bay Extn. at 765KV Jabalpur Pooling Station. (Gadarwara Part A)	765/400	PGCIL	0	MAY-17
5	Bay Extn. at 765/400/220KV KanpurS/stn.	765	PGCIL	0	MAY-17
6	Bay Extn. at 765/400/220KV Lucknow S/stn.	765	PGCIL	0	MAY-17
7	Hyderabad (Maheshwaram) (GIS) S/S - (ICT-I)	765/400	PGCIL	1500	JUL-17
8	Bay Extn. at 765/400KV Hyderabad S/stn for 765KV D/C Nizamabad - Hyderabad line	765/400	PGCIL	0	JUL-17
9	Extn. Ranchi S/S	765/400	PGCIL	0	JUL-17
10	Vindhyachal Pooling Station	765/400	PGCIL	1500	JUL-17
11	Bay Extn. at 765/400KV Kanpur GIS	765/400	PGCIL	0	SEP-17
12	Hyderabad (Maheshwaram) (GIS) S/S - (ICT-II)	765/400	PGCIL	1500	SEP-17
13	Padghe S/S GIS	765/400	PGCIL	3000	DEC-17
14	Ajmer S/S	765/400	PGCIL	3000	DEC-17
15	Chittorgarh S/S	765/400	PGCIL	3000	DEC-17
16	Orai (ICT-I)	765/400	PGCIL	1000	MAR-18
			TOTAL CENTRAL SECTOR	**16000**	
STATE SECTOR					
17	Anta GSS (ICT-3)	765/400	RVPNL	1500	APR-17
18	Unnao (Addl ICT- III) s/s	765/400	UPPTCL	1000	JUN-17

19	765 kV S/S Greater Noida (New) ICT-II	765/400	UPPTCL	1500	FEB-18
	TOTAL STATE SECTOR			**4000**	
PRIVATE SECTOR					
20	Hapur AIS (ICT-II)	765/400	WUPPTCL	1500	AUG-17
21	Hapur (New) ICT-I	765/400	WUPPTCL	1500	JAN-18
	TOTAL PRIVATE SECTOR			**3000**	
	TOTAL 765 kV			**23000**	
400 kV					
CENTRAL SECTOR					
22	Extn. Vadodara S/S (GIS)	400/220	PGCIL	1000	APR-17
23	Agra (Extn.) s/s	400/220	PGCIL	315	JUN-17
24	Trichy (Extn.)	400/220	PGCIL	500	JUN-17
25	Ballabhgarh S/S (Replacement of ICT-III and ICT-IV) ((500-315)	400/220	PGCIL	370	JUN-17
26	Itarsi S/S	400/220	PGCIL	500	JUL-17
27	Gurgaon S/s 4th-ICT (Aug.) (under NRSS-XXXII)	400/220	PGCIL	500	JUL-17
28	Betul (GIS) S/S	400/220	PGCIL	630	JUL-17
29	Mainpuri Extn.	400/220	PGCIL	500	AUG-17
30	Kala Amb S/S (PKATL-TBCB)	400/220	PGCIL	630	AUG-17
31	Bay Extn. at 400/220KV Sholapur S/stn.	400	PGCIL	0	SEP-17
32	Maithon S/S (Replacement of ICT-II) (500-315)	400/220	PGCIL	185	OCT-17
33	Kaithal s/s (Extn.)	400/220	PGCIL	315	OCT-17
34	Satna s/s (Extn.)	400/220	PGCIL	500	OCT-17
35	Tumkur (Pavagada) Pooling Station (ICT-I)	400/220	PGCIL	500	OCT-17
36	Jamshedpur S/S	400/220	PGCIL	315	DEC-17
37	Narendra S/S - (ICT-I) Repl.	400/220	PGCIL	185	DEC-17
38	Parbati S/S (PS)	400/220	PGCIL	630	DEC-17
39	Gurgaon S/S - (ICT)	400/220	PGCIL	500	DEC-17
40	Bay Extn at 400KV Tuticorin Pooling Stn.	400	PGCIL	0	DEC-17
41	Tumkur (Pavagada) PS (3x500) (ICT-II)	400/220	PGCIL	500	FEB-18
42	400/220kV Patna S/S	400/220	PGCIL	500	FEB-18
43	Extn. at Sikar S/S	400/220	PGCIL	500	MAR-18
44	Extn at Tirunelveli S/s	400/220	PGCIL	500	MAR-18
45	Rewa (ICT-I and II)	400/220	PGCIL	1000	MAR-18
46	Extn. at Karaikudi s/s	400/230	PGCIL	500	MAR-18
47	Daltonganj (ICT-I)	400/220	PGCIL	315	MAR-18
48	Extn.at Daltonganj S/S	400/220	PGCIL	320	MAR-18
49	Extn. at Kozhikode S/s	400/220	PGCIL	500	MAR-18
50	Yehlanka	400/220	PGCIL	1000	MAR-18
51	Extn. at Arasur S/s	400/230	PGCIL	500	MAR-18
	TOTAL CENTRAL SECTOR			**14210**	

STATE SECTOR					
52	Maath (Mathura) s/s (ICT-1)	400/220	UPPTCL	315	APR-17
53	Azamgarh (ICT-1) (Aug 500-315)	400/220	UPPTCL	185	APR-17
54	Maath Mathura (New) (ICT-II)	400/220	UPPTCL	315	MAY-17
55	Banda (New) (ICT-I)	400/220	UPPTCL	315	MAY-17
56	Agra (Aug) (500-315)	400/220	UPPTCL	185	MAY-17
57	Sultanpur (Additional) s/s	400/220	UPPTCL	315	MAY-17
58	Veltoor (Aug.)	400/220	TSTRANSCO	315	JUN-17
59	Thervaigandigai	400/230/110	TANTRANSCO	830	JUN-17
60	Manali (GIS)	400/230/110	TANTRANSCO	1030	JUN-17
61	Dindi S/S	400/220	TSTRANSCO	630	JUN-17
62	Rasipalayam S/S	400/230	TANTRANSCO	1030	JUN-17
63	Gani (3x500 - ICT-II)	400/220	APTRANSCO	500	JUN-17
64	Agra (South) S/S	400/132	UPPTCL	600	JUN-17
65	Kasara Mau (Addl ICT-III) S/s	400/132	UPPTCL	200	JUN-17
66	Vemagiri (Aug) (ICT-III)	400/220	APTRANSCO	315	JUN-17
67	Jammalamudgu (ICT-II) (GEC-I)	400/220/132	APTRANSCO	315	JUN-17
68	Uravakonda (Aug) (ICT-I)	400/220	APTRANSCO	500	JUN-17
69	Dhuri (New) (Addl.)	400/220	PSTCL	500	JUL-17
70	Gani (3x500 - ICT-III)	400/220	APTRANSCO	500	JUL-17
71	Maheswaram S/S	400/220	TSTRANSCO	500	AUG-17
72	Rasipalayam S/S (ICT-6)	400/110	TANTRANSCO	200	AUG-17
73	Manali (Addl)	400/110	TANTRANSCO	200	AUG-17
74	Alamathy	400/110	TANTRANSCO	200	AUG-17
75	Bhadla (Distt. Jodhpur)-ICT-1	400/220	RVPNL	500	AUG-17
76	Asupaka S/S	400/220	TSTRANSCO	315	AUG-17
77	New Chanditala 400kV S/s	400/220	WBSETCL	315	AUG-17
78	Dharmapuri (Palavady) 200MVA-ICT-II	400/110	TANTRANSCO	200	SEP-17
79	Dharmapuri (Palavady)-ICT-II	400/230	TANTRANSCO	315	SEP-17
80	Narsapur (ICT-II)	400/220	TSTRANSCO	315	SEP-17
81	New Chanditala 400kV- (ICT-II)	400/220	WBSETCL	315	SEP-17
82	Bhadla (Distt Jhodpur)-ICT-II	400/220	RVPNL	500	SEP-17
83	Sultanpur (Aug.) (315-240)	400/220	UPPTCL	75	OCT-17
84	Jagdalpur (ICT-I)	400/220	CSPTCL	315	NOV-17
85	Anaikadavu SS	400/230/110	TANTRANSCO	1030	NOV-17
86	Chhegaon Addl. (Distt. Khandwa) (Makhan)	400/220	MPPTCL	315	NOV-17
87	Orai (New) (ICT-II)	400/220	UPPTCL	315	NOV-17
88	Padhge ICT Repl(500-315)	400/220	MSETCL	185	NOV-17
89	Maheshwaram (2x500)-ICT-II	400/220	TSTRANSCO	500	NOV-17
90	Narsapur-ICT-III	400/220	TSTRANSCO	315	NOV-17
91	Sholinganallur (Ottinmbakkam) S/S	400/230/110	TANTRANSCO	830	DEC-17

92	Moradabad (Aug.) S/S (500 - 315)	400/220	UPPTCL	185	DEC-17
93	Muradnagar -II (Aug.) S/S (315-240)	400/220	UPPTCL	75	DEC-17
94	Kudus New S/S - (ICT-I)	400/220	MSETCL	500	DEC-17
95	Gorkhpur (Aug.) (500-240)	400/220	UPPTCL	260	JAN-18
96	Hinjewadi II (GIS)	400/220	MSETCL	1000	FEB-18
97	Jejuri (Addl.)	400/220/33	MSETCL	500	MAR-18
98	Muradnagar-I (Aug.) (500-315)	400/220	UPPTCL	185	MAR-18
99	GSS Babai S/S	400/220	RVPNL	315	MAR-18
100	Sanand	400/220	GETCO	500	MAR-18
101	Mardam	400/220	APTRANSCO	630	MAR-18
102	Kudus (ICT -II)	400/220	MSETCL	500	MAR-18
103	Chandrapur-II (Addl.)	400/220	MSETCL	500	MAR-18
104	Aurangabad-II (Thaptitanda) (Addl.)	400/220	MSETCL	500	MAR-18
	TOTAL STATE SECTOR			**22300**	
PRIVATE SECTOR					
105	Darbhanga (GIS) (DMTCL - TBCB)	400/220	ESSEL	1000	APR-17
106	Nehtaur (Bijnor) (New) AIS	400/132	WUPPTCL	200	JUN-17
107	Gonda AIS	400/220	SEUPPTCL	630	JUL-17
108	Motihari (GIS) (DMTCL -TBCB)	400/132	ESSEL	400	AUG-17
109	Ataur	400/220	WUPPTCL	500	SEP-17
110	Indirapuram (New)	400/220	WUPPTCL	1000	OCT-17
111	Dasna GIS	400/220	WUPPTCL	630	NOV-17
112	Ataur (New)- ICT-II	400/220	WUPPTCL	500	NOV-17
113	Morena S/S (C-WRTL - TBCB)	400/220	APL	630	FEB-18
	TOTAL PRIVATE SECTOR			**5490**	
	TOTAL 400 kV			**42000**	
230 kV					
STATE SECTOR					
114	Oragadam (3rd Auto) s/s	230/110	TANTRANSCO	100	MAY-17
115	Kumbakkonam (JICA) S/S	230/110	TANTRANSCO	200	JUN-17
116	Central CMRL (GIS) (JICA)	230/110	TANTRANSCO	200	JUN-17
117	Eachangadu S/S	230/110	TANTRANSCO	30	JUL-17
118	Valayapatty	230/110	TANTRANSCO	80	JUL-17
119	Mondipatty (1x80)	230/110	TANTRANSCO	80	SEP-17
120	Jambunathapuram	230/110	TANTRANSCO	200	NOV-17
121	Anuppankulam (Enhancement from 1x100- 1x60)	230/110	TANTRANSCO	60	FEB-18
122	Pudukkottai (Additional Transformer)	230/110	TANTRANSCO	160	FEB-18
123	Savasapuram	230/110	TANTRANSCO	100	MAR-18
	TOTAL STATE SECTOR			**1210**	
	TOTAL 230 kV			**1210**	
220 kV					
CENTRAL SECTOR					

124	Balipara S/S -ICT-I (Repl. 1x160-1x50)	220/132	PGCIL	110	SEP-17
125	(J and K) Khalsti S/S	220/66	PGCONSULTANCY	50	NOV-17
126	(J and K) Leh S/S	220/66	PGCONSULTANCY	125	NOV-17
127	Raebareli SS (Repl. of 100 MVA to 200MVA)- ICT-1	220/132	PGCIL	100	NOV-17
128	Raebareli SS)Repl. of 100 MVA - 200 MVA)- (ICT-II)	220/132	PGCIL	100	FEB-18
	TOTAL CENTRAL SECTOR			**485**	
STATE SECTOR					
129	Meerpur Kurali s/s (ICT-1)	220/66	HVPNL	100	APR-17
130	Sec-1 IMT Manesar s/s	220/66	HVPNL	60	APR-17
131	Chandausi (Sambhal) (ICT-II)	220/132	UPPTCL	160	APR-17
132	Chhata (Mathura) s/s (ICT-1)	220/132	UPPTCL	160	APR-17
133	Nanauta (ICT-I) (Aug200-100)	220/132	UPPTCL	100	APR-17
134	Sadaipur s/s (ICT-1)	220/132	WBSETCL	160	APR-17
135	Omega Industrial Estate s/s	220/110	TANTRANSCO	200	APR-17
136	Taramani (4th Auto Trf)	220/110	TANTRANSCO	100	APR-17
137	Basti (ICT-1) (Aug 200-160)	220/132	UPPTCL	40	APR-17
138	Bharthana (Etawah) (ICT-1)(Aug 160-100)	220/132	UPPTCL	60	APR-17
139	Morena (new) s/s	220/132	MPPTCL	160	APR-17
140	Vile Bhagad s/s (ICT-II)	220/22	MSETCL	25	APR-17
141	Bonai S/S (ICT-1)	220/33	OPTCL	20	APR-17
142	RA Puram (GIS) UG (JICA)	220/33	TANTRANSCO	200	APR-17
143	Allahabad (Rewa Road) (Augmentation of 160MVA ICT-II)	220/132	UPPTCL	40	MAY-17
144	Gurugram Sec-20 (GIS)	220/66	HVPNL	200	MAY-17
145	Sonta s/s (2nd T/F)	220/66	HVPNL	100	MAY-17
146	Bhawanigarh s/s	220/66	PSTCL	160	MAY-17
147	Kotla Jagan s/s	220/66	PSTCL	60	MAY-17
148	Mhaisal s/s (Addl)	220/33	MSETCL	25	MAY-17
149	Airoli Knowledge Park s/s	220/22	MSETCL	50	MAY-17
150	Bhelupur - (ICT -II)	220/132	UPPTCL	60	MAY-17
151	Chinchwad-II (Addl-ICT) s/s	220/132	MSETCL	200	MAY-17
152	Kharghar S/s	220/33	MSETCL	50	JUN-17
153	Mandalgarh S/s	220/132	RVPNL	100	JUN-17
154	Warud S/S	220/132	MSETCL	200	JUN-17
155	Jorian (Aug) S/s	220/132	HVPNL	60	JUN-17
156	Bhestan S/S	220/66	GETCO	300	JUN-17
157	Bechraji S/S	220/66	GETCO	200	JUN-17
158	Dharamkot (Addl)	220/66	PSTCL	100	JUN-17
159	Bahadurgarh (Bhater) (Aug.)	220/66	PSTCL	100	JUN-17
160	Bagha Purana (Addl)	220/66	PSTCL	100	JUN-17
161	Magadi	220/66	KPTCL	200	JUN-17

162	Chinthamani (Aug.)	220/66	KPTCL	100	JUN-17
163	Gurgaon Sector - 33 S/s	220/66	HVPNL	160	JUN-17
164	Masjid Moth (Addl.)	220/33	DTL	100	JUN-17
165	Sector -6 Sonipat S/S	220/33	HVPNL	100	JUN-17
166	Bhokardhan (2nd Trf.)	220/33	MSETCL	50	JUN-17
167	Vallabhipur S/S	220/66	GETCO	100	JUN-17
168	Hapur (New)(ICT-II)	220/132/33	UPPTCL	180	JUN-17
169	Musahari S/S	220/132/33	BSPTCL	320	JUN-17
170	Motipur (GSS) (Bikhanpura new) S/S	220/132/33	BSPTCL	320	JUN-17
171	Goddumarri	220/11	APTRANSCO	100	JUN-17
172	Yellanur	220/11	APTRANSCO	50	JUN-17
173	Barahua/ Gorakhpur (Aug)	220/132	UPPTCL	60	JUN-17
174	Amroha (New) (ICT-I)	220/132	UPPTCL	160	JUN-17
175	Dichpally (Aug.)	220/132	TSTRANSCO	315	JUN-17
176	Pratapgarh (Upgradation)(160-100)	220/132	RVPNL	60	JUN-17
177	Peeragarhi (Addl.)	220/33	DTL	100	JUL-17
178	Karnal s/s	220/33	HVPNL	50	JUL-17
179	Panchgaon S/S	220/33	HVPNL	100	JUL-17
180	Mhaisal s/s (Addl-2)	220/33	MSETCL	25	JUL-17
181	Mahilpur (Addl)	220/66	PSTCL	100	JUL-17
182	Amroha (New)(ICT-II)	220/132	UPPTCL	160	AUG-17
183	Malegaon S/S	220/132	MSETCL	200	AUG-17
184	Lodhi Road GIS (Addl.)	220/33	DTL	100	AUG-17
185	Jammalamadugu (220kV ICT-I)	220/132	APTRANSCO	160	AUG-17
186	Talwandi Bhai (Addl)	220/66	PSTCL	160	AUG-17
187	Gurgaon Sector - 20 (Aug.)	220/66	HVPNL	100	SEP-17
188	Narsapur (ICT-II) (160 MVA)	220/132	TSTRANSCO	160	SEP-17
189	Narsapur (ICT-I) (100 MVA)	220/132	TSTRANSCO	100	SEP-17
190	Yawatmal (Addl ICT)	220/132	MSETCL	100	SEP-17
191	Jahangirabad (Aug.) (150-100)	220/132	UPPTCL	50	OCT-17
192	Mangliya S/s	220/132	MPPTCL	160	OCT-17
193	Miraj (Aug.) (200-100)	220/132	MSETCL	100	OCT-17
194	Balasore (3rd Trf.)	220/132	OPTCL	160	OCT-17
195	Sarnath (Aug.)	220/132	UPPTCL	200	OCT-17
196	Beed (Aug.)	220/33	MSETCL	25	OCT-17
197	Waluj (Aug.) (100-50)	220/33	MSETCL	50	OCT-17
198	Bonai (2nd Trf.)	220/33	OPTCL	20	OCT-17
199	Panchgaon	220/66	HVPNL	160	OCT-17
200	Kanjli (2nd Addl. Trf.)	220/66	PSTCL	100	OCT-17
201	Bassi (Said Pura)- ICT-III	220/66	PSTCL	100	NOV-17
202	Isherwal (Aug)	220/132	HVPNL	100	NOV-17
203	Pilibhit ICT-I	220/132	UPPTCL	100	NOV-17
204	Pandhurna S/S	220/132	MPPTCL	160	NOV-17
205	Pinjore s/s	220/66	HVPNL	100	NOV-17
206	Hinjewadi Trf repl. (100-50)	220/22	MSETCL	50	DEC-17

207	Pilibhit (New) S/S (ICT-II)	220/132	UPPTCL	100	DEC-17
208	Noida Sec.-62 S/S (Aug.) (160-100)	220/132	UPPTCL	60	DEC-17
209	Nanauta (Aug.) S/S (200-160)	220/132	UPPTCL	40	DEC-17
210	Anjangaon S/S	220/33	MSETCL	50	DEC-17
211	Sarna S/S (ICT-II)	220/66	PSTCL	100	DEC-17
212	Panchkula Sector- 32 S/S	220/66	HVPNL	200	DEC-17
213	Shatabdinagar (Aug.) S/S (200-160)	220/132	UPPTCL	40	DEC-17
214	Sitapur (Aug.) S/S (200-100)	220/132	UPPTCL	100	DEC-17
215	Shahdol (Upgradation)	220/132	MPPTCL	160	JAN-18
216	Khurja (Aug.) (200-160)-ICT-I	220/132	UPPTCL	40	JAN-18
217	Gr. Noida (Aug) (200-160)-ICT-II	220/132	UPPTCL	40	JAN-18
218	Bhugaon (Addl.)	220/132	MSETCL	100	JAN-18
219	Pappankalan-III	220/66	DTL	320	FEB-18
220	Karian S/S	220/33	HPPTCL	63	FEB-18
221	Sadaipur s/s (ICT-II)	220/132	WBSETCL	160	FEB-18
222	Satgachia Aug.	220/132	WBSETCL	160	FEB-18
223	New Chanditala ICT-III	220/132	WBSETCL	315	FEB-18
224	Krishna nagar (Aug.)	220/132	WBSETCL	160	FEB-18
225	Arambag (Aug.)	220/132	WBSETCL	160	FEB-18
226	Alipurduar S/S	220/132	WBSETCL	320	FEB-18
227	220kV S/S Shahjahanpur (Aug.) (200-100)	220/132	UPPTCL	100	FEB-18
228	220 kV S/S Sahupuri (Aug.) II (200-160)	220/132	UPPTCL	40	FEB-18
229	220kV S/S Nara Mzn (Aug.)I (200-160)	220/132	UPPTCL	40	FEB-18
230	220kV S/S Modipuram (Aug.)II(200-160)	220/132	UPPTCL	40	FEB-18
231	220kV S/S Gonda (Aug.) II (160-100)	220/132	UPPTCL	60	FEB-18
232	220 kV S/S Gajokhar (Aug.) I (160-100)	220/132	UPPTCL	60	FEB-18
233	220kV S/S Fatehpur (Aug(200-160)	220/132	UPPTCL	40	FEB-18
234	220 kV S/S Azamgarh-II (New)	220/132	UPPTCL	320	FEB-18
235	Bhadrak (ICT Repl.)	220/132	OPTCL	60	FEB-18
236	Jalna MIDC (Nagewadi)	220/132	MSETCL	150	FEB-18
237	Mansa (ICT Repl.)	220/66	PSTCL	60	FEB-18
238	KIADB Hardware Park Devanahalli S/S	220/66	KPTCL	200	FEB-18
239	Gururam Sec.-56	220/66	HVPNL	160	FEB-18
240	Kartarpur (160-100)	220/132	PSTCL	60	MAR-18
241	Meerpur Kurali s/s (ICT-2)	220/66	HVPNL	100	MAR-18
242	Zagadia	220/66	GETCO	160	MAR-18
243	Ukai (Hydro)	220/66	GETCO	160	MAR-18
244	Sanand	220/66	GETCO	160	MAR-18
245	Sachin (Talangpore)	220/66	GETCO	60	MAR-18

246	Botad s/s	220/66	GETCO	160	MAR-18
247	CG City (AIS) Lucknow (New)	220/33	UPPTCL	180	MAR-18
248	Malkangiri (ICT-II)	220/33	OPTCL	40	MAR-18
249	Mendhegiri (Wind)	220/33	MSETCL	50	MAR-18
250	Krishnoor S/S	220/33	MSETCL	25	MAR-18
251	Theur s/s (Addl.)	220/22	MSETCL	50	MAR-18
252	Bargarh New (ICT-I)	220/132/33	OPTCL	100	MAR-18
253	R.C. Green Gr. Noida (Aug.)	220/132	UPPTCL	160	MAR-18
254	Noida Sec-148 (New)	220/132	UPPTCL	160	MAR-18
255	Neebkarori Farrukhabad (New)	220/132	UPPTCL	100	MAR-18
256	Motiran Adda Gorakhpur (Aug.) (ICT-III (Addl.)	220/132	UPPTCL	160	MAR-18
257	Mirzapur (Aug.) (160-100)	220/132	UPPTCL	60	MAR-18
258	Bansi Siddharth Nagar (New)	220/132	UPPTCL	100	MAR-18
259	Agra (Aug.) (160-100)	220/132	UPPTCL	60	MAR-18
260	Rajla (160-100)	220/132	PSTCL	60	MAR-18
261	Palwal (Aug.)	220/66	HVPNL	160	MAR-18
262	Ahemednagar (Kedgaon) (Addl.)	220/132	MSETCL	200	MAR-18
263	Dadhibana (Aug.)	220/132	HVPNL	100	MAR-18
264	Shapur s/s	220/132	GETCO	100	MAR-18
265	Gotri	220/132	GETCO	300	MAR-18
			TOTAL STATE SECTOR	**16318**	
PRIVATE SECTOR					
266	Ataur (3x60 MVA)	220/33	WUPPTCL	180	SEP-17
			TOTAL PRIVATE SECTOR	**180**	
			TOTAL 220 kV	**16983**	
			GRAND TOTAL	**86193**	

ANNEXURE- 4A

Power Supply Position for 2017-18

	Energy				Peak			
State /	**April, 2017 - March, 2018**				**April, 2017 - March, 2018**			
System /	Energy Requirement	Energy Supplied	Energy not Supplied		Peak Demand	Peak Met	Demand not Me	
Region	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%
Chandigarh	1,610	1,601	9	1.0	363	363	0	0.0
Delhi	31,826	31,806	19	0.1	6,553	6,526	27	0.4
Haryana	50,775	50,775	0	0.0	9,671	9,539	132	1.4
Himachal Pradesh	9,399	9,346	53	0.6	1,594	1,594	0	0.0
Jammu & Kashmir	18,808	15,050	3,759	20.0	2,899	2,319	580	20.0
Punjab	54,812	54,812	0	0.0	11,705	11,705	0	0.0
Rajasthan	71,194	70,603	591	0.8	11,722	11,564	158	1.3
Uttar Pradesh	120,052	118,303	1,749	1.5	20,274	18,061	2,213	10.9
Uttarakhand	13,457	13,426	31	0.2	2,149	2,149	0	0.0
Northern Region	371,934	365,723	6,211	1.7	60,749	58,448	2,301	3.8
Chattisgarh	25,916	25,832	84	0.3	4,169	3,887	282	6.8
Gujarat	109,984	109,973	12	0.0	16,590	16,590	0	0.0
Madhya Pradesh	69,925	69,925	0	0.0	12,338	12,301	37	0.3
Maharashtra	149,761	149,531	230	0.2	22,542	22,494	48	0.2
Daman & Diu	2,534	2,534	0	0.0	362	362	0	0.0
Dadar Nagar Haveli	6,168	6,168	0	0.0	790	790	0	0.0
Goa	4,117	4,117	0	0.0	559	558	1	0.2
Western Region	368,405	368,080	326	0.1	50,477	50,085	392	0.8
Andhra Pradesh	58,384	58,288	96	0.2	8,993	8,983	10	0.1
Telangana	60,319	60,235	83	0.1	10,298	10,284	14	0.1
Karnataka	67,869	67,701	168	0.2	10,857	10,802	56	0.5
Kerala	25,002	24,917	85	0.3	3,892	3,870	22	0.6
Tamil Nadu	106,006	105,839	166	0.2	15,001	14,975	26	0.2
Puducherry	2,668	2,661	7	0.3	390	387	3	0.7
Lakshadweep#	47	47	0	0.0	9	9	0	0.0
Southern Region	320,248	319,642	606	0.2	47,385	47,210	175	0.4
Bihar	27,019	26,603	417	1.5	4,521	4,515	6	0.1
DVC	21,549	21,373	176	0.8	2,896	2,896	0	0.0
Jharkhand	7,907	7,753	154	1.9	1,332	1,260	72	5.4
Odisha	28,802	28,706	96	0.3	4,652	4,402	250	5.4
West Bengal	50,760	50,569	191	0.4	8,137	8,114	23	0.3
Sikkim	485	484	0	0.1	96	96	0	0.0

Andaman- Nicobar #	328	299	29	9.0	58	54	4	7.0
Eastern Region	136,522	135,489	1,034	0.8	20,794	20,485	309	1.5
Arunachal Pradesh	799	788	10	1.3	145	145	0	0.3
Assam	9,094	8,779	315	3.5	1,822	1,745	77	4.2
Manipur	874	827	46	5.3	202	195	7	3.2
Meghalaya	1,557	1,553	3	0.2	369	368	1	0.2
Mizoram	497	488	9	1.7	105	96	9	8.4
Nagaland	794	774	20	2.5	155	146	9	5.9
Tripura	2,602	2,553	49	1.9	342	342	0	0.0
NE Region	16,216	15,763	453	2.8	2,629	2,520	109	4.1
All India	1,213,326	1,204,697	8,629	0.7	164,066	160,752	3,314	2.0

Lakshadweep and Andaman & Nicobar Islands are stand- alone systems, power supply position of these doesn't form part of regional requirement and availability.

ANNEXURE-4-B

Details of Total Share of the States From Central Generating Stations

(As on 31-03-2018)

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**	**106**	4.7	1.4	**14**	**120**	**280**	0.35
2	Delhi	**4814**	**0**	0.0	0.0	**30**	**30**	**4844**	6.04
3	Haryana	**2576**	**0**	0.0	0.0	**15**	**15**	**2591**	3.23
4	Himachal Pradesh	**1489**	**15**	0.7	0.2	**0**	**15**	**1504**	1.87
5	Jammu & Kashmir	**1688**	**863**	38.1	11.0	**118**	**981**	**2669**	3.33
6	Punjab	**2214**	**37**	1.6	0.5	**30**	**67**	**2281**	2.84
7	Rajasthan	**2693**	**635**	28.0	8.1	**52**	**687**	**3380**	4.21
8	Uttar Pradesh	**5845**	**435**	19.2	5.5	**60**	**495**	**6340**	7.90
9	Uttarakhand	**907**	**170**	7.5	2.2	**0**	**170**	**1077**	1.34
10	Railways	**0**	**0**	0.0	0.0	**0**	**0**	**0**	0.00
11	PowerGrid	**5**	**4**	0.2	0.1	**0**	**4**	**9**	0.01
	Northern Region	**22390**	**2265**	100.0	28.9	**319**	**2584**	**24974**	**31.12**
12	Chhattisgarh	**1322**	**25**	1.4	0.3	**0**	**25**	**1347**	1.68
13	Gujarat	**3995**	**0**	0.0	0.0	**0**	**0**	**3995**	4.98
14	Madhya Pradesh	**4768**	**413**	23.4	5.3	**0**	**413**	**5181**	6.46
15	Maharashtra	**6641**	**382**	21.6	4.9	**0**	**382**	**7023**	8.75
16	Daman & Diu	**174**	**144**	8.1	1.8	**0**	**144**	**318**	0.40
17	Dadar Nagar Haveli	**244**	**707**	40.1	9.0	**0**	**707**	**951**	1.18
18	Goa	**497**	**81**	4.6	1.0	**0**	**81**	**578**	0.72
19	PowerGrid	**2.72**	**3**	0.2	0.0	**0**	**3**	**6.00**	0.01
20	Railways WR	**540**	**0**	0.0	0.0	**0**	**0**	**540**	0.67
21	HWP of DAE	**0**	**0**	0.0	0.0	**0**	**0**	**0**	0.00
22	BARC Facilities	**0**	**10**	0.6	0.1	**0**	**10**	**10**	0.01
	Western Region	**18184**	**1765**	100	22.5	**0**	**1765**	**19948**	**24.86**
23	Andhra Pradesh	**1935**	**586**	22.4	7.5	**0**	**586**	**2521**	3.14

24	Karnataka	**3127**	**801**	30.6	10.2	**0**	**801**	**3929**	4.90
25	Kerala	**1830**	**214**	8.2	2.7	**0**	**214**	**2045**	2.55
26	Tamil Nadu	**5838**	**481**	18.4	6.1	**0**	**481**	**6319**	7.87
27	Telangana	**2027**	**381**	14.5	4.9	**0**	**381**	**2408**	3.00
28	Pondicherry	**334**	**149**	5.7	1.9	**0**	**149**	**483**	0.60
29	NLC	**100**	**0**	0.0	0.0	**0**	**0**	**100**	0.12
30	PowerGrid	**0**	**6**	0.2	0.1	**0**	**6**	**6**	0.01
	Southern Region	**15191**	**2619**	100.0	33.4	**0**	**2619**	**17810**	**22.19**
31	Bihar	**2902**	**604**	65.1	7.7	**12**	**616**	**3518**	4.38
32	DVC	**6478**	**8**	0.9	0.1	**8**	**16**	**6494**	8.09
33	Jharkhand	**596**	**138**	14.9	1.8	**5**	**143**	**739**	0.92
34	Orissa	**1801**	**77**	8.3	1.0	**6**	**83**	**1884**	2.35
35	West Bengal	**1499**	**86**	9.3	1.1	**18**	**104**	**1603**	2.00
36	Sikkim	**156**	**12**	1.2	0.1	**1**	**13**	**169**	0.21
37	Railway	**450**	**0**	0.0	0.0	**0**	**0**	**450**	0.56
37	PowerGrid	**0**	**1**	0.1	0.0	**0**	**1**	**1**	0.00
	Eastern Region	**13882**	**927**	100.0	11.8	**50**	**977**	**14859**	**18.52**
38	Arunachal Pradesh	**169**	**3**	1.3	0.0	**9**	**12**	**181**	0.23
39	Assam	**1039**	**117**	44.2	1.5	**148**	**265**	**1304**	1.62
40	Manipur	**191**	**27**	10.0	0.3	**0**	**27**	**218**	0.27
41	Meghalaya	**207**	**82**	30.9	1.0	**0**	**82**	**289**	0.36
42	Mizoram	**95**	**23**	8.5	0.3	**8**	**31**	**126**	0.16
43	Nagaland	**123**	**11**	4.3	0.1	**1**	**12**	**136**	0.17
44	Tripura	**402**	**2**	0.7	0.0	**0**	**2**	**404**	0.50
44	PowerGrid	**2.5**	**0.0**	0.0	0.0	**0**	**0.0**	**2.5**	0.00
	North-Eastern Region	**2229**	**265**	100.0	3.4	**166**	**431**	**2659**	**3.31**
	Grand Total	**71876**	**7840**		100.00	**535**	**8375**	**80251**	**100.00**

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.**

ANNEXURE - 5A

PFRS under 50 000 MW Hydroelectric Initiative

Statewise List of Schemes

	Scheme	Consultant	Installed Capacity			Head (m)	Annual Energy (GWh)	Tariff (Rs/kWh)
			Nos of Units	Size(MW)	Total (MW)			
Andhra Pradesh								
1	Pondugala	WAPCOS	3	27	81	18.67	399.36	3.48
	Total (Andhra Pradesh) 1 schemes		3		81			
Arunachal Pradesh								
2	Agoline	NHPC	3	125	375	163.00	1267.38	3.51
3	Amulin	NHPC	3	140	420	132.00	1716.40	3.37
4	Ashupani	NHPC	2	15	30	395.00	126.45	8.75
5	Attunli	NHPC	4	125	500	264.00	2247.32	2.35
6	Badao	NEEPCO	4	30	120	154.50	441.00	2.32
7	Bhareli-I	NEEPCO	8	140	1120	97.00	4112.40	1.85
8	Bhareli-II	NEEPCO	5	120	600	51.00	2345.00	1.67
9	Chanda	NEEPCO	4	27.5	110	175.67	401.91	2.67
10	Demwe	NHPC	12	250	3000	138.00	10823.82	1.97
11	Dengser	NHPC	4	138	552	120.00	2666.71	3.26
12	Dibbin	NEEPCO	2	50	100	151.24	335.72	2.23
13	Duimukh	NHPC	3	50	150	65.00	551.48	8.50
14	Elango	NHPC	3	50	150	363.00	583.14	5.00
15	Emini	NHPC	4	125	500	125.00	1695.45	3.51
16	Emra-II	NHPC	3	130	390	278.00	1648.09	3.02
17	Etabue	NHPC	3	55	165	378.00	683.66	3.43
18	Etalin	NHPC	16	250	4000	385.00	16071.60	1.70
19	Hirong	NHPC	4	125	500	285.00	2535.80	1.62
20	Hutong	WAPCOS	12	250	3000	166.77	9901.00	1.28
21	Kalai	WAPCOS	10	260	2600	193.21	10608.64	1.01
22	Kameng Dam	NEEPCO	5	120	600	65.00	2345.55	2.29
23	Kapakleyak	NEEPCO	4	40	160	245.00	627.95	1.74
24	KurungI&II	NHPC	3	110	330	151.00	1435.40	4.04
25	Mihumdon	NHPC	4	100	400	286.00	1451.75	3.60
26	Mirak	NHPC	3	47	141	136.40	748.44	3.42
27	Naba	NHPC	4	250	1000	221.00	3995.25	2.14
28	Nalo	NHPC	4	90	360	221.00	1733.00	3.27
29	Naying	NHPC	4	250	1000	245.00	5077.15	1.18
30	Niare	NHPC	4	200	800	205.00	3356.62	2.02
31	Oju-I	NHPC	4	175	700	257.00	3291.58	2.08
32	Oju-II	NHPC	4	250	1000	322.00	4629.93	1.46
33	Pakke	NEEPCO	2	55	110	452.50	335.26	3.33
34	Papu	NEEPCO	2	100	200	238.00	505.00	2.94
35	Phanchung	NEEPCO	2	30	60	157.13	174.83	3.24
36	Ringong	NHPC	3	50	150	166.50	659.07	3.61
37	Sebu	NEEPCO	2	40	80	123.00	227.53	3.71
38	Simang	NHPC	3	30	90	125.00	417.82	5.43
39	Talong	NEEPCO	3	100	300	171.67	915.50	2.24
40	Tarangwarang	NEEPCO	2	15	30	185.55	93.81	2.88
41	Tato-II	NHPC	4	175	700	168.00	3465.90	1.48
42	Tenga	NEEPCO	4	150	600	875.00	1046.50	3.52
43	Utung	NEEPCO	3	33.3	100	291.00	359.13	3.10
	Total (Arunachal Pr.) 42 schemes		**182**		**27293**			

	Scheme	Consultant	Installed Capacity			Head (m)	Annual Energy (GWh)	Tariff (Rs/kWh)
			Nos of Units	Size(MW)	Total (MW)			
Chhattisgarh								
44	Kotri	WAPCOS	3	50	150	36.99	330.95	5.48
45	Nugur-I	WAPCOS	5	34	170	24.54	316.13	4.89
46	Nugur-II	WAPCOS	5	42	210	16.66	787.78	4.16
47	Rehar-I	WAPCOS	3	57	171	46.84	264.38	8.70
48	Rehar-II	WAPCOS	3	49	147	38.17	290.32	5.16
	Total (Chhattisgarh) - 5 schemes		**19**		**848**			
Himachal Pradesh								
49	Bajoli Holi	HPSEB	3	60	180	278.00	762.98	2.03
50	Bardang	HPSEB	*3*	*38*	114	55.00	438.41	2.91
51	Chamba	HPSEB	3	42	126	110.00	646.82	1.48
52	Chhatru	HPSEB	3	36	108	160.00	455.72	2.89
53	Gharopa	HPSEB	3	38	114	169.00	534.25	2.09
54	Gondhala	HPSEB	3	48	144	134.00	586.08	1.92
55	Jangi Thopan	HPSEB	3	160	480	174.14	1779.45	2.00
56	Khab-I	SJVNL	3	150	450	170.00	1551.00	2.24
57	Khab-II	SJVNL	3	62	186	70.00	640.00	3.04
58	Khoksar	HPSEB	3	30	90	99.00	351.91	2.46
59	Luhri	HPSEB	3	155	465	88.00	1825.13	2.41
60	Thopan Powari	HPSEB	3	160	480	161.14	1786.26	1.81
61	Tidong-I	HPSEB	2	30	60	511.50	211.65	2.71
62	Tidong-II	HPSEB	2	35	70	575.00	256.18	2.02
63	Yangthang	HPSEB	3	87	261	186.45	938.02	2.08
	Total (Himachal Pr.) 15 schemes		**43**		**3328**			
Jammu & Kashmir								
64	Barinium	WAPCOS	2	120	240	117.77	1170.34	2.54
65	Bichlari	WAPCOS	2	17.5	35	462.60	148.29	1.11
66	Dumkhar	NHPC	3	15	45	27.80	219.18	4.66
67	Kanyunche	NHPC	3	15	45	28.76	223.02	4.71
68	Karkit	NHPC	3	10	30	26.90	153.11	5.40
69	Kawar	WAPCOS	4	80	320	74.00	1426.56	1.09
70	Khalsi	NHPC	3	20	60	33.00	272.60	4.10
71	Kiru	WAPCOS	4	107.5	430	105.33	1935.77	0.77
72	Ratle	WAPCOS	4	140	560	92.33	2483.37	1.40
73	Shamnot	WAPCOS	4	92.5	370	56.33	1650.19	1.69
74	Shuas	WAPCOS	2	115	230	115.70	1117.87	2.94
75	Takmaching	NHPC	3	10	30	18.53	145.52	5.54
76	Ujh	WAPCOS	4	70	280	143.33	465.06	5.06
	Total (J & K) - 13 schemes		**41**		**2675**			
Karnataka								
77	Agnashini	KPCL	4	150	600	427.00	1431.00	1.07
78	Gangavali	KPCL	2	200	400	378.30	759.00	1.46
79	Gundia	KPCL	2	150	300	600.00	616.00	1.41
80	Kalinadi Stage-III	KPCL	2	150	300	407.67	610.00	1.67
81	Tamankal	KPCL	2	150	300	87.29	401.00	3.32
	Total (Karnataka) - 5 schemes		**12**		**1900**			
Kerala								
82	Karappara Kuriarkutty PH1	WAPCOS	2	18	66	390.00	126.10	7.88
	PH2		2	15		307.00		
83	Perianjakully	WAPCOS	2	30	60	282.90	86.30	6.25
	Total (Kerala) - 2 schemes		**6**		**126**			
Madhya Pradesh								
84	Basania	NHPC	3	30	90	38.00	240.00	17.23
85	Bauras	NHPC	3	18.33	55	17.50	248.43	3.96
86	Hoshangabad	NHPC	3	20	60	16.50	288.21	4.10
	Total (Madhya Pradesh) - 3 schemes		**9**		**205**			

	Scheme	Consultant	Installed Capacity			Head (m)	Annual Energy (GWh)	Tariff (Rs/kWh)
			Nos of Units	Size(MW)	Total (MW)			
Maharashtra								
87	Ghargaon	WAPCOS	4	13	52	9.84	74.47	15.50
88	Hiranyakeshi	WAPCOS	2	9	18	36.10	23.76	20.26
89	Kadvi	WAPCOS	2	11	22	36.30	29.59	34.03
90	Kasari	WAPCOS	2	12.5	25	40.67	33.32	18.16
91	Kumbhi	WAPCOS	2	8.5	17	37.48	22.93	35.19
92	Kunghara	WAPCOS	4	18	72	12.77	133.40	11.34
93	Pranhita	WAPCOS	2	24	48	25.30	135.96	10.32
94	Samda	WAPCOS	4	13	52	10.64	83.40	14.11
95	Wainganga	WAPCOS	5	21	105	19.74	246.15	3.86
	Total (Maharashtra) - 9 schemes		**27**		**411**			
Manipur								
96	Khongnum Chakka st.-II	WAPCOS	2	33.5	67	281.25	192.84	4.59
97	Nunglieban	WAPCOS	2	52.5	105	82.42	268.93	5.16
98	Pabaram	WAPCOS	2	95	190	116.67	474.77	4.33
	Total (Manipur) - 3 Nos. schemes		**6**		**362**			
Meghalaya								
99	Mawblei	WAPCOS	2	70	140	400.33	303.66	4.44
####	Mawhu	WAPCOS	3	40	120	438.15	482.96	1.40
####	Mawput	WAPCOS	3	7	21	93.42	83.95	4.07
####	Nongkolait	WAPCOS	2	60	120	463	332.87	1.97
####	Nongnam	WAPCOS	2	25	50	215.17	212.59	2.44
####	Rangmaw	WAPCOS	2	32.5	65	321.00	229.60	2.32
####	Selim	WAPCOS	2	85	170	433.67	534.68	2.02
####	Sushen	WAPCOS	2	32.5	65	114.58	220.6	3.85
####	Umduna	WAPCOS	3	19	57	253.17	231.24	1.68
####	Umjaut	WAPCOS	3	23	69	375.20	276.70	1.51
####	Umngi	WAPCOS	2	27	54	304.75	89.65	2.86
	Total (Meghalaya) - 11 Nos. schemes		**26**		**931**			
Mizoram								
####	Boinu	WAPCOS	4	160	640	158.67	1118.93	4.83
####	Lungleng	WAPCOS	5	163	815	219.67	1169.06	4.17
####	Tlawng	WAPCOS	2	22.5	45	123.67	151.67	5.84
	Total (Mizoram) - 3 Nos. schemes		**11**		**1500**			
Nagaland								
####	Dikhu	NEEPCO	4	35	140	79.44	513.41	2.8
####	Tizu	NEEPCO	3	50	150	64.19	568.41	2.56
####	Yangnyu	NEEPCO	2	20	40	115	176.45	4.48
	Total (Nagaland) - 3 Nos. schemes		**9**		**330**			
Orissa								
####	Baljori	WAPCOS	2	89	178	165.75	479.8	5.9
####	Lower Kolab	WAPCOS	3	155	465	196.9	845.86	7.1
####	Naraj	WAPCOS	7	41	287	16.14	759.31	4.92
####	Tikarpara	WAPCOS	7	37	259	16.97	828.37	3.69
	Total (Orissa) - 4 Nos. schemes		**19**		**1189**			
Sikkim								
####	Dikchu	NHPC	3	35	105	352	469	2.15
####	Lachen	NHPC	3	70	210	350	865.94	2.35
####	Lingza	NHPC	3	40	120	736	477.51	2.85
####	Panan	NHPC	4	50	200	312	762	2.15
####	Rangyong	NHPC	3	47	141	723.18	639.52	2.7
####	Ringpi	NHPC	2	35	70	1106.4	317.41	3.17
####	Rongni Storage	NHPC	3	65	195	442	**510.35**	8.6
####	Rukel	NHPC	3	11	33	537.1	149.41	5.48
####	Talem	NHPC	3	25	75	393.19	305.48	4.34
####	Teesta-I	NHPC	4	80	320	576.85	1298.12	1.8
	Total (Sikkim) - 10 Nos. schemes		**31**		**1469**			

	Scheme	Consultant	Installed Capacity			Head (m)	Annual Energy (GWh)	Tariff (Rs/kWh)
			Nos of Units	Size(MW)	Total (MW)			
Uttaranchal								
####	Arakot Tiuni	UJVNL	3	24	72	250.2	382.9	1
####	Badrinath	WAPCOS	2	70	140	459.67	702.7	0.81
####	Bagoli Dam	UJVNL	3	24	72	139.5	340.7	4.1
####	Bhaironghati	WAPCOS	2	32.5	65	108.9	293.18	1.8
####	Bogudiyar - Sirkari Bhyal	WAPCOS	2	85	170	344.47	744	1.99
####	Bokang Baling	WAPCOS	3	110	330	455.2	1124.62	1.68
####	Chhunger - Chal	WAPCOS	2	120	240	292.83	853.28	1.13
####	Deodi	WAPCOS	2	30	60	560.3	296.76	1.37
####	Devsari	WAPCOS	3	100	300	227.5	878.5	2.77
####	Gangotri	WAPCOS	1	55	55	336.33	264.76	1.62
####	Garba Tawaghat	WAPCOS	3	210	630	470.97	2483.11	0.9
####	Gohana Tal	WAPCOS	2	30	60	584.52	269.35	1.64
####	Harsil	WAPCOS	3	70	210	281.33	920.57	1.1
####	Jadh Ganga	WAPCOS	2	25	50	142.6	220.88	2.19
####	Jakhol Sankri	UJVNL	3	11	33	364	**144.24**	1.71
####	Jelam Tamak	WAPCOS	2	30	60	195.58	268.12	1.71
####	Kalika Dantu	WAPCOS	2	115	230	**99.75**	1067.3	2.95
####	Karmoli	WAPCOS	2	70	140	**419.7**	**621.31**	1.3
####	Khartoi Lumti Talli	WAPCOS	2	27.5	55	56.6	241.51	3
####	Lata Tapovan	UJVNL	4	77.5	310	265	1123	2.21
####	Maleri Jelam	WAPCOS	2	27.5	55	200.33	243.07	1.8
####	Mapang - Bogidiyar	WAPCOS	2	100	200	465.07	882.04	1.3
####	Naitwar-Mori	UJVNL	3	11	33	76	151	1.85
####	Nand Prayag	UJVNL	3	47	141	72	794	2.05
####	Ramganga	UJVNL	3	22	66	100.1	327	3.25
####	Rishi Ganga - 1	WAPCOS	2	35	70	536.17	327.3	1.18
####	Rishi Ganga - II	WAPCOS	1	35	35	236.96	164.64	2.22
####	Rupsiabagar Khasiyabara	WAPCOS	2	130	260	449.47	1195.63	1.59
####	Sela Urthing	WAPCOS	2	115	230	255.5	816.73	1.4
####	Sirkari Bhyol Rupsiabagar	WAPCOS	3	70	210	388.97	967.97	1.55
####	Taluka Sankri	UJVNL	2	70	140	564.9	559.47	1.33
####	Tamak Lata	UJVNL	4	70	280	291.4	1040.7	2.3
####	Urthing Sobla	UJVNL	4	70	280	414.96	**1360.2**	1.49
	Total (Uttaranchal) - 33 Nos. schemes		**81**		**5282**			
	Grand Total - 162 Nos. schemes		**525**		**47930**			

Annexure - 5B

Hydro Capacity addition during 2017-18

Sl. No.	Particular	Unit Nos.	Cap. (MW)	Commissioning as programmed	Actual(A)/ Anticipated	Remarks
A.	**Central Sector**					
1	**Tuirial** NEEPCO, Mizoram 2x30 = 60 MW	Unit # 1 Unit # 2	30 30	Jun.17 Sep.17	**25.08.2017 (A)** **28.11.2017 (A)**	**Commissioned** **Commissioned**
2	**Kishanganga** NHPC, J&K 3x110 = 330 MW	Unit #1 Unit # 2 Unit # 3	110 110 110	Jan.18 Feb.18 Mar.18	**13.03.2018 (A)** **21.03.2018 (A)** **30.03.2018 (A)**	**Commissioned** **Commissioned** **Commissioned**
3	**Pare** NEEPCO, Arunachal Pradesh 2x55=110 MW	Unit # 1 Unit # 2	55 55	Feb.18 Mar.18	Slipped (2018-19) Slipped (2018-19)	Leakage observed in Diversion Tunnel during water filling.
4	**Kameng** NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit # 1 Unit # 2	150 150	Mar.18 Mar.18	Slipped (2018-19) Slipped (2018-19)	Leakage observed in penstocks during water filling.
	Sub- total (A):		**800**		**390 MW**	
B.	**State Sector**					
1	**Sainj** HPPCL, H.P. 2x50= 100 MW	Unit # 1 Unit # 2	50 50	May.17 Jun.17	**04.09.2017 (A)** **04.09.2017 (A)**	**Commissioned** **Commissioned**
2	**Uhl - III** 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 (2018-19) Slipped (2018-19) Slipped (2018-19)	Delay in completion of HRT lining.
3	**Pulichintala** TSGENCO,Telangana 4x30=120 MW	Unit # 2 Unit # 3	30 30	Aug.17 Oct.17	**26.10.2017 (A)** **01.11.2017 (A)**	**Commissioned** **Commissioned**
4	**New Umtru** MePGCL, Meghalaya 2x20=40 MW	Unit # 1 Unit # 2	20 20	Apr.17 Jul.17	**22.04.2017 (A)** **30.06.2017 (A)**	**Commissioned** **Commissioned**
	Sub- total (B):		**300**		**200 MW**	
C.	**Private Sector**					
1	**Chanju-I** IA Energy, H.P. 3x12 = 36 MW	Unit # 3	12	May.17	**26.07.2017 (A)**	**Commissioned**
2	**Dikchu** Sneha Kinetic Power Projects Pvt. Ltd., Sikkim,2x48MW= 96	Unit # 1 Unit # 2	48 48	Apr.17 May.17	**11.04.2017 (A)** **12.04.2017 (A)**	**Commissioned** **Commissioned**
3	**Tashiding** Shiga Energy Pvt. Ltd. Sikkim 2x48.5= 97 MW	Unit # 1 Unit # 2	48.5 48.5	Jul.17 Aug.17	**06.11.2017 (A)** **06.11.2017 (A)**	**Commissioned** **Commissioned**
	Sub- total (C):		**205**		**205 MW**	
	Total (A+B+C)		**1305**		**795 MW**	

Annexure - 5C

Tentative Programme for Hydro Capacity addition for 2018-19

Sl. No.	Particular	Unit Nos.	Capacity (MW)	Commissioning as programmed	COD as programmed
A.	**Central Sector**				
1	**Pare** NEEPCO, Arunachal Pradesh 2x55=110 MW	Unit # 1 Unit # 2	55 55	May 18 May 18	June 18 June 18
2	**Kameng** NEEPCO, Arunachal Pradesh 4x150=600 MW	Unit # 1 Unit # 2 Unit # 3 Unit # 4	150 150 150 150	Aug. 18 Aug. 18 Sept. 18 Sept. 18	Sept. 18 Sept. 18 Oct. 18 Oct. 18
	Sub- total (A):		**710 MW**		
B.	**State Sector**				
1	**Sawara Kuddu** HPPCL, H.P. 3x37= 111 MW	Unit # 1	37	Mar.19	Mar. 19
2	**Uhl - III** BVPCL, H.P. 3x33.33=100 MW	Unit #1 Unit # 2 Unit # 3	33.33 33.33 33.33	June 18 July.18 July.18	July 18 Aug. 18 Aug. 18
3	**Pulichintala** TSGENCO,Telangana 4x30=120 MW	Unit # 4	30	Sept. 18	Sept. 18
	Sub- total (B):		**167**		
C.	**Private Sector**				
1	**Singoli Bhatwari** L&T UHPL, Uttarakhand 3x33 = 99 MW	Unit # 1	33	Mar.19	Mar.19
	Sub- total (C):		**33**		
	Total (A+B+C)		**910 MW**		

ANNEXURE-6A

THERMAL CAPACITY ADDITION TARGET/ACHIEVEMENT (RFD) FOR THE YEAR 2017-18

	State	Project	Imp Agency	Equip. Supplier	Fuel	Unit	Targeted Capacity (MW)	Capacity Achieved (MW)	Actual date of comm.	Comm. Target as per RFD
		CENTRAL SECTOR								
1	Assam	Bongaigaon TPP	NTPC	BHEL	Coal	U-3	250			Dec-17
2	Bihar	Nabi Nagar TPP	JV of NTPC &Rly	BHEL	Coal	U-2	250	250	03.04.17	Apr-17
3	Bihar	New Nabi Nagar TPP	JV of NTPC & BSPGCL	NON BHEL	Coal	U-1	660			Aug-17
4	Chhattisgarh	Lara TPP	NTPC	NON BHEL	Coal	U-1	800	800		Oct-17
5	Karnataka	Kudgi STPP Ph-I	NTPC	NON BHEL	Coal	U-3	800	800	12.03.18	Aug-17
6	MP	Gadarwara STPP,St-I	NTPC	BHEL	Coal	U-1	800			Jan-18
	Maharashtra	Solapur STPP	NTPC	NON BHEL	Coal	U-1	660	660	07.04.17	Apr-17
	UP	Meja STPP	JV of NTPC & UPRVUNL	NON BHEL	Coal	U-1	660	660	31.03.18	Oct-17
				Total Central Sector			**4880**	**3170**		
		STATE SECTOR								
1	AP	Rayal seema TPP	APGENCO	BHEL	Coal	U-6	600	600.00	12.03.18	Aug-17
2	Assam	Namrup	APGCL	BHEL	Gas	ST	36.15			Feb-18
3	MP	Shree Singaji TPP, St-II	MPPGCL	NON BHEL	Coal	U-3	660			Dec-17
4	Rajasthan	Suratgarh TPS	RRVUNL	BHEL	Coal	U-7	660			Nov-17
5	Rajasthan	Chhabra SCTPP	RRVUNL	L&T & MHI	Coal	U-5	660	660.00	04.04.17	Apr-17
6	Rajasthan	Chhabra SCTPP	RRVUNL	L&T & MHI	Coal	U-6	660			Jan-18
7	Telangana	Bhadradri TPP	TGENCO	BHEL	Coal	U-1	270			Mar-18
				Total State Sector			**3546.15**	**1260.00**		
		PRIVATE SECTOR								
1	Chhattisgarh	Akaltara (Naiyara) TPP	KSK Mahandi Power Company Ltd	CHINESE	Coal	U-3	600	600.00	18.01.18	Nov-17
2	Chhattisgarh	Binjkote TPP	SKS Power Generation (Chhattisgarh) Ltd	CHINESE	Coal	U-1	300	300.00	25.04.17	May-17
3	Chhattisgarh	Nawapara TPP	TRN Energy	CHINESE	Coal	U-2	300	300.00	18.04.17	May-17
4	Chhattisgarh	Lanco Amarkantak TPS-II	LAP Pvt. Ltd.	CHINESE	Coal	U-3	660			Nov-17
5	Maharashtra	Nasik TPP Ph-I	RattanIndia Nasik Power Ltd	BHEL	Coal	U-3	270	270.00	14.04.17	May-17

6	UP	Bara TPP	Prayagraj Power Generation Co.Ltd.	BHEL	Coal	U-3	660	660.00	22.05.17	Aug-17
7	WB	India Power TPP (Haldia)	Indian Energy Ltd (Haldia)	BHEL	Coal	U-1	150	150.00	07.06.17	Apr-17
				Total Private Sector			**2940**	**2280.0**		
				Total Target during 2016-17			**11366.15**	**6710.00**		
	ADDITIONAL CAPACITY COMMISSIONED									
		STATE SECTOR								
1	Bihar	Barauni Ext.	BSEB	BHEL	Coal	U-8		250.0	11.01.18	
2	Bihar	Barauni Ext.	BSEB	BHEL	Coal	U-9		250.0	31.03.18	
		PRIVATE SECTOR								
1	Maharashtra	Nasik TPP Ph-I	RattanIndia Nasik Power Ltd	BHEL	Coal	U-4		270.00	19.05.17	
2	Maharashtra	Nasik TPP Ph-I	RattanIndia Nasik Power Ltd	BHEL	Coal	U-5		270.00	30.05.17	
3	Chhattisgarh	Uchpinda TPP	RKM Powergen Pvt.Ltd.	Chinese	Coal	U-3		360.00	12.09.17	
4	Maharashtra	Shirpur TPP	Shirpur Power Pvt. Ltd.	BHEL	Coal	U-1		150.00	28.09.17	
5	WB	India Power TPP (Haldia)	Indian Energy Ltd (Haldia)	BHEL	Coal	U-2		150.00	31.12.17	
6	Chhattisgarh	Binjkote TPP	SKS Power Generation (Chhattisgarh) Ltd	CHINESE	Coal	U-2		300.00	28.03.18	
				Total Additional Capacity				**2000.0**		
		Grand Total 2017-18					**13440.5**	**8710.00**		

ANNEXURE-6B

THERMAL CAPACIYT ADDITION TARGET FOR THE YEAR 2018-19

	State	Project Name	Impl Agency	Equipment Supplier	Fuel	Unit No.	Targeted Cap. (MW)	Comm. Cap. (MW)	Actual Comm Date	Comm. Target as per RFD
	CENTRAL SECTOR									
1	Assam	Bongaigaon TPP	NTPC	BHEL	Coal	U-3	250			Sep-18
2	Bihar	Nabi Nagar TPP	JV of NTPC &Rly	BHEL	Coal	U-3	250			Dec-18
3	Bihar	New Nabi Nagar TPP	JV of NTPC & BSPGCL	NON BHEL	Coal	U-1	660			Jan-19
4	MP	Gadarwara TPP	NTPC	BHEL	Coal	U-1	800			Nov-18
5	Odisha	Darlipalli STPP	NTPC	NON BHEL	Coal	U-1	800			Mar/ Apr-19
		TOTAL CENTRAL SECTOR					**2760**			
	STATE SECTOR									
1	Assam	Namrup CCGT	APGCL	BHEL	Gas	ST	36.15			Feb-19
2	MP	Shri Singhaji TPP St-II	MPGENCO	NON BHEL	Coal	U-3	660			Sep-18
3	MP	Shri Singhaji TPP St-II	MPGENCO	NON BHEL	Coal	U-4	660			Feb-19
4	Odisha	Ib valley TPP	OPGCL	BHEL	Coal	U-3	660			Mar-19
5	Rajasthan	Chhabra TPP Extn	RRVUNL	NON BHEL	Coal	U-6	660			Dec-18
6	Rajasthan	Suratgarh SCTPP	RRVUNL	BHEL	Gas	U-7	660			Dec-18
7	Karnataka	Yelahanka CCPP	KPCL	BHEL	Coal	GT+ ST	370			Oct-18
8	Telangana	Kothagudem TPS St-VII	TSGENCO	BHEL	Coal	U-1	800			Dec-18
		TOTAL STATE SECTOR					**4506.15**			
	PRIVATE SECTOR									
1	AP	Thamminapatnam TPP stage -II	Meenakshi Energy Pvt. Ltd.	CHINESE	Coal	4	350			Mar-19
2	Chhattisgarh	Akaltara TPP (Naiyara)	KSK Mahandi Power Company Ltd	CHINESE	Coal	4	600			Mar-19
		TOTAL PRIVATE SECTOR					**950**			
		TOTAL THERMAL CAPACITY					**8216.15**			

Annexure-12A

Details of Tours performed attended by CEA officer(s) during April, 2017 to March, 2018:-

Sl. No.	Name & Designation S/Sh.	Duration	Venue	Name of the Programme
1.	Sh. Gorakh Thakur, Chief Engineer (TCD)	16.01.2018-19.01.2018	Bhutan	Visit of CEA Officers to Punatsangchhu-II at Bhutan.
2.	Sh. Neeraj Kumar, Dir. (TCD)	16.01.2018-19.01.2018	Bhutan	Visit of CEA Officers to Punatsangchhu-II at Bhutan.

Annexure-9A

OUTSTANDING DUES OF POWER UTILITIES PAYABLE TO CENTRAL PUBLIC SECTOR UNDERTAKINGS (CPSUs)
(Dues of Principal and Surcharge outstanding for more than 60 days)

based upon the information received from CPSUs upto 31st March, 2018

All Figures in Rs Crores

Sl. No.	STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCIL		DVC		NLC		SJVNL		BBMB		THDC		NHDC		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
	NORTHERN REGION																							
	HARYANA																							
1	HVPNL					14																		**14.00**
	TOTAL (Haryana)	**0.00**	**0.00**	**0.00**	**0.00**	**14.00**	**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**	**14.00**
	HIMACHAL																							
2	HPSEB				**0.65**						0.14						10.34	**0.63**		**-3.57**				**8.19**
3	Govt.of HP															8.75	311.61							**320.36**
	TOTAL (Himachal)	0.00	0.00	**0.00**	**0.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.14**			**0.00**	**0.00**	**8.75**	**321.95**	**0.63**	**0.00**	**-3.57**	**0.00**	**0.00**	**0.00**	**328.55**
	DELHI																							
4	DTL																11.54							**11.54**
5	BYPL /BSES YAMUNA			**182.91**	**154.42**					**212.88**	124.87					42.14	71.26			**281.40**				**1069.88**
6	BRPL/BSES RAJDHANI									**117.38**	87.96									**257.51**				**462.85**
	TOTAL (Delhi)	**0.00**	**0.00**	**182.91**	**154.42**	**0.00**	**0.00**	**0.00**	**0.00**	**330.26**	**212.83**	**0.00**	**0.00**	**0.00**	**0.00**	**42.14**	**82.80**	**0.00**	**0.00**	**538.91**	**0.00**	**0.00**	**0.00**	**1544.27**
	JAMMU & KASHMIR																							
7	J&K PDD	823.55				**102.00**				196.06	2.60					94.56	12.03	**6.80**		**68.44**				**1306.04**
8	J&K PDCL			**514.02**	**50.09**																			**564.11**
	TOTAL (J&K)	823.55	0.00	**514.02**	**50.09**	**102.00**	**0.00**	**0.00**	**0.00**	**196.06**	**2.60**			**0.00**	**0.00**	**94.56**	**12.03**	**6.80**	**0.00**	**68.44**	**0.00**	**0.00**	**0.00**	**1870.15**
	PUNJAB																							
9	PSEB										0.11													**0.11**
10	PSPCL				**19.58**	28.00						91.62				0.17	1.60			1.90				**142.87**
	TOTAL (Punjab)	0.00	0.00	**0.00**	**19.58**	**28.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.11**	91.62	0.00	**0.00**	**0.00**	**0.17**	**1.60**	**0.00**	**0.00**	**1.90**	**0.00**	**0.00**	**0.00**	**142.98**
	RAJASTHAN																							
11	RRVUNL /RSEB																	**213.86**						**213.86**
12	JVVNL			**0.12**	**0.01**					**6.28**										**0.18**				**78.61**
13	AVVNL			**0.13**	**0.02**					**4.39**										**0.11**				**4.65**
14	JDVVNL			**9.34**	**0.91**					**3.13**	0.05			**72.02**						**0.05**				**13.48**
	TOTAL (Rajasthan)	0.00	0.00	**9.59**	**0.94**	**0.00**	**0.00**	**0.00**	**0.00**	**13.80**	**0.05**			**72.02**	**0.00**	**0.00**	**0.00**	**213.86**	**0.00**	**0.34**	**0.00**	**0.00**	**0.00**	**310.60**
	OTHERS																							
15	HWB (KOTA)									**23.23**	0.02													**23.25**
	UTTAR PRADESH																							
16	UPPCL				**59.10**					**5.27**	159.14						128.13			**570.88**				**922.52**
	TOTAL (Uttar Pradesh)	0.00	0.00	0.00	59.10	0.00	0.00	0.00	0.00	5.27	159.14	0.00	0.00	0.00	0.00	0.00	128.13	0.00	0.00	570.88	0.00	0.00	0.00	**922.52**
	UTTARAKHAND																							
17	UPCL										0.90													**0.90**
	CHANDIGARH																							
18	CPDD				**0.02**	**2.00**												**140.14**		8.72				**150.88**
	OTHERS																							
19	M/s N.F.L. Nangal																	**0.01**						**0.01**
20	B.S.L. Project S/Nagar																	**0.20**						**0.20**
21	Beas Project talwara																	**0.03**						**0.03**
	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	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	
	TOTAL (Northern Region)	**823.55**	**0.00**	**706.52**	**284.80**	**146.00**	**0.00**	**0.00**	**0.00**	**568.62**	**375.79**	**91.62**	**0.00**	**72.02**	**0.00**	**145.62**	**546.51**	**361.67**	**0.00**	**1185.62**	**0.00**	**0.00**	**0.00**	**5308.34**
	WESTERN REGION																							
	GUJARAT																							
22	GUVNL									**3.17**														**3.17**
	MADHYA PRADESH																							
23	MPPCL			0.60	0.33	14.00				**0.24**														15.17
24	MPPMCL Jabalpur											134.01								-0.30		**47.07**		**180.78**
	TOTAL (Madhya Pradesh)	0.00	0.00	0.60	0.33	14.00	0.00	0.00	0.00	0.24	0.00	134.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.30	0.00	47.07	0.00	195.95
	CHHATTISGARH																							
25	CSEB/CSPDCL										0.04													**0.04**
	TOTAL(CHHATTISGARH)	0.00				0.00				0.00	0.04													0.04
	MAHARASHTRA																							
26	MSEDCL									**0.09**	**0.11**					28.21	6.16							**34.57**
	OTHERS																							
27	**BARC**										**0.16**													**0.16**
	TOTAL (Western Region)	0.00	0.00	0.60	0.33	14.00	0.00	0.00	0.00	3.50	0.31	134.01	0.00	0.00	0.00	28.21	6.16	0.00	0.00	-0.30	0.00	47.07	0.00	233.89

Sl. No.	STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCIL		DVC		NLC		SJVNL		BBMB		THDC		NHDC		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
	SOUTHERN REGION																							
	ANDHRA PRADESH																							
28	APEPDCL/APNPCL /APTRANSCO	1342.76				19.00				**8.70**	11.08			**89.21**										**1470.75**
	TOTAL (Andhra Pradesh)	1342.76				**19.00**				**8.70**	11.08			**89.21**	**0.00**									**1470.75**
	KARNATAKA																							
29	BESCOM									**0.73**		**126.00**												**411.29**
30	MESCOM									0.40														**0.40**
31	CESCOM	17.38								**15.74**	4.23													**37.35**
32	HESCOM	13.56								**277.14**	74.79													**365.49**
33	GESCOM									**63.68**	4.86													**68.54**
34	ESCOMS													**284.56**										
	TOTAL (Karnataka)	30.94			**0.00**	**0.00**				**357.69**	**83.88**	126.00	0.00	284.56										**883.07**
	TELANGANA																							
35	TELANGANA DISCOMS	118.72								0.74	4.72			**75.33**										**199.51**
	KERALA																							
36	KSEB									**6.82**	0.09	30.56		57.16										**94.63**
	TAMILNADU																							
37	TNEB/TANGEDCO	12.16								**698.18**	**269.80**			**1500.89**										**2481.03**
	Puducherry																							
38	PED										**1.10**			**71.11**										**72.21**
	TOTAL (Southern Region)	1504.58	0.00	0.00	0.00	19.00	0.00	0.00	0.00	1072.13	370.67	156.56	0.00	2078.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**5201.20**
	EASTERN REGION																							
39	**DVC**				0.02	**113.00**																		**113.02**
	BIHAR																							
40	BIHAR(NBPDCL/SBPCL)			**0.25**	**0.03**							**11.53**												**11.81**
	WEST BENGAL																							
41	WBSEB				**29.92**		7.00					**415.26**												**452.18**
	JHARKHAND																							
42	JBVNL											**2066.68**												**2066.68**
	ORISSA																							
43	GRIDCO						21.00																	**21.00**
	Andaman & Nicobar																							
44	Electricity Deptt	5.55																						**5.55**
	TOTAL (Eastern Region)	**5.55**	**0.00**	**0.25**	**29.97**	**113.00**	**28.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2493.47**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2670.24**
	NORTH EASTERN REGION																							
	ARUNACHAL PRADESH																							
45	Department of Power				0.01			0.84																**0.85**
	MANIPUR																							
46	Electricity Department			**0.02**	**1.47**																			**1.49**
	MEGHALAYA																							
47	MeEcl/MeSEB	123.87		**12.53**	**13.97**	**1.00**		**218.54**																**369.91**
	MIZORAM																							
48	Electricity Department				**0.05**																			**0.05**
	TOTAL (NE Region)	123.87	0.00	**12.55**	**15.50**	**1.00**	**0.00**	**219.38**	**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**	**372.30**
	GRAND-TOTAL	**2457.55**	**0.00**	**719.92**	**330.60**	**293.00**	**28.00**	**219.38**	**0.00**	**1644.25**	**746.77**	**2875.66**	**0.00**	**2150.28**	**0.00**	**173.83**	**552.67**	**361.67**	**0.00**	**1185.32**	**0.00**	**47.07**	**0.00**	**13785.97**

Note : The Negative values Rs. -3.57 cr and Rs. -0.30 cr under THDC colum implies that THDC will have to return the amount to HPSEB and MPPMCL respectively as per the Revised Estimate

Sl. No.	STATE / UTILITY	NTPC		NHPC		PGCIL		NEEPCO		NPCIL		DVC		NLC		SJVNL		BBMB		THDC		NHDC		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

Utilities

1	APCPDCL	Andhra Pradesh Cenral Power Distribution Company Ltd.
2	APEPDCL	Andhra Pradesh Eastern Power Distribution Co. Ltd.
3	APNPDCL	Andhra Pradesh Northern Power Distribution Co. Ltd.
4	APSPDCL	Andhra Pradesh Southern Power Distribution Co. Ltd.
5	APTRANSCO	Andhra Pradesh Transmission Corporation Ltd.
6	AVVNL	Ajmer Vidyut Vitran Nigam Ltd.
7	BBMB	Bhakra Beas Management Board
8	BESCOM	Bangalore Electricity Supply Company Ltd.
9	BRPL	BSES Rajdhani Power Ltd.
10	BYPL	BSES Yamuna Power Ltd.
11	CESCOM	Chamundeshwari Electricity Supply Company Ltd.
12	CPDD	Chandigarh Power Development Department.
13	DTL	Delhi Transco Ltd.
14	DVC	Damodar Valley Corporation
15	ESCOMS	Electricity Supply Company (Karnataka)
16	GESCOM	Gulbarga Electricity Supply Company Ltd.
17	GUVNL	Gujarat Urja Vikas Nigam Limited
18	HESCOM	Hubli Electricity Supply Company Ltd.
19	HVPNL	Haryana Vidyut Prasaran Nigam Ltd.
20	HPSEB	Himachal Pradesh State Electricity Board
21	HWB	Heavy Water Board (Kota)
22	J&K PDCL	Jammu & Kashmir Power Development Corporation Ltd.
23	J&K PDD	Jammu & Kashmir Power Development Department
24	JDVVNL	Jodhpur Vidyut Vitran Nigam Ltd.
25	JVVNL	Jaipur Vidyut Vitran Nigam Ltd.
26	MESCOM	Mangalore Electricity Supply Company Ltd.
27	MPPMCL	Madya Pradesh Power Management company Ltd.
28	MSEDCL	Maharashtra State Electricity Distribution Co. Ltd.
29	NEEPCO	North Eastern Electric Power Corporation Ltd.
30	NHDC	Narmada Hydro Development Corporation
31	NHPC	National Hydro Power Corporation
32	NLC	Nyveli Lignite Corporation
33	NPCIL	Nuclear Power Corporation of India Ltd.
34	NTPC	National Thermal Power Corporation
35	PED	Pondicherry Electricity Department
36	PGCIL	Power Grid Corporation of India Ltd.
37	PSPCL	Punjab State Power Corporation Ltd.
38	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
39	SJVNL	Satluj Jal Vidyut Nigam Ltd.
40	THDC	Tehri Hydro Development Corporation
41	UPCL	Uttarakhand Power Corporation Ltd.
42	UPPCL	Uttar Pradesh Power Corporation Ltd.

Utilities

1	APCPDCL	Andhra Pradesh Central Power Distribution Company Ltd.
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12	CPDD	Chandigarh Power Development Department.
13	DTL	Delhi Transco Ltd.
14	DVC	Damodar Valley Corporation
15	ESCOMS	Electricity Supply Company (Karnataka)
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17	GUVNL	Gujarat Urja Vikas Nigam Limited
18	HESCOM	Hubli Electricity Supply Company Ltd.
19	HVPNL	Haryana Vidyut Prasaran Nigam Ltd.
20	HPSEB	Himachal Pradesh State Electricity Board
21	HWB	Heavy Water Board (Kota)
22	J&K PDCL	Jammu & Kashmir Power Development Corporation Ltd.
23	J&K PDD	Jammu & Kashmir Power Development Department
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30	NHDC	Narmada Hydro Development Corporation
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32	NLC	Nyveli Lignite Corporation
33	NPCIL	Nuclear Power Corporation of India Ltd.
34	NTPC	National Thermal Power Corporation
35	PED	Pondicherry Electricity Department
36	PGCIL	Power Grid Corporation of India Ltd.
37	PSPCL	Punjab State Power Corporation Ltd.
38	RRVUNL	Rajasthan Rajya Vidyut Utpadan Nigam Ltd.
39	SJVNL	Satluj Jal Vidyut Nigam Ltd.
40	THDC	Tehri Hydro Development Corporation
41	UPCL	Uttarakhand Power Corporation Ltd.
42	UPPCL	Uttar Pradesh Power Corporation Ltd.

Annexure-9B

CENTRAL ELECTRICITY AUTHORITY

FINANCIAL STUDIES & ASSISTANCE DIVISION

STATEMENT SHOWING ESTIMATED AVERAGE RATES OF ELECTRICITY (upto 01.04.2017) (Provisional)

(Rates in Paise/KWh)

SL No.	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 60%L.F. (438000 KWh/ Month)		Heavy Industry (11KV) 10000KW 60%L.F.		Heavy Industry (33KV) 20000KW		Railway Traction 12500KW (25000000 KWh/ Month)	
States																																		
1	Andhra Pradesh	01.04.2016	208.50		491.63		679.50		856.91		980.78		1007.42		1012.75		71.88	*	71.88	*	71.88	*	693.75		693.75		745.04		745.04		696.62		703.16	
2	Arunachal Pradesh	01.04.2016	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		-	
3	Assam	01.08.2015	434.00		635.70		713.28		814.33		833.53		853.60		854.24		451.19		451.19		612.55		515.67	U	712.43		679.68		679.54		679.53		-	
																							484.00	R										
4	Bihar	01.04.2016	376.30	U	462.43		555.44		644.83	U	788.99		794.18		795.21		174.00	U	174.00	U	174.00	U	663.52		785.87		634.40		-		602.60	132KV	687.23	at 25KV
			238.50	R					296.80	R							114.00	R	114.00	R	114.00	R											687.23	at 132KV
5	Chhattishgarh	01.04.2016	397.44		523.26		735.26		701.87		866.13		903.47		910.93		450.00		450.00		450.00		573.96		693.05		807.84		807.84		759.84		711.11	at 132KV
6	Goa	01.04.2016	170.00		242.50		325.00		468.33		523.00		534.33		536.60		156.00		156.00		156.00		433.48		444.14		563.42		563.42		563.42		-	
7	Gujarat	01.04.2016	405.38	U	517.50	U	577.88	U	585.42		585.42		642.36		655.56		202.50		202.50		202.50		572.00		577.87		550.68		625.98		627.05		600.00	at 132KV
			335.94	R	119.59	R	540.19	R																										
8	Haryana	01.04.2016	370.00		530.63		685.00		615.00		685.00		738.33		738.33		10.00		10.00		10.00		605.00		716.67		578.41		578.41		559.91		612.62	at 11KV
																																	587.12	at 220KV
9	Himachal Pradesh	01.04.2016	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		-	
10	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		-	
11	Jharkhand	01.01.2016	323.00	U	322.75		334.00		716.67	U	720.67		721.33		721.47		67.00		67.00		67.00		660.11		660.11		473.18		473.18		459.14		738.24	at 25 kV
			197.00	R					215.00	R																								
12	Karnataka	01.04.2016	453.68	D	667.27	D	731.19	D	881.57	D	895.70	D	898.06	D	898.53	D	0.00		0.00		0.00		658.55	D	763.52	D	754.49	D	765.38	D	763.87	D	737.29	
			417.64	F	615.86	F	672.46	F	821.50	F	835.63	F	837.99	F	838.46	F							617.92	F	720.48	F	738.32	F	747.03	F	745.40	F		
13	Kerala	16.08.2014	350.00		691.00		845.00		854.00		1063.00		1103.00		1103.00		222.98		222.98		222.98		638.67		655.33		606.10		606.10		606.10		618.89	at 110KV
14	Madhya Pradesh	01.04.2016	523.20	U	803.78	U	858.97	U	739.10	U	744.29	U	879.24	U	879.44	U	407.50		445.25		465.13		855.65	U	855.65	U	788.06		788.06		723.61		742.22	132/220KV
			495.95	R	792.66	R	847.80	R	716.30	R	721.33	R	860.08	R	860.28	R							775.72	R	752.46	R								
15	Maharashtra	01.11.2016	553.45		965.54		1271.14		1019.93		1227.62		1360.67		1360.65		304.50		304.50		304.50		852.92		978.00		943.13	B	943.13	B	863.34		781.56	
																											1019.64	C	1019.64	C				
16	Manipur	01.04.2016	380.00		470.00		506.00		556.67		626.00		-		-		347.38		347.38		347.38		368.33		504.07		525.37		525.37		-		-	
17	Meghalaya	01.04.2016	370.00		477.50		524.00		699.33		738.00		744.44		745.73		278.38		278.38		278.38		616.67		616.67		640.35		640.21		616.21		-	
18	Mizoram	01.04.2016	315.00		450.00		489.00		500.00		574.67		587.11		589.60		198.06		198.06		198.06		469.67		484.60		447.46		447.46		-		-	
19	Nagaland	01.04.2016	434.00		566.00		616.40		758.00		847.60		862.53		865.52		300.00		300.00		300.00		566.67		623.33		688.86		689.89		-		-	
20	Odisha	01.04.2016	369.20		487.50		556.92		627.47		707.89		721.30		723.98		153.00		153.00		153.00		588.00		600.00		649.64		649.63		627.04		655.88	at 25/33KV
																																	640.90	at 132KV
21	Punjab	01.04.2016	510.76		659.92		708.74		754.46		761.09		762.20		762.42		517.54	WS	517.54	WS	517.54	WS	618.11		681.39		681.39		681.39		681.39		740.15	at 132KV
																	0.00	S	0.00	S	0.00	S												
22	Rajasthan	01.09.2016	737.50		729.38		751.25		953.33		985.67		1078.19		1081.21		486.50		486.50		486.50		768.09		832.02		841.93		-		818.62		832.78	
23	Sikkim	01.04.2016	172.00		362.75		440.90		533.50		611.97		627.32		630.39		-		-		-		619.00	U	476.86	11kV	619.73		619.73		-		-	
24	Tamil Nadu	23.05.2016	85.00		470.00		584.00		836.50		932.58		939.69		941.12		0.00		0.00		0.00		691.25		691.25		713.36		770.48		713.36		718.33	
25	Telangana	01.07.2016	238.50		668.50		821.00		891.00		975.00		995.67		999.80		79.38	*	74.88	*	73.38	*	721.00		731.00		800.11		799.77		747.12		-	
26	Tripura	01.04.2014	521.50		755.00		755.00		691.50		768.33		768.33		768.33		366.19		366.19		477.38		740.00		764.00		-		-		-		-	
27	Uttar Pradesh	01.08.2016	535.00	U	585.63	U	657.25	U	827.50	U	1004.83	U	1027.72	U	1032.30	U	565.00	U	565.00	U	145.00	U	925.83	U	950.83	U	857.00	U	857.00	U	819.02		1052.94	132KV
			275.00	R	275.00	R	275.00	R	400.83	R	400.83	R	400.83	R	400.83	R	122.50	R	122.50	R	122.50	R	788.08	R	809.33	R	793.29	R	793.29	R			1017.65	132KV & above
28	Uttarakhand	01.04.2016	300.00		386.25		440.00		561.67		561.67		646.37		646.37		170.00		170.00		170.00		511.67		557.25		588.89		588.89		588.89		597.06	
29	West Bengal	01.04.2016	630.89	U	843.94	U	941.92	U	880.79	U	1027.09	U	1044.80	U	1048.34	U	487.43		487.43		487.43		758.88	U	895.17	U	937.72		937.72		933.12		913.00	at 25KV
			617.07	R	830.79	R	936.66	R	880.06	R	1026.94	R	1044.75	R	1048.31	R							739.06	R	867.79	R							913.00	at 132KV
																							423.33	R										
Union Territories																																		
30	A & N Islands	01.04.2016	200.00		456.25		542.50		678.33		840.33		880.11		888.07		150.00		150.00		150.00		591.67		618.33		-		-		-		-	
31	Chandigarh	01.04.2016	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		598.83		-	
32	Dadra & Nagar Haveli	01.04.2016	150.00		192.50		230.00		308.33		329.67		333.22		333.93		70.00		70.00		70.00		367.34		367.34		409.76		409.76		-		-	
33	Daman & Diu	01.04.2016	150.00		192.50		230.00		331.67		358.33		362.78		363.67		70.00		70.00		70.00		372.34		372.34		496.64		496.64		-		-	
34	(BYPL/BRPL/NDPL)	01.10.2015	462.00		548.63		711.90		994.00		994.00		1081.11		1081.11		296.58		296.58		296.58		943.25		991.67		896.63		896.63		875.05		841.22	
35	Delhi (NDMC)	01.10.2015	362.25		433.13		579.60		850.50		850.50		1068.53		1068.53		-		-		-		893.53		893.53		918.49		918.49		896.41		911.65	at 33KV
36	Lakshadweep	01.04.2016	140.00		356.25		484.50		668.33		749.67		763.22		765.93		-		-		-		550.93		550.93		725.37		725.37		-		-	
37	Puducherry	01.04.2016	150.00		283.75		389.50		601.21		645.24		652.58		654.05		-		-		-		541.23		536.65		614.67		-		591.31		-	
Private Companies																																		
38	CESC Ltd. (Kolkata)	28.10.2016	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	
39	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	
40	Durgapur Projects Ltd. (West 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
																																	642.78	at 132KV
41	D.V.C. (A) Jharkhand Area	01.09.2014	-		-		-		-		-		-		-		-		-		-		-		-		-		-		520.13		481.18	at 132KV
	(B) West Bengal Area	01.04.2016	-		-		-		-		-		-		-		-		-		-		-		-		-		-		616.56		645.88	at 132KV
42	Mumbai (B.E.S.T.)	01.10.2016	470.76		731.76		1028.14		1228.39		1267.11		1370.01		1370.01		-		-		-		1055.83		1119.63		1073.70		1073.70		-		-	
43	Mumbai (Reliance Energy)	01.10.2016	492.80		851.82		1095.54		1284.05		1193.71		1463.18		1463.18		481.00		481.00		481.00		1024.86		1234.40		1185.18		1185.18		-		-	at 100/33/22/11/6.6kV
44	Mumbai (TATA'S)	01.10.2016	410.44		700.73		1090.55		1325.19		1234.85		1205.45		1205.45		-		-		-		1035.79		1145.86		1069.33		1069.33		-		849.78	33/22kV
45	Torrent Power Ltd. (Ahmedabad)	01.04.2016	437.00		503.13		543.95		620.83		637.50		733.33		733.33		330.00		330.00		330.00		561.00		645.33		514.14		514.14		-		-	
46	Torrent Power Ltd. (Surat)	01.04.2016	422.63		508.16		556.31		602.08		602.08		749.77		749.77		70.00		70.00		70.00		529.83		659.80		623.65		623.64		-		-	

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

S : With Govt. Subsidy WS : Without Govt. Subsidy

* : 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 varrying parameters for various categories of consumers.The above comparision 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 2017-18

Fuel, Sector/Organisation	Target (MU)	Actual (MU)	PLF (%)
THERMAL			
CENTRAL SECTOR			
APCPL	5500	7734.53	58.86
BRBCL	2500	1060.94	29.16
DVC	34475	35694.21	55.19
K.B.U.N.L	1500	1750.61	35.1
MUNPL	0	8.22	*
NEEPCO.	2710	2958.05	**
NLC	20848	20548.15	72.4
NPGCPL	100	0	0
NSPCL	3746	3877.77	88.53
NTECL	9201	7167.72	54.55
NTPC Ltd.	242571	261362.83	78.87
NTPL	6570	5412.83	61.79
ONGC	4500	4053.16	**
PVUNL	1280	0	0
RGPPL	4248	4501.03	**
TOTAL CENTRAL SECTOR	**339749**	**356130.05**	**72.38**
STATE SECTOR			
HPGCL	10200	10708.59	44.94
IPGPCL	700	578.8	**
JKSPDC	0	0	**
PRAGATI	4198	4912.93	**
PSPCL	8380	5520.19	24.05
RRVUNL	32188	28195.43	55.25
UPRVUNL	34399	31548.71	62.04
BECL	200	480.15	*
CSPGCL	19115	20834.05	72.51
GMDCL	1480	1357.12	61.97
GPPCL	500	168.06	**
GSECL	15197	23044.31	60.89
GSEGL	345	195.81	**
MAHAGENCO	53201	49271.57	51.35
MPPGCL	18500	18246.17	51.48
APEPDCL	722	1065.12	**
APGENCO	20000	17746.25	71.59
APPDCL	9200	4939.92	35.24
KPCL	20880	14855.66	58.88
KSEB	54	1.92	#

P&ED, Pudu.	223	226.45	#
RPCL	4000	997.45	*
SCCL	5500	9575.16	91.09
TNGDCL	27516	24785.15	60.43
TSGENCO	18437	18869.41	74.73
A&N ADM	200	258.79	#
BSEB	400	39.48	2.14
DPL	2400	2524.46	43.66
OPGC	3050	2840.33	77.2
TVNL	2200	1933.31	52.55
WBPDC	24300	23445.98	59.44
APGPCL	1215	983.89	**
ED, Manipur	0	0	#
TSECL	594	586.31	**
TOTAL STATE SECTOR	**339494**	**320736.93**	**56.9**
PVT. SEC. UTILITY			
CESC	6050	6337.15	64.3
RIL (DAHANU)	3800	3534.27	80.69
TATA PCL	6384	6294.16	45.12
TOR. POW. (UNOSUGEN)	2312	2638.78	71.38
TOTAL PVT. UTILITY SECTOR	**18546**	**18804.36**	**60.42**
PVT. SEC. IPP			
ABAN POWR	491	480.13	**
ACB	2000	2174.11	81.05
ADHUNIK	3400	2909.92	61.52
AMNEPL	0	0	0
APGPCL	600	1192.04	**
APL	56000	44571.34	55.07
BALCO	3000	2313.07	44.01
BELLARY	0	0	#
BEPL	2250	924.4	23.45
BLAPPL	250	87.88	22.29
BSES(C)	0	42.65	**
BSES(P)	0	0	**
CEPL	4500	3906.24	37.16
CGPL	26620	26514.87	75.67
CIPL	300	434.57	**
DBPCL	6500	6536.81	62.18
DIPL	1500	2393.27	45.53
EPGL	5600	2682.42	25.52
ESSAR	0	0	**
ESSARPMPL	3000	2918.23	55.52
GAUTAMI	0	0	**
GCEL	1600	1367.92	6.14
GEPL	0	0	0
GIPCL	3747	3307.28	74.7
GIPL	400	560.66	**
GMR ENERG	9500	9330.09	64.55

GPGSL (GVK)	1500	1541	32.58
GREL	625	0	**
GVKP&IL	100	0	**
HEL	4200	4525.89	86.11
HNPC	4100	3326.14	36.51
HYEL	0	27.48	*
IBPIL	0	0	0
IEPL	0	80.51	3.4
ITPCL	3590	5724.29	54.45
JHAPL	1500	1666.87	31.71
JITPL	6600	3657.42	34.79
JPL	8870	10905.76	42.29
JPPVL	9500	10154.21	63.69
JSWEL	11200	10744.42	59.54
JhPL(HR)	4000	7325.47	63.35
KONA	0	0	**
KONDAPALI	2200	660.7	**
KWPCL	2500	572.13	10.89
LANCO	4100	4139.42	78.76
LAPPL	8000	8397.1	79.88
LPGCL	8001	8565.92	49.39
LVS POWER	0	0	#
MADURAI P	0	0	**
MBPMPL	4500	6225.05	59.22
MCCPL	1500	2223.84	84.62
MEL	1200	587.3	22.35
MPL	7376	7345.34	79.86
NDPL	0	0	**
NPL	8400	9110.04	74.28
PENNA	300	371.45	**
PGPL	500	0	**
PPGCL (Jaypee)	4500	5635.06	33.74
PPNPGCL	200	0	**
RELIANCE	0	0	**
RKMPPL	1833	1438.78	22.01
RPSCL	7200	7718.8	73.43
RWPL (JSW)	6800	6855.95	72.47
RattanIndia	2500	4773.07	33.62
SAMALPATI	0	0	#
SCPL	400	743.06	73.2
SEIL	8200	9833.58	85.04
SEL	3000	1074.47	12.27
SEPL	2000	25.02	0.48
SGPL	3800	8970.59	77.58
SKS	200	673.97	*
SPGL	1000	572.4	**
SPL	30000	31792.52	91.65
SPPL		4.74	*
ST-CMSECP	1500	1025.27	46.82

SVPPL	300	27.13	4.92
SrEPL	400	1062.33	**
TATA PCL	1666	1618.38	76.98
TOR. POW. (SUGEN)	4200	6522.62	**
TOR. POW. (UNOSUGEN)	0	0	**
TRNE	1900	2741.13	54.39
TSPL	6600	8556.82	49.33
UPCL	8000	6181.32	58.8
VASAVI	0	0	#
VEMAGIRI	400	0	**
VESPL	0	0	0
VIP	3800	3306.31	62.91
VVL	0	0	0
WPCL	7500	6936.68	44.21
Total PVT. SEC. IPP	**343519**	**340615.65**	**55.09**
PVT. SEC. IMP			
GIPCL	180	196.18	-
ICCL	290	296.5	-
NALCO	250	279.43	-
Total PVT. SEC. IMP	**720**	**772.11**	
Total IPP & Import	**344239**	**341387.76**	**55.09**
Total PVT. Sector	**362785**	**360192.12**	**55.34**
THERMAL Total	**1042028**	**1037059.1**	**60.72**
NUCLEAR			
CENTRAL			
DAE	0	0	0
NPCIL	40972	38346.12	65.53
CENTRAL Total	**40972**	**38346.12**	**64.56**
NUCLEAR Total	**40972**	**38346.12**	**64.56**
HYDRO			
CENTRAL			
BBMB	9360	10864.14	
DVC	235	256.35	
NEEPCO.	3492	3203.1	
NHDC	3100	1325.36	
NHPC	23046	22549.52	
NTPC Ltd.	3055	3313.62	
SJVNL	8625	9222.73	
THDC	4115	4301.27	
CENTRAL Total	**55028**	**55036.09**	
STATE			
HPPCL	568	332.12	
HPSEB	1647	1590.86	
JKSPDC	4599	5136.89	
PSPCL	4021	4230.51	
RRVUNL	720	819.53	
UJVNL	4688	4526	
UPJVNL	1170	1486.69	
CSPGCL	250	178.07	

GSECL	857	612.45	
MAHAGENCO	4296	3143.16	
MPPGCL	2625	1420.98	
SSNNL	4460	939.47	
APGENCO	2400	1760.7	
KPCL	11687	7008.65	
KSEB	6221	5199.26	
TNGDCL	4415	2919.6	
TSGENCO	4440	2601.75	
JSEB	150	190.38	
OHPC	5672	5555.29	
TUL	5214	4429.33	
WBSEDCL	1596	1282.02	
APGPCL	390	484.98	
MeECL	919	1140.26	
STATE Total	**73005**	**56988.95**	
PVT SEC. UTL			
HYDRO			
BHIRA HPS	883	341.17	
BHIRA PSS HPS	0	551.13	
BHIVPURI HPS	297	307.2	
KHOPOLI HPS	270	316.38	
TOTAL PVT SEC. UTL	**1450**	**1515.88**	
PVT SEC. IPP			
HYDRO			
ALLAIN DUHANGAN HPS	700	683.01	
BASPA HPS	1250	1336.65	
BHANDARDHARA HPS ST-	37	42.55	
BUDHIL HPS	282	317.63	
CHANJU-I HPS		79.42	
CHUZACHEN HPS	495	444.79	
DIKCHU HPS		370.1	
JORETHANG LOOP	459	406.01	
KARCHAM WANGTOO HPS	4250	4569.93	
MALANA HPS	344	346.29	
MALANA-II HPS	360	368.89	
SRINAGAR HPS	1340	1382.54	
TASHIDING HPS	400	73.07	
TIDONG HPS	200	0	
VISHNU PRAYAG HPS	1800	2160.9	
TOTAL PVT SEC. IPP	**11917**	**12581.78**	
TOTAL PVT. SEC.	**13367**	**14097.66**	
HYDRO Total	**141400**	**126122.7**	

Based on March 2018 Final report
Generation from conventional sources (Thermal/Hydro/Nuclear) with station capacity > 25 MW

- **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 31.03.2018)

(UTILITIES)

Region	Ownership/ Sector	Mode wise breakup							Grand Total
		Thermal				Nuclear	Hydro	RES * (MNRE)	
		Coal	Gas	Diesel	Total				
Northern Region	State	16888.00	2879.20	0.00	19767.20	0.00	8643.55	689.56	29100.31
	Private	22760.83	558.00	0.00	23318.83	0.00	2514.00	11854.66	37687.49
	Central	13290.37	2344.06	0.00	15634.43	1620.00	8596.22	329.00	26179.65
	Sub Total	**52939.20**	**5781.26**	**0.00**	**58720.46**	**1620.00**	**19753.77**	**12873.22**	**92967.45**
Western Region	State	21280.00	2849.82	0.00	24129.82	0.00	5446.50	311.19	29887.51
	Private	34285.67	4676.00	0.00	38961.67	0.00	481.00	19473.89	58916.56
	Central	15042.95	3280.67	0.00	18323.62	1840.00	1520.00	661.30	22344.92
	Sub Total	**70608.62**	**10806.49**	**0.00**	**81415.11**	**1840.00**	**7447.50**	**20446.38**	**111148.99**
Southern Region	State	19432.50	791.98	287.88	20512.36	0.00	11808.03	518.02	32838.41
	Private	12124.50	5322.10	473.70	17920.30	0.00	0.00	33359.36	51279.66
	Central	14225.02	359.58	0.00	14584.60	3320.00	0.00	491.90	18396.50
	Sub Total	**45782.02**	**6473.66**	**761.58**	**53017.26**	**3320.00**	**11808.03**	**34369.28**	**102514.57**
Eastern Region	State	7070.00	100.00	0.00	7170.00	0.00	3537.92	225.11	10933.03
	Private	6375.00	0.00	0.00	6375.00	0.00	399.00	803.29	7577.29
	Central	13876.64	0.00	0.00	13876.64	0.00	1005.20	10.00	14891.84

	Sub Total	**27321.64**	**100.00**	**0.00**	**27421.64**	**0.00**	**4942.12**	**1038.40**	**33402.16**
North Eastern Region	State	0.00	457.95	36.00	493.95	0.00	422.00	254.25	1170.20
	Private	0.00	24.50	0.00	24.50	0.00	0.00	23.31	47.81
	Central	520.02	1253.60	0.00	1773.62	0.00	920.00	5.00	2698.62
	Sub Total	**520.02**	**1736.05**	**36.00**	**2292.07**	**0.00**	**1342.00**	**282.56**	**3916.63**
Islands	State	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	2.21	2.21
	Central	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Sub Total	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**12.56**	**52.61**
ALL INDIA	State	64670.50	7078.95	363.93	72113.38	0.00	29858.00	2003.37	103974.75
	Private	75546.00	10580.60	473.70	86600.30	0.00	3394.00	65516.72	155511.02
	Central	56955.00	7237.91	0.00	64192.91	6780.00	12041.42	1502.30	84516.63
	Total	**197171.50**	**24897.46**	**837.63**	**222906.59**	**6780.00**	**45293.42**	**69022.39**	**344002.39**

Figures at decimal may not tally due to rounding off

Abbreviation:- SHP=Small Hydro Project (≤ 25 MW), BP=Biomass Power, U&I=Urban & Industrial Waste Power, RES=Renewable Energy Sources

Note : - 1. RES include SHP, BP, U&I, Solar and Wind Energy. Installed capacity in respect of RES (MNRE) as on 31.03.2018 (As per latest information available with MNRE)

***Break up of RES all India as on 31.03.2018 is given below (in MW) :**

Small Hydro Power	**Wind Power**	**Bio-Power**		**Solar Power**	**Total Capacity**
		BM Power/Cogen.	**Waste to Energy**		
4485.81	**34046.00**	**8700.80**	**138.30**	**21651.48**	**69022.39**

A.

Capacity Added during March., 2018	**3890 MW**

1. U-1 of MEJA STPP (660 MW) has been commissioned and added to the Central Sector of NR states as per their allocation..
2. U-1 of LARA TPP (800 MW) has been commissioned and added to the Central Sector of WR states as per their allocation..
3. U-3 of KUDGI STPP (800 MW) has been commissioned and added to the Central Sector of SR states as per their allocation.
4. U-1,2&3 of KISHANGANGA HPS (3*110=330 MW) has been commissioned and added to the Central Sector of NR states as per their tentative allocation.
5. U-6 of RAYALASEEMA TPS (600 MW) has been commissioned and added to the State Sector of Andhra Pradesh.
6. U-9 of BARAUNI TPS (250 MW) has been commissioned and added to the State Sector of Bihar.
7. U-2 of BINJKOTE TPP (300 MW) has been commissioned and added to the Private Sector of Chhattisgarh.
8. U-2 of Hiranmaye TPP (150 MW) has been commissioned and added to the Private Sector of West Bengal.

B.

Capacity Retired during March., 2018	**210 MW**

1. PANKI TPS U-3&4 (2*105=210 MW) has been retired from the State Sector of Uttar Pradesh.

C.

Capacity Derated	**March., 2018**	**0 MW**

D.

Net Capacity Added during March., 2018	**A-B-C**	**3680 MW**

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 31.03.2018)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Delhi	State	135.00	1800.40	0.00	1935.40	0.00	0.00	0.00	1935.40
	Private	869.22	108.00	0.00	977.22	0.00	0.00	121.57	1098.79
	Central	3817.72	207.01	0.00	4024.73	102.83	723.09	0.00	4850.65
	Sub-Total	**4821.94**	**2115.41**	**0.00**	**6937.35**	**102.83**	**723.09**	**121.57**	**7884.84**
Haryana	State	2720.00	150.00	0.00	2870.00	0.00	1084.51	59.30	4013.81
	Private	4080.78	0.00	0.00	4080.78	0.00	200.00	347.45	4628.23
	Central	1294.72	535.61	0.00	1830.34	100.94	663.70181	5.00	2599.98
	Sub-Total	**8095.50**	**685.61**	**0.00**	**8781.12**	**100.94**	**1948.21**	**411.75**	**11242.01**
Himachal Pradesh	State	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	992.00	597.23	1589.23
	Central	183.40	62.01	0.00	245.41	28.95	1223.88	0.00	1498.24
	Sub-Total	**183.40**	**62.01**	**0.00**	**245.41**	**28.95**	**2910.48**	**853.84**	**4038.68**

Jammu & Kashmir	State	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	51.36	51.36
	Central	506.39	129.07	0.00	635.47	67.98	1139.48	0.00	1842.93
	Sub-Total	**506.39**	**304.07**	**0.00**	**810.47**	**67.98**	**2369.48**	**180.39**	**3428.32**
Punjab	State	2620.00	150.00	0.00	2770.00	0.00	2570.23	127.80	5468.03
	Private	5115.50	0.00	0.00	5115.50	0.00	288.00	1154.62	6558.12
	Central	854.58	264.01	0.00	1118.59	196.81	923.42	0.00	2238.82
	Sub-Total	**8590.08**	**414.01**	**0.00**	**9004.09**	**196.81**	**3781.65**	**1282.42**	**14264.97**
Rajasthan	State	5850.00	603.80	0.00	6453.80	0.00	1087.96	23.85	7565.61
	Private	3882.00	0.00	0.00	3882.00	0.00	104.00	6455.79	10441.79
	Central	1206.25	221.10	0.00	1427.35	556.74	739.01	294.00	3017.10
	Sub-Total	**10938.25**	**824.90**	**0.00**	**11763.15**	**556.74**	**1930.97**	**6773.64**	**21024.50**
Uttar Pradesh	State	5563.00	0.00	0.00	5563.00	0.00	724.10	25.10	6312.20
	Private	8714.33	0.00	0.00	8714.33	0.00	842.00	2621.91	12178.24
	Central	3796.39	549.49	0.00	4345.88	289.48	1854.93	30.00	6520.29
	Sub-Total	**18073.72**	**549.49**	**0.00**	**18623.21**	**289.48**	**3421.03**	**2677.01**	**25010.73**
Uttarakhand	State	0.00	0.00	0.00	0.00	0.00	1252.15	67.87	1320.02
	Private	99.00	450.00	0.00	549.00	0.00	88.00	479.53	1116.53
	Central	343.24	69.66	0.00	412.90	31.24	475.54	0.00	919.68
	Sub-Total	**442.24**	**519.66**	**0.00**	**961.90**	**31.24**	**1815.69**	**547.40**	**3356.23**
Chandigarh	State	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	25.20	25.20
	Central	38.15	15.03	0.00	53.17	8.01	101.71	0.00	162.89
	Sub-Total	**38.15**	**15.03**	**0.00**	**53.17**	**8.01**	**101.71**	**25.20**	**188.09**

Central - Unallocated		1249.53	291.05	0.00	1540.58	237.03	751.45	0.00	2529.07
Total (Northern Region)	State	16888.00	2879.20	0.00	19767.20	0.00	8643.55	689.56	29100.31
	Private	22760.83	558.00	0.00	23318.83	0.00	2514.00	11854.66	37687.49
	Central	13290.37	2344.06	0.00	15634.43	1620.00	8596.22	329.00	26179.65
	Grand Total	**52939.20**	**5781.26**	**0.00**	**58720.46**	**1620.00**	**19753.77**	**12873.22**	**92967.45**

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 31.03.2018)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Goa	State	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
	Private	0.00	48.00	0.00	48.00	0.00	0.00	0.91	48.91
	Central	454.78	19.67	0.00	474.45	26.00	0.00	0.00	500.45
	Sub-Total	**454.78**	**67.67**	**0.00**	**522.45**	**26.00**	**0.00**	**0.96**	**549.41**
Daman & Diu	State	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	10.61	10.61
	Central	126.63	43.34	0.00	169.97	7.00	0.00	0.00	176.97
	Sub-Total	**126.63**	**43.34**	**0.00**	**169.97**	**7.00**	**0.00**	**10.61**	**187.58**
Gujarat	State	4750.00	2177.82	0.00	6927.82	0.00	772.00	8.00	7707.82
	Private	7765.67	3960.00	0.00	11725.67	0.00	0.00	7049.02	18774.69
	Central	3090.51	424.00	0.00	3514.51	559.00	0.00	238.30	4311.81
	Sub-Total	**15606.18**	**6561.82**	**0.00**	**22168.00**	**559.00**	**772.00**	**7295.32**	**30794.32**
Madhya Pradesh	State	4080.00	0.00	0.00	4080.00	0.00	1703.66	83.96	5867.62
	Private	5574.00	100.00	0.00	5674.00	0.00	0.00	3635.84	9309.84
	Central	2794.41	257.00	0.00	3051.41	273.00	1520.00	300.00	5144.41

	Sub-Total	**12448.41**	**357.00**	**0.00**	**12805.41**	**273.00**	**3223.66**	**4019.80**	**20321.87**
Chhattisgarh	State	2280.00	0.00	0.00	2280.00	0.00	120.00	11.05	2411.05
	Private	8490.00	0.00	0.00	8490.00	0.00	0.00	524.30	9014.30
	Central	1953.44	0.00	0.00	1953.44	48.00	0.00	0.00	2001.44
	Sub-Total	**12723.44**	**0.00**	**0.00**	**12723.44**	**48.00**	**120.00**	**535.35**	**13426.79**
Maharashtra	State	10170.00	672.00	0.00	10842.00	0.00	2850.84	208.13	13900.97
	Private	12456.00	568.00	0.00	13024.00	0.00	481.00	8247.75	21752.75
	Central	4334.75	2272.73	0.00	6607.48	690.00	0.00	123.00	7420.48
	Sub-Total	**26960.75**	**3512.73**	**0.00**	**30473.48**	**690.00**	**3331.84**	**8578.88**	**43074.19**
Dadra & Nagar Naveli	State	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	5.46	5.46
	Central	174.44	66.34	0.00	240.78	9.00	0.00	0.00	249.78
	Sub-Total	**174.44**	**66.34**	**0.00**	**240.78**	**9.00**	**0.00**	**5.46**	**255.24**
Central - Unallocated		2114.00	197.59	0.00	2311.59	228.00	0.00	0.00	2539.59
Total (Western Region)	State	21280.00	2849.82	0.00	24129.82	0.00	5446.50	311.19	29887.51
	Private	34285.67	4676.00	0.00	38961.67	0.00	481.00	19473.89	58916.56
	Central	15042.95	3280.67	0.00	18323.62	1840.00	1520.00	661.30	22344.92
	Grand Total	**70608.62**	**10806.49**	**0.00**	**81415.11**	**1840.00**	**7447.50**	**20446.38**	**111148.99**

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 31.03.2018)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Andhra Pradesh	State	5010.00	235.40	0.00	5245.40	0.00	1673.60	48.75	6967.75
	Private	3873.88	3694.12	36.80	7604.80	0.00	0.00	6427.13	14031.93
	Central	1674.56	0.00	0.00	1674.56	127.27	0.00	250.00	2051.83
	Sub-Total	**10558.44**	**3929.52**	**36.80**	**14524.76**	**127.27**	**1673.60**	**6725.88**	**23051.51**
Telangana	State	5082.50	0.00	0.00	5082.50	0.00	2449.93	40.22	7572.65
	Private	839.45	950.88	0.00	1790.33	0.00	0.00	3609.30	5399.63
	Central	1956.12	0.00	0.00	1956.12	148.73	0.00	10.00	2114.85
	Sub-Total	**7878.07**	**950.88**	**0.00**	**8828.95**	**148.73**	**2449.93**	**3659.52**	**15087.13**
Karnataka	State	5020.00	0.00	127.92	5147.92	0.00	3599.80	155.33	8903.05
	Private	1958.50	0.00	25.20	1983.70	0.00	0.00	12283.52	14267.22
	Central	2829.20	0.00	0.00	2829.20	698.00	0.00	0.00	3527.20
	Sub-Total	**9807.70**	**0.00**	**153.12**	**9960.82**	**698.00**	**3599.80**	**12438.85**	**26697.47**
Kerala	State	0.00	0.00	159.96	159.96	0.00	1881.50	151.02	2192.48
	Private	615.00	174.00	0.00	789.00	0.00	0.00	178.44	967.44
	Central	1143.22	359.58	0.00	1502.80	362.00	0.00	50.00	1914.80
	Sub-Total	**1758.22**	**533.58**	**159.96**	**2451.76**	**362.00**	**1881.50**	**379.46**	**5074.72**

Tamil Nadu	State	4320.00	524.08	0.00	4844.08	0.00	2203.20	122.70	7169.98
	Private	4837.67	503.10	411.70	5752.47	0.00	0.00	10860.81	16613.28
	Central	4489.52	0.00	0.00	4489.52	1448.00	0.00	181.90	6119.42
	Sub-Total	**13647.19**	**1027.18**	**411.70**	**15086.07**	**1448.00**	**2203.20**	**11165.41**	**29902.68**
NLC	State	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
	Central	100.00	0.00	0.00	100.00	0.00	0.00	0.00	100.00
	Sub-Total	**100.00**	**0.00**	**0.00**	**100.00**	**0.00**	**0.00**	**0.00**	**100.00**
Puducherry	State	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	0.16	0.16
	Central	248.40	0.00	0.00	248.40	86.00	0.00	0.00	334.40
	Sub-Total	**248.40**	**32.50**	**0.00**	**280.90**	**86.00**	**0.00**	**0.16**	**367.06**
Central - Unallocated		1784.00	0.00	0.00	1784.00	450.00	0.00	0.00	2234.00
Total (Southern Region)	State	19432.50	791.98	287.88	20512.36	0.00	11808.03	518.02	32838.41
	Private	12124.50	5322.10	473.70	17920.30	0.00	0.00	33359.36	51279.66
	Central	14225.02	359.58	0.00	14584.60	3320.00	0.00	491.90	18396.50
	Grand Total	**45782.02**	**6473.66**	**761.58**	**53017.26**	**3320.00**	**11808.03**	**34369.28**	**102514.57**

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 31.03.2018)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Bihar	State	710.00	0.00	0.00	710.00	0.00	0.00	70.70	780.70
	Private	281.00	0.00	0.00	281.00	0.00	0.00	255.45	536.45
	Central	2914.33	0.00	0.00	2914.33	0.00	110.00	0.00	3024.32
	Sub-Total	**3905.33**	**0.00**	**0.00**	**3905.33**	**0.00**	**110.00**	**326.15**	**4341.47**
Jharkhand	State	420.00	0.00	0.00	420.00	0.00	130.00	4.05	554.05
	Private	730.00	0.00	0.00	730.00	0.00	0.00	25.67	755.67
	Central	393.74	0.00	0.00	393.74	0.00	61.00	0.00	454.74
	Sub-Total	**1543.74**	**0.00**	**0.00**	**1543.74**	**0.00**	**191.00**	**29.72**	**1764.46**
West Bengal	State	5520.00	100.00	0.00	5620.00	0.00	986.00	91.95	6697.95
	Private	2425.00	0.00	0.00	2425.00	0.00	0.00	343.87	2768.87
	Central	760.77	0.00	0.00	760.77	0.00	410.00	0.00	1170.77
	Sub-Total	**8705.77**	**100.00**	**0.00**	**8805.77**	**0.00**	**1396.00**	**435.82**	**10637.59**
DVC	State	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

	Central	6985.04	0.00	0.00	6985.04	0.00	186.20	0.00	7171.24
	Sub-Total	**6985.04**	**0.00**	**0.00**	**6985.04**	**0.00**	**186.20**	**0.00**	**7171.24**
Odisha	State	420.00	0.00	0.00	420.00	0.00	2061.92	6.30	2488.22
	Private	2939.00	0.00	0.00	2939.00	0.00	0.00	178.30	3117.30
	Central	1633.90	0.00	0.00	1633.90	0.00	89.00	10.00	1732.90
	Sub-Total	**4992.90**	**0.00**	**0.00**	**4992.90**	**0.00**	**2150.92**	**194.60**	**7338.42**
Sikkim	State	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	399.00	0.00	399.00
	Central	87.03	0.00	0.00	87.03	0.00	64.00	0.00	151.03
	Sub-Total	**87.03**	**0.00**	**0.00**	**87.03**	**0.00**	**823.00**	**52.11**	**962.14**
Central - Unallocated		1101.83	0.00	0.00	1101.83	0.00	85.01	0.00	1186.84
Total (Eastern Region)	State	7070.00	100.00	0.00	7170.00	0.00	3537.92	225.11	10933.03
	Private	6375.00	0.00	0.00	6375.00	0.00	399.00	803.29	7577.29
	Central	13876.64	0.00	0.00	13876.64	0.00	1005.20	10.00	14891.84
	Grand Total	**27321.64**	**100.00**	**0.00**	**27421.64**	**0.00**	**4942.12**	**1038.40**	**33402.16**

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 31.03.2018)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Assam	State	0.00	288.45	0.00	288.45	0.00	100.00	30.01	418.46
	Private	0.00	24.50	0.00	24.50	0.00	0.00	16.55	41.05
	Central	279.02	435.56	0.00	714.58	**0.00**	331.23	0.00	1045.81
	Sub-Total	**279.02**	**748.51**	**0.00**	**1027.53**	**0.00**	**431.23**	**46.56**	**1505.32**
Arunachal Pradesh	State	0.00	0.00	0.00	0.00	0.00	0.00	104.61	104.61
	Private	0.00	0.00	0.00	0.00	0.00	0.00	5.39	5.39
	Central	24.70	46.82	0.00	71.52	0.00	97.45	0.00	168.97
	Sub-Total	**24.70**	**46.82**	**0.00**	**71.52**	**0.00**	**97.45**	**110.00**	**278.97**
Meghalaya	State	0.00	0.00	0.00	0.00	0.00	322.00	31.03	353.03
	Private	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
	Central	30.40	109.69	0.00	140.09	0.00	65.19	0.00	205.28
	Sub-Total	**30.40**	**109.69**	**0.00**	**140.09**	**0.00**	**387.19**	**31.05**	**558.33**
Tripura	State	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	0.09	0.09
	Central	37.40	436.95	0.00	474.35	0.00	62.38	5.00	541.73
	Sub-Total	**37.40**	**606.45**	**0.00**	**643.85**	**0.00**	**62.38**	**21.10**	**727.33**
Manipur	State	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	0.06	0.06
	Central	31.40	71.57	0.00	102.97	0.00	88.93	0.00	191.90
	Sub-Total	**31.40**	**71.57**	**36.00**	**138.97**	**0.00**	**88.93**	**5.51**	**233.41**
Nagaland	State	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	1.00	1.00
	Central	21.40	48.93	0.00	70.33	0.00	53.37	0.00	123.70
	Sub-Total	**21.40**	**48.93**	**0.00**	**70.33**	**0.00**	**53.37**	**31.67**	**155.37**
Mizoram	State	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	0.20	0.20
	Central	20.70	40.46	0.00	61.16	0.00	94.19	0.00	155.35
	Sub-Total	**20.70**	**40.46**	**0.00**	**61.16**	**0.00**	**94.19**	**36.67**	**192.02**
Central - Unallocated		75.00	63.62	0.00	138.62	0.00	127.26	0.00	265.88
Total (North-Eastern Region)	State	0.00	457.95	36.00	493.95	0.00	422.00	254.25	1170.20
	Private	0.00	24.50	0.00	24.50	0.00	0.00	23.31	47.81
	Central	520.02	1253.60	0.00	1773.62	0.00	920.00	5.00	2698.62
	Grand Total	**520.02**	**1736.05**	**36.00**	**2292.07**	**0.00**	**1342.00**	**282.56**	**3916.63**

INSTALLED CAPACITY (IN MW) OF POWER UTILITIES IN THE STATES/UTS LOCATED IN ISLANDS

INCLUDING ALLOCATED SHARES IN JOINT & CENTRAL SECTOR UTILITIES

(As on 31.03.2018)

State	Ownership/ Sector	Modewise breakup							Grand Total
		Thermal				Nuclear	Hydro (Renewable)	RES (MNRE)	
		Coal	Gas	Diesel	Total				
Andaman & Nicobar	State	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	1.46	1.46
	Central	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Sub-Total	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**11.81**	**51.86**
lakshadweep	State	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	0.75	0.75
	Central	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**	**0.75**	**0.75**
Total (Islands)	State	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	2.21	2.21
	Central	0.00	0.00	0.00	0.00	0.00	0.00	5.10	5.10
	Grand Total	**0.00**	**0.00**	**40.05**	**40.05**	**0.00**	**0.00**	**12.56**	**52.61**

ANNEXURE 12A

Details of Foreign Tours performed during 2017-18

Sl.No.	Participant(Shri/Smt/Ms)	Country	Purpose of the visit	Duration/Year
1.	Shri Deepak Choudhary, Assistant Director	Germany	Inspection of 400kv XLPE cable for contract package MEM-, Punatsangchhu HPA-I	25 April, 2017
2.	Shri Vivek Goyal, Director	Germany & Spain	Study Tour to Spain & Germany on "Integration of Renewable Energy Resources into the grid"	31 May, 2017 to 10 June, 2017
3.	Shri Asit Singh, Superintending Engineer	Germany & Spain	Study Tour to Spain & Germany on "Integration of Renewable Energy Resources into the grid"	15 June, 2017 to 30 June, 2017
4.	Shri Irfan Ahmed, Director Shri Annepu Suresh, Dy. Director	Germany & Spain	Study Tour to Spain & Germany on "Integration of Renewable Energy Resources into the grid"	17 June, 2017 to 30 June, 2017
5.	Shri Shantanu Biswas, Dy Director	Spain, Germany	Study Tour to Spain & Germany on "Integration of Renewable Energy Resources into the grid"	14 June, 2017 to 01 July, 2017
6.	Shri Anil Thomas, Director Smt. N S Malini, Dy .Director	Germany & Spain	Study Tour to Spain & Germany on "Integration of Renewable Energy Resources into the grid"	6 July, 2017 to 14 July, 2017
7.	Shri M M Dhakate, Director Shri N R L K Prasad, Executive Engineer Smt. Anusha Das, Asst. Executive Engineer	Spain, Germany	Study Tour to Spain & Germany on "Integration of Renewable Energy Resources into the grid"	27 July, 2017 to 04 August, 2017
8.	Shri Brieflee Lyngkhoi, Director D K Srivastava Director	Spain, Germany	Capacity Building Programme on Integration of Renewable Energy Sources	02 July, 2017 to 14 July, 2017
9.	Shri Vikram Singh, Director (GM) Shri Ishan Sharan, Director (PSLF)	Bhutan	Workshop on Identification, Comparison & Scenario Based Application of Power Demand/ Load Forecasting tools	04 July 2017 to 05 July 2017
10.	Shri Deepak Sharma, Dy Director	Bhutan	Inspection of the ongoing Assembly/ erection works and witnessing of Hydro Testing of Spiral Casing Unit V of Punatsangchhu- I HEP (6*200 MW)	15 June, 2017 to 17 June, 2017

11.	Shri Shravan Kumar, Director	Maruitius	To assess energy requirements and develop a road map for Mauritius	24 July, 2017 to 30 July, 2017
12.	Shri K K Arya, Member Shri P C Kureel Chief Engineer	Bhutan	To attend TCC Meeting of Punatsangchhu HEP-I &II HEP	20 July, 2017 to 22 July, 2017
13.	Shri J S Bawa, Chief Engineer	Nepal	Meeting on DPR finalization of Pancheshwar, Multipurpose Project	21 August 2017 to 22 August 2017
14.	Shri K K Arya Member	Germany	To witness inspection of generator Transformer Bushing of Punatsangchhu-I HEP	22 August, 2017 to 24 August, 2017
15.	Shri Ravinder Gupta, Chief Engineer Shri Ghanshyam Prasad, Chief Engineer	Pakistan	workshop on "Growth of Indian Power Infrastructure and Lessons Learnt"	13 September 2017 to 14 September 2017
16.	Shri J S Bawa, Chief Engineer	Washington	2nd Meeting of World bank with Senior representative of India and Pakistan in Washington, USA on issue relating to Kishenganga and Ratle HEPs under Indus Water Treaty	14 September, 2017 to 15 September, 2017
17.	Shri. P S Mhaske, Member	Bangladesh	13th Meeting of Indo-Bangladesh Joint working Group (JWG) and Joint Steering Committee (JSC) on Cooperation in Power Sector	27 September 2017 to 28 September 2017
18.	Shri Pankaj Batra, Member	Australia	Participation in Second Lateral Learning Programme on Smart Grid Technologies and Implications for Inclusive Development	02 October, 2017 to 06 October, 2017
19.	Shri Rakesh Kumar, Director Shri Mukesh Kumar, Dy. Director Shri Suyash Verma, Asst. Director Shri Shrey Kumar, Asst. Director	Nepal	Preparation of Detailed Project Report of Kuri-Gongri Hydro Electric Project (2640 MW)	25 October, 2017 to 27 August, 2017
20.	Smt. Rishika Sharan, Director Shri. Irfan Ahmad, Director	Bangladesh	workshop on system operation and settlement mechanism for cross border trade/regional power market	10 December 2017 to 11 December 2017

21.	Shri M A K P Singh, Member Secretary	Australia	Executive Exchange on "Electricity Markets and Renawable Grid Integration"	11 December 2017 to 15 December 2017
22.	Shri Goutam Roy, Chief Engineer	Nepal	Inspection of transmission line for strengthening of 132kV Power Transmission Interconnection between India and Nepal	21 November 2017 to 24 November, 2017
23.	Shri Ramesh Kumar, Director	Japan	Workshop on Energy Conservation	15 January, 2018 to 19 January, 2018
	Shri Bhailal, Chief Engineer	South Korea	Training on 420kV Gas Insulated Switchgears & Associated Equipments	29 January, 2018 to 09 February, 2018
	Shri Amit Roy Singhal, Asst. Director			
24.	Shri Gorakh Thakur, Chief Engineer	Bhutan	Visit of CEA Officers to Punatsangchhu-II at Bhutal	16 January, 2018 to 19 January, 2018
	Shri Neeraj Kumar, Director	Bhutan		
24.	Shri Rakesh Kumar, Director	China	11th Expert Level Mechanism (ELM) meeting	26 March, 2018 to 29 March, 2018