

**BEFORE THE UTTARAKHAND ELECTRICITY REGULATORY COMMISSION,
DEHRADUN**

IN THE MATTER OF: Filing of Business Plan for PTCUL for the MYT Control Period FY 2019-20 to FY 2021-22

AND

IN THE MATTER OF: Power Transmission Corporation of Uttarakhand Ltd.

VidyutBhawan”, 132KV Substation Majra, Saharanpur Road,
Near I.S.B.T. Crossing, Dehradun 248002Petitioner

- 1. Specific Legal provisions under which the petition is being filed:** This Business Plan is being filed under Regulation 43 of UERC (Conduct of Business) Regulations, 2014 and Regulation 8 of the Uttarakhand Electricity Regulatory Commission (Terms and Conditions for Determination of Multi Year Tariff) Regulations, 2018
- 2. Limitation:** The Petitioner submits that the present petition is within the time period specified under UERC (Conduct of Business) Regulations, 2014 and Regulation 8 of the Uttarakhand Electricity Regulatory Commission (Terms and Conditions for Determination of Multi Year Tariff) Regulations, 2018
- 3. Facts of the case:** The Petitioner has requested the Hon'ble Commission to kindly approve the Business Plan for PTCUL for the third Control Period FY 2019-20 to FY 2021-22
- 4. Cause of action:** The Petitioner has submitted its Business Plan for the third Control Period FY 2019-20 to FY 2021-22
- 5. Ground of Relief**
- 6. Details of Remedy Exhausted:** The petitioner declares that he has availed all the remedies available to him under the relevant provisions of applicable law and rules/regulations framed there under.
- 7. Matter not previously filed or pending with any other court:** The Petitioner further declares that he has not previously filed any petition or writ petition or suit regarding the matter in respect of which this petition has been made, before the Hon'ble Commission, or any court or any other authority, nor any such writ petition or suit is pending before any of them.
- 8. Relief sought:** The petitioner prays for the approval of Business Plan of PTCUL for the third Control Period FY 2019-20 to FY 2021-22 along with all of its components.
- 9. Interim Order**

No prayer for Interim Order has been made.

10. Details of Index

S. No.	Particulars	Annexure	Page No.	
			From	To
1.	Form-I	—		
2.	Form-II (Affidavit verifying the Petition)	—		
3.	Certified True copy of the BoD Resolution	—		
4.	Copy of Demand Draft No. 845259 dated			

S. No.	Particulars	Annexure	Page No.	
			From	To
	17.11.2018			
5.	Business Plan Petition	—		

11. Details of Tariff Filing Fees: Enclosed Demand Draft of Rupees 100000.00 (Rs. One Lakh Only) bearing number "845259" of Punjab National Bank, Dehradun dated 17.11.2018.

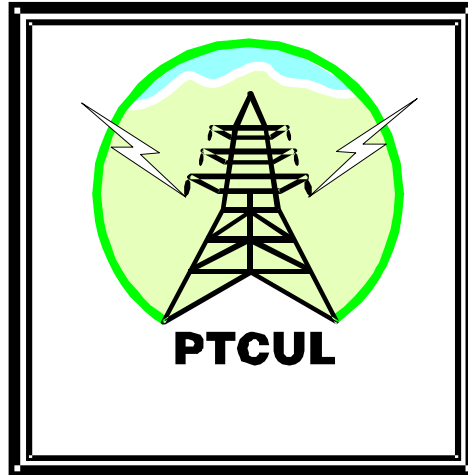
For and on behalf of
Power Transmission Corporation of Uttarakhand Limited

Sanjaya Mittal
Director (Projects)

I, Sanjaya Mittal, S/o Shri Surendra Kumar Mittal aged about 56 years, working as Director (Projects), Power Transmission Corporation of Uttarakhand Ltd., "VidyutBhawan", 132KV Substation Majra, Saharanpur Road, Near I.S.B.T. Crossing, Dehradun, do verify that the contents of the Para 1 to 8 are true to my personal knowledge and are derived from official records, which are true from record, and para 1 to 8 are believed to be true on legal advice and that I have not suppressed any material fact.

Sanjaya Mittal
Director (Projects)

**POWER TRANSMISSION CORPORATION OF
UTTARAKHAND LIMITED**



**PETITION
FOR
APPROVAL OF
BUSINESS PLAN FOR CONTROL PERIOD FROM FY 2019-20 to FY 2021-22**

**SUBMITTED TO
UTTARAKHAND ELECTRICITY REGULATORY COMMISSION**

30.11.2018

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1. Executive Summary

1.1. Introduction

In exercise of powers conferred under sub-section 4 of Section 131 of the Electricity Act 2003,, the Government of Uttarakhand through transfer scheme dated May 31, 2004 vested all the interests, rights and liabilities related to Power Transmission and Load Despatch of “Uttaranchal Power Corporation Limited” into itself and thereafter, re-vested them into a new company, the “Power Transmission Corporation of Uttaranchal Limited”, now “Power Transmission Corporation of Uttarakhand Limited” (hereinafter referred to as ‘PTCUL’) after change of name of the State. The State Government, further vide another notification dated May 31, 2004 declared the Power Transmission Corporation of Uttarakhand as the State Transmission Utility (STU)

1.2. Objective

The key objectives of this business plan are:

- Providing a tool for strategic planning - The primary objective of the Business Plan is to analyse and anticipate the future requirements in advance and strategically plan for the capital investments, related means of financing and various associated costs and document them which would serve as an effective tool for monitoring and execution of future works. It is key to ensure that the growth in transmission network infrastructure is commensurate with the energy demand in the State
- Lead to better Operational Efficiency: The Business Plan is to contain the proposed Transmission Loss reduction trajectory for the Control Period along with the measures taken towards achieving the same, planning such a trajectory in advance sets targets that are to be achieved and makes planning more result-oriented.
- Meeting the regulatory compliance of submission of a Business Plan as mandated by the UERC (Terms and Conditions for determination of Multi Year Tariff) Regulations, 2018.

1.3. Operational Performance

Operational parameters and performance provide a basis for determining the financial viability and strategies for the company. Some of the operational performance parameters have been analysed in this section.

The availability factor of the transmission network for the year 2017-18 has been greater than 99%. PTCUL’s transmission network availability level has been one of the most efficient among utilities in the country. The availability levels have steadily increased over the previous few years. PTCUL was awarded the prestigious "Gold Shield" for the year 2009-10 in the category of "Transmission System Availability" by Ministry of Power, Govt. of India.

PTCUL is one of the most efficient transmission utilities in the country. This fact has been reaffirmed time and again by the low level of transmission losses. The loss level over the past few years has always been below 2%.

1.4. Operational Plan

PTCUL has prepared the Business/Operational Plan taking into consideration all the factors, which would affect the operations of the company. It is submitted that the Business plan being a dynamic document may need to be updated at periodic intervals taking into account the changes in the internal and external environment and these changes would be intimated to the State Commission from time to time. The operational plans include the estimates of each capital expenditure scheme of PTCUL from FY 2019-20 to FY 2021-22.

1.5. Proposed Capitalization for FY 2019-20 to 2021-22

PTCUL is developing network for strengthening of Transmission System (132kV& above) to meet out the load growth requirement of Uttarakhand distribution system & also for evacuation of power from various generators i.e. Hydro as well as gas based, which are coming up in Uttarakhand.

The transmission schemes planned in the state would increase the present transformation capacity by 8237.5 MVA to 10427.5 MVA by the end of 2021-22.

The Capital investment plan proposes to increase the network length from 2888.07 ckt..Km in 2018-19 to 3185.32 ckt.Km in 2021-22 over the MYT Control Period.

The following table summarizes the capitalization for the Control Period 2019-20 to 2021-22:

Table 1: Capitalization in the MYT Control Period (INR Crore)

Particular	2017-18 (Actual)	2018-19 (Estimate)	2019-20 (Proposed)	2020-21 (Proposed)	2021-22 (Proposed)
Capitalization	94.6	421.8	508.5	410.7	878.9

1.6. Aggregate Revenue Requirement

The Projected Aggregate Revenue Requirement (ARR) of PTCUL for each year of the Control Period FY 2019-20 to FY 2021-22 is provided in table below:

Table 2: ARR for the Control Period

S.No.	Particular	FY2019-20	FY2020-21	FY2021-22
1	O&M Expenses			
1.1	Employee expenses	122.14	129.90	145.07
1.2	R&M expenses	41.42	53.87	63.92
1.3	A&G expenses	30.46	31.97	33.66
2	Total O&M expenses	194.03	215.73	242.65
3	Interest on Loan	85.00	109.61	145.77
4	Return on Equity	68.41	89.78	119.76
5	Depreciation	94.18	117.74	150.79
6	Interest on Working Capital	15.45	18.76	22.46
7	Total ARR	457.06	551.62	681.43
9	Add: Income from Medium Term Open Access Charges (to be refunded to UPCL)	-	-	-
10	Add: True-up of previous year including carrying cost	(20.80)	-	-
11	Total ARR	436.26	551.62	681.43
12	Less: Non-tariff Income	3.75	3.94	4.13
13	Less: Income from Short-term Open Access Charges	1.65	1.73	1.82
14	Less: SLDC Charges	25.83	26.28	31.53
15	ARR (excluding SLDC)	405.03	519.67	643.94
16	Less: Revenue from Natural ISTS Lines	20.93	20.93	20.93

S.No.	Particular	FY2019-20	FY2020-21	FY2021-22
17	Net ARR	384.10	498.74	623.01
18	Provision for RoE on initial equity	276.46		
19	Provision for RoE on equity contributed by GoU through PDF	246.67		

2. Introduction

2.1. Background

In accordance with the provisions of the Uttar Pradesh Reorganization Act 2000 (Act 29 of 2000), enacted by the Parliament of India on August 25, 2000, the State of Uttarakhand came into existence on November 9, 2000. Section 63(4) of the above Reorganization Act allowed the Government of Uttaranchal (hereinafter referred to as “GoU” or “State Government”) to constitute a State Power Corporation at any time after the creation of the State. GoU, accordingly, established the Uttaranchal Power Corporation Limited (UPCL) under the Companies Act, 1956, on February 12, 2001 and entrusted it with the business of transmission and distribution in the State. Subsequently, from April 1, 2001, all works pertaining to the transmission, distribution and retail supply of electricity in the area of Uttaranchal were transferred from Uttar Pradesh Power Corporation Limited (UPPCL) to UPCL, in accordance with the Memorandum of Understanding dated March 13, 2001, signed between the Government of Uttaranchal and Government of Uttar Pradesh.

Electricity Act, 2003 enacted by the Parliament of India on June 10, 2003, mandated separate licenses for transmission and distribution activities. In exercise of powers conferred under sub-section 4 of Section 131 of the Electricity Act, 2003, therefore, the Government of Uttarakhand through transfer scheme dated May 31, 2004 first vested all the interests, rights and liabilities related to Power Transmission and Load Dispatch of “Uttaranchal Power Corporation Limited” into itself and thereafter, re-vested them into a new company, i.e. “Power Transmission Corporation of Uttaranchal Limited”, now “Power Transmission Corporation of Uttarakhand Limited” (hereinafter referred to as ‘PTCUL’) after change of name of the State. The State Government, further vide another notification dated May 31, 2004 declared Power Transmission Corporation of Uttarakhand as the State Transmission Utility (STU) responsible for undertaking, amongst others, the following main functions:

- a) To undertake transmission of electricity through intra-state transmission system
- b) To discharge all functions of planning and co-ordination relating to intra-state transmission system
- c) To ensure development of an efficient, co-ordinated and economical system of intra-state transmission lines
- d) To provide non-discriminatory open access.

A new company in the State was thus, created to look after the functions of Intra-State Transmission and Load Dispatch w.e.f. May 31, 2004. In view of re-structured function of UPCL and creation of a separate company for looking after the transmission related works, the Uttarakhand Electricity Regulatory Commission (hereinafter referred to as the ‘Hon’ble Commission’ or the ‘UERC’ or the ‘State Commission’ or the ‘Commission’) amended the earlier ‘Transmission and Bulk Supply License’ granted to UPCL and Transmission License was vested on PTCUL for carrying out transmission related works in the state vide Commission’s order dated June 9, 2004.

Transmission network serves as an important link between the Generation and Distribution segments of electricity supply business. The issues and challenges pertaining to the transmission business are mostly in terms of keeping up with the growth needs of the other two segments. Considering that the peak demand is projected to increase to 3180 MW in FY 2021-22, the need to meet the demand and energy requirement by arranging supply from internal and external generation sources has acquired heightened importance and the transmission system has to be strengthened adequately and timely for maintaining grid stability and supply quality.

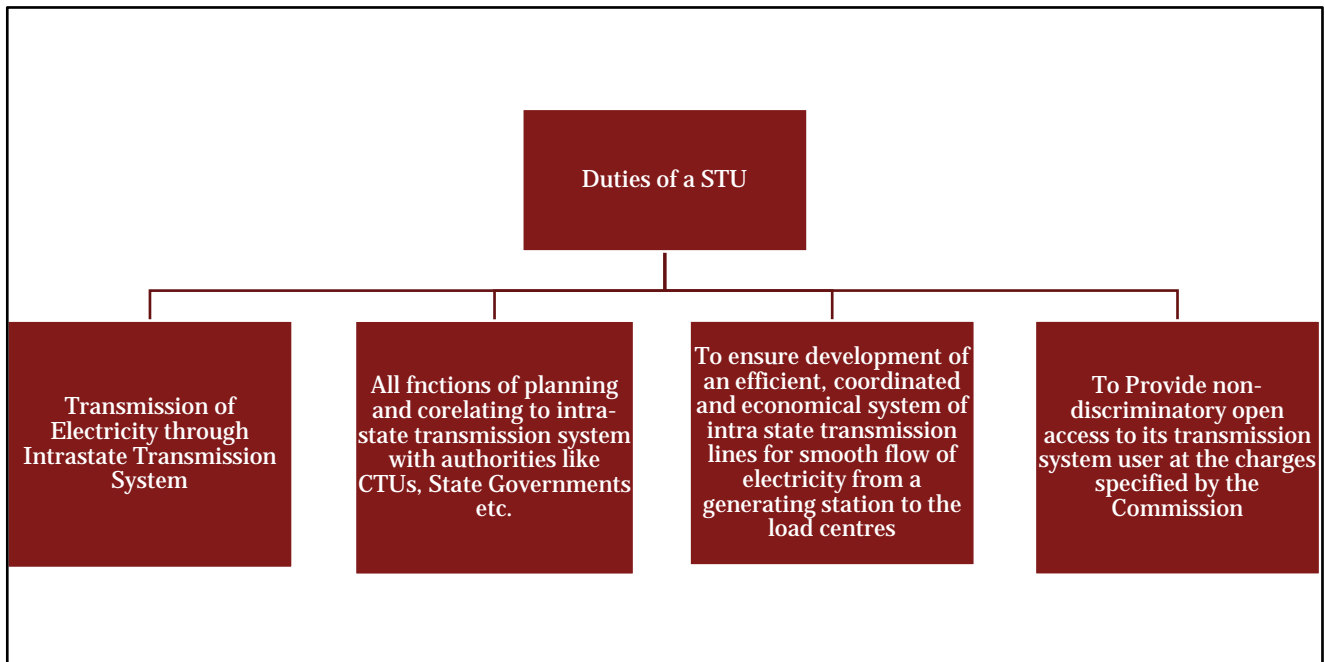
The push for infrastructure enhancement also comes from the Saubhagya Scheme or **Pradhan Mantri Sahaj Bijli Har Ghar Yojana**, an initiative of Government of India (GoI) launched in September 2017 with the objective to electrify all rural and poor urban households by December 2018.

The program has been successful in Uttarakhand with the state achieving 96.56% electrification despite the geographical constraints it faces. This has been possible due to the various state Utilities working with dedication and cohesion toward the goal of electrification.

2.2. Duties of a STU

The main duties of a State Transmission Utility as provided in the sub-section (1) of Section 39 of the Electricity Act, 2003 are as below:

Figure 1: Duties of a STU



2.3. Corporate Vision, Aims and Objectives of PTCUL

Corporate Vision

PTCUL endeavors to be among the best of Power Transmission utility in India in Operating Efficiency, System Reliability Standards and Commercially Viable Operations

Corporate Aims

- To provide Reliable & Efficient Transmission Network throughout Uttarakhand at competitive cost.
- Adopt best practices of Project and Operations & Maintenance Management leading to System Efficiency, Reliability and Commercial Viability.
- Create a work environment which motivates & enhances Employee Performance, Value Systems and Reward Contribution.
- Develop and train employees towards upgrading their skills at work, enrich work content to made it more substantive and responsive to Company Goals.
- Imbibe transparency and accountability in all operational areas, be it Procurement, Construction, Operations and Maintenance.
- Expand horizons of activities in to contracting and others by leveraging the Company's available Technical and Project Expertise.

- Build, in essence PTCUL to a Company geared to high standards of Management Capabilities and Professional Performance.

Corporate Objectives

The main objectives of PTCUL are listed below:

- To acquire, establish, construct, take over, erect, lay, operate, run, manage, hire, lease, buy, sell, maintain, enlarge, alter, renovate, modernize, work and use electrical transmission lines and/or network through extra high voltage, medium voltage and low voltage lines and associated sub-stations, including cables, wire, accumulators, plants, motors meters, apparatus, computers and material connected with transmission and wheeling of electrical energy along with ancillary services, telecommunication and telemetering equipment in the State of Uttaranchal and elsewhere. To undertake, for and on behalf of other erection, operation, maintenance, management of extra-high voltage, high voltage, medium voltage and low voltage, lines and associated sub-stations, equipment, apparatus, cable and wires.
- To co-ordinate the facilities for the inter State, regional and inter regional generation and efficient, economical and integrated transmission and supply of electricity. To levy and charge such fees and Wheeling charges from the generating, distribution Companies, licensees, bulk consumers as may be specified by appropriate Regulatory Commission.
- To facilitate and promote transmission, wheeling and inter connection arrangements within the State of Uttaranchal for the transmission and supply of electricity by economical and efficient utilization of the electricity.
- Till a separate SLDC is established as per law, for the time being, to establish, acquire, construct, take over the State Load Despatch Centre and run, manage supervise, operate the State Load Despatch Centre as the apex body to ensure integrated operation of the Power System in the State of Uttaranchal and optimum scheduling and dispatch of electricity within the State of Uttaranchal, monitor grid operation and levy and collect such fees and charges from the generating companies and licensees engaged in Intra-State Transmission of electricity as may be specified by appropriate Regulatory Commission. To schedule and dispatch generation of all units connected to the State power system including the centrally owned generating stations, in respect of the share assigned to the State and electricity purchased from other State undertakings.
- To study, investigate, collect information and data, review operations, plan research, design, prepare project reports, diagnose operational difficulties and weakness, and advise on the remedial measures to improve and modernize. To tender and/or finalize contract for transmission and wheeling of power from generating stations and other sources.

2.4. Core Activities

The Core activities of PTCUL as a State Transmission Utility (STU) can broadly be classified into Projects and Operations & Maintenance (O&M). The table below lists the major roles discharged under both divisions:

Table 3: Main Activities of PTCUL

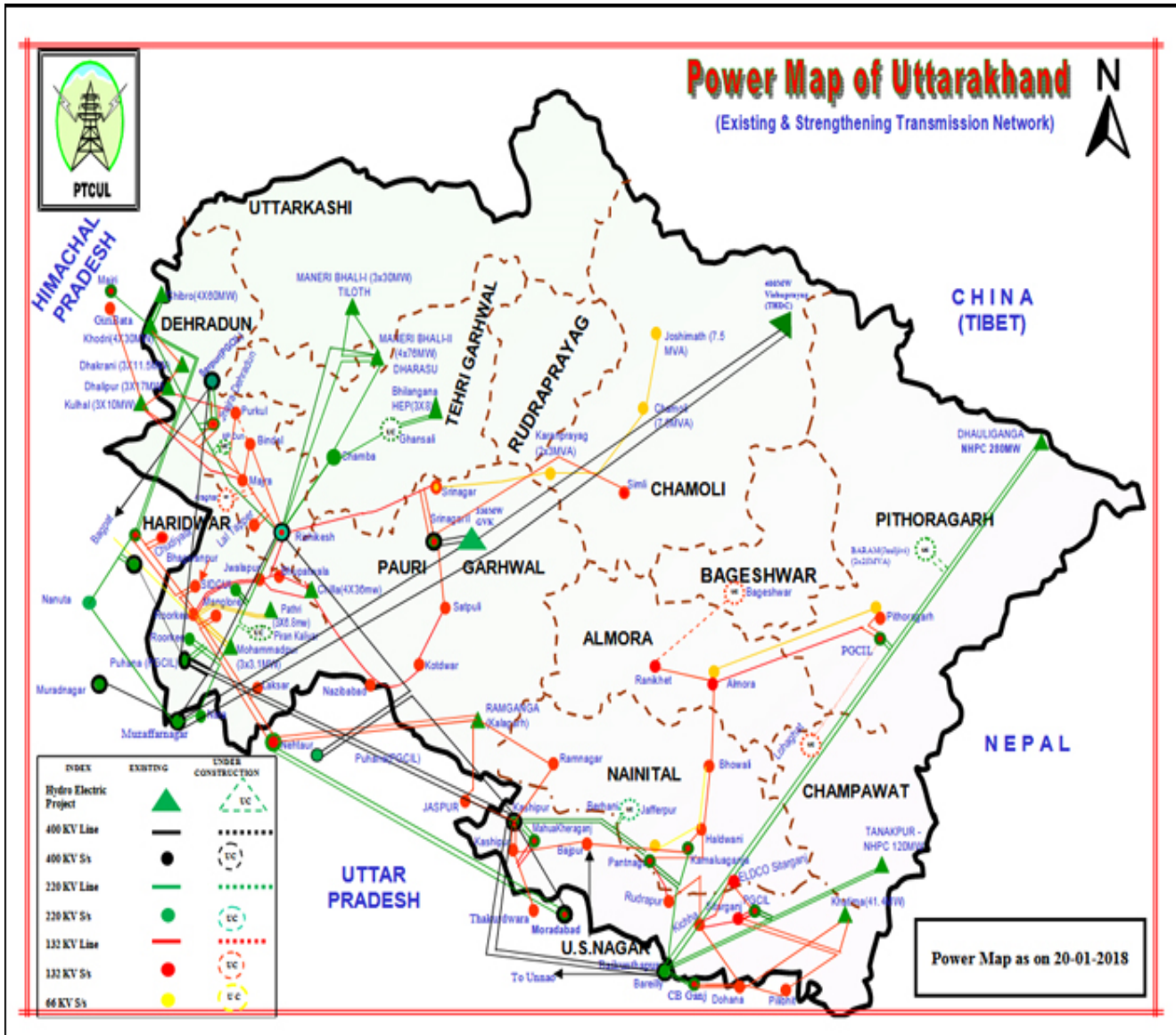
Projects	Operations and Maintenance (O&M)
Planning execution, control of engineering design, procurement and construction of Transmission lines of varying capacity and length in Circuit Kilometres	Operational activities of Transmission lines and Substations as per the CEA Grid Standards.
Planning execution, control of engineering design, procurement and construction of Substations of varying capacity in MVA	Maintenance and augmentation activities of Lines and Substations to ensure their reliable and efficient functioning.

2.5. Power Map of Uttarakhand

The power map of a region is a visual representation of its Power generation and transmission system. By utilizing symbols to depict various generating stations, transmission sub stations, transmission lines etc. on a physical map of the region, it enables both geographical and technical analyses of the extant and upcoming power system capabilities of that region.

The power map of Uttarakhand depicting the generating stations, transmission substations and major power lines that are operational or under construction in the state is as below:

Figure 2: Power Map of Uttarakhand



2.6. Key Objectives of Business Plan

The key objectives of this business plan have been listed below:

- Providing a tool for strategic planning:** The primary objective of the Business Plan is to analyse and anticipate the future requirements in advance and strategically plan for the capital investments, related means of financing and various associated costs and document them, which would serve as an effective tool for monitoring and execution of future works. It is important to project the growth in

transmission network infrastructure commensurate with the energy demand required for fueling the economic growth targets of the State.

- **Providing a roadmap for performance improvement:** The Business Plan shall contain a transmission loss reduction trajectory for the Control Period and measures to achieve the said reduction.
- **Aid in decision making leading to better Operational Efficiency:** The Business Plan is prepared to be useful to the Managing Board, associated stakeholders, the Hon'ble Commission and various government bodies. The future projections in the Plan would help the transmission utility in decision making and taking proactive actions, thus improving the overall operational efficiency of the transmission network infrastructure.
- Meeting the regulatory compliance of submission of a business plan as mandated by the UERC MYT Regulations, 2018

3. Business Overview: Operational

PTCUL is one of the efficient Transmission Utilities in India with availability of over 99% and very low transmission losses, which has been below 2% in past years.

The major strengths of PTCUL are:

- *High system availability:* A robust preventive maintenance plan improves the overall system availability and enables long term & short term open access without undue shutdowns
- *Low transmission losses:* A modern, technologically sophisticated network based on the best engineering practices ensures low transmission loss

Few of the major challenges being encountered by PTCUL are ageing equipment - failure rate, Quality of Power, Grid Discipline, Network planning commensurate with generation & distribution, strengthening network to cope up with quality of power, and Renovation and Modernization. To aid its expanding operations, PTCUL has also been steadily increasing its workforce in order to fill in the vacant posts.

3.1. Current Infrastructure

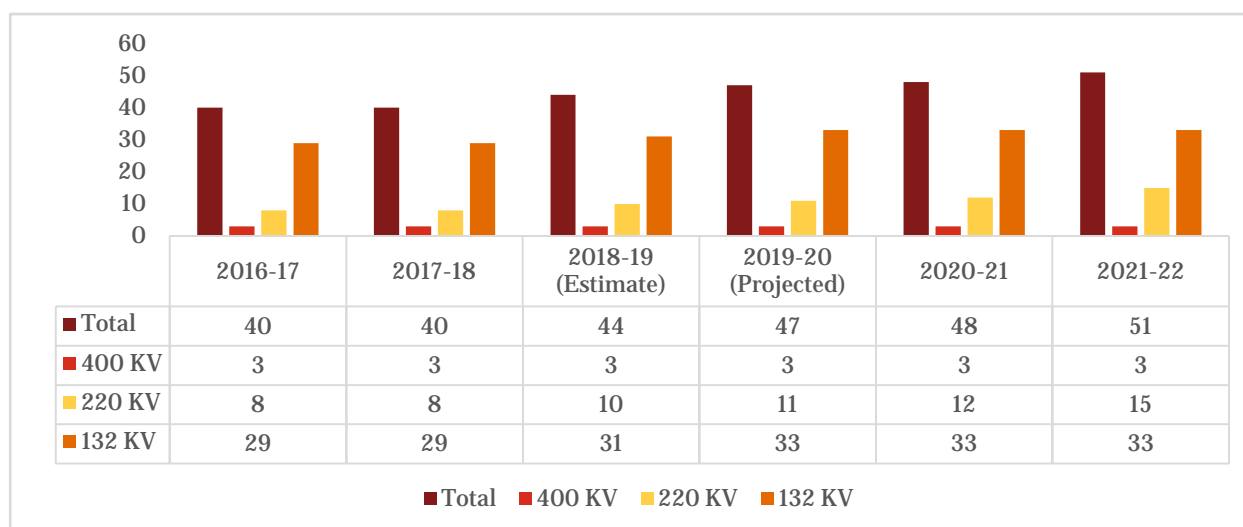
PTCUL has a network which is spread over 2888Ckt.Kms of transmission line and has an installed transformation capacity of 8237.5 MVA (as of September, 2018) with a total of 42 substations. PTCUL is in the process of increasing its network capacity to handle the increasing demand in future years.

3.2. Growth in Existing Infrastructure

PTCUL has been making steady progress in increasing the capacity of its transmission network ever since its inception in 2004. Increase of approximately 1700ckt.Kms. in the length of its transmission lines and of approximately 5700 MVA in the transformation capacity of its sub stations are a testament to PTCUL's commitment towards improving the power system of Uttarakhand. Keeping up with its tradition of development, PTCUL, through its Capital investment Plan has proposed large strides in capacity addition to the transmission network. The sections below graphically represent the increase in capacity over the preceding MYT Control Period and the proposed increment in capacity in the upcoming Control Period.

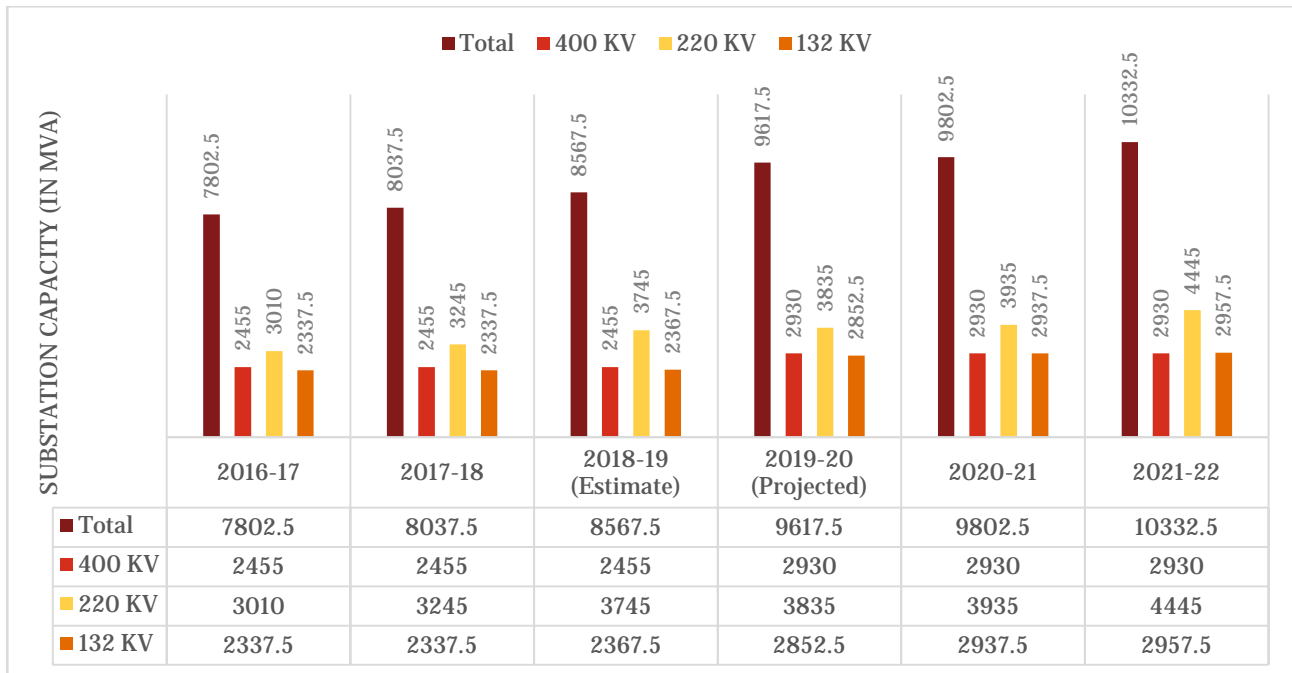
3.2.1. Growth in number of Sub-stations

Figure 3: Growth in Number of Sub Stations



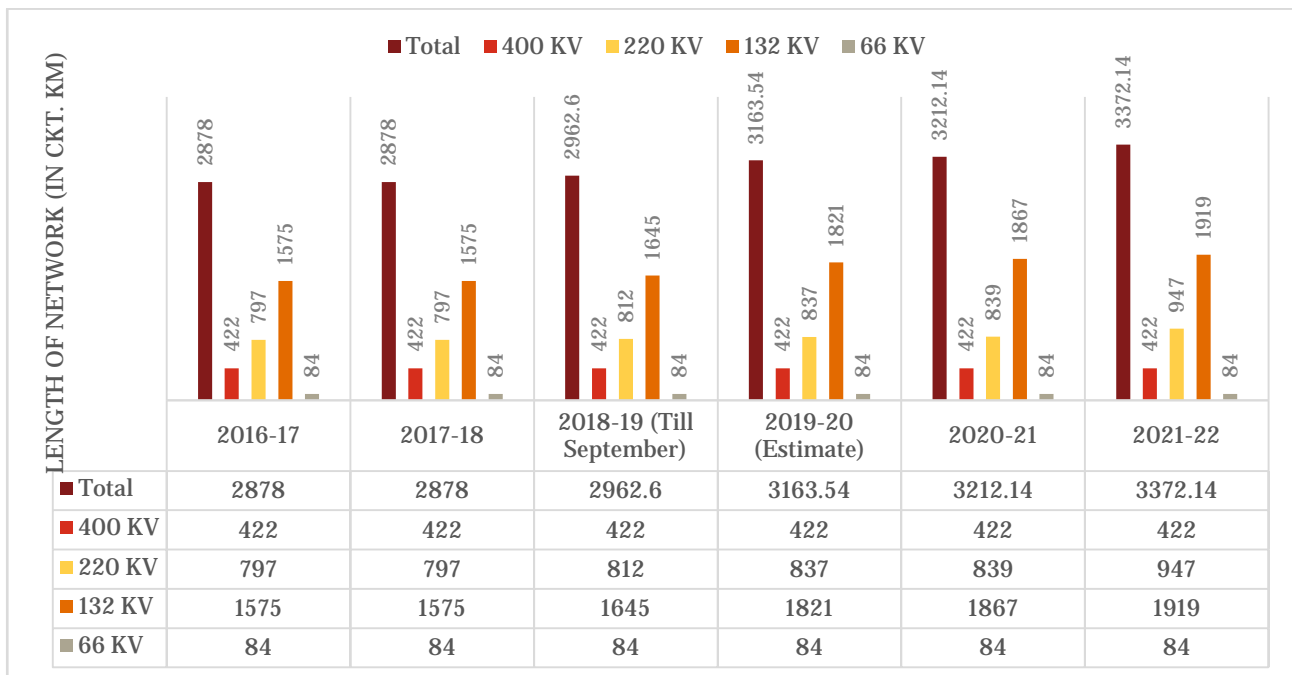
3.2.2. Growth in Sub-station Capacity

Figure 4: Growth in Sub Station Capacity



3.2.3. Growth in Network Level

Figure 5: Growth in Network



3.2.4. Congestion points and mitigation Solution

Even though there has been a substantial increase in the network, there are a few congestion points in the current network of PTCUL. These have been identified and are being resolved through various mitigation solutions. The Capital Expenditure plan for the Control Period from 2019-20 to 2021-22 has been made keeping

in mind the congestion points currently being encountered by PTCUL. The table below lists the constraints observed in the network, the mitigation actions being currently undertaken and status of the said actions.

Table 4 : Congestion points and mitigation Solutions proposed

S.No.	Constraints in STU (PTCUL) observed by SLDC	Mitigation Actions	Status
1.	Loading on 400/220 kVKashipur ICTs are not N-1 compliant in case of low gas generation	Increasing capacity at 400/220 kV level by additional 315 MVA T/F	The tender award activities are under process for this project; Work on the project is expected to start soon
2.	Loading on 220 kVPuhana (Roorkee, PGCIL) – Roorkee line and lines at 220 kVRoorkee s/s are not N-1 compliant	220/33 kV S/s Pirankaliyar has been Commissioned. It will reduce loading on 220 kVRoorkee-Puhana line due to shifting of Pirankaliyar and nearby area load from 220 kV S/s Roorkee.	Work on the substation has been completed
3.	Overloading of 160MVA ICTs at 400 kVKashipur Substation	Increasing capacity at 220/132 kV level by additional 160 MVA T/F	The system augmentation project is currently in the tendering stage and work is expected to be started by the end of the current financial year
4.	160MVA ICTs are not N-1 compliant at 220kVRoorkee Substation	i) Loading on 160 MVA T/F will be reduced after shifting of load from 220/132/33 kV S/s Roorkee to 220/33 kV S/s Pirankaliyar. ii) 220/132kV S/s Mangalore is proposed. After Commissioning of this S/s loading on 160 MVA T/F will be reduced in future.	The 220/33 kV S/s Pirankaliyar has been Commissioned and the 220/132 kV S/s Mangalore is proposed for completion in FY 2021-22
5.	220kV radial feeder for 220kVHaldwani Substation	Construction of 220kV LILO of 220kVKashipur (400 kV S/S) -Pantnagar at Barheni to connect 220kV S/s Kamaluaganja on existing corridor of 132kVBazpur--Kamaluaganja on Multi voltage/Multi Circuit Tower is proposed.	The project to mitigate the constraint has been proposed in the Investment plan and is due for completion in FY 2021-22
6.	132 kV radial feeder for 132 kVManglore Substation	LILO of 132 kV Mangalore-Air Liquid and Mangalore-Ashai Glass line is proposed at proposed 220/132 kV S/s Mangalore which will provide reliability in case of N-1 Contingency.	The project to mitigate the constraint has been proposed in the Investment plan and is due for completion in FY 2021-22
7.	132 kV radial feeder for 132 kVRanikhet Substation	132 kVRanikhet-Bageshwar line is under implementation and 132 kV S/s Bageshwar is under implementation. Approximately 45 MW SHP will be connected to 132/33 kV under construction S/sBageshwar will provide the reliability in case of N-1 Contingency.	Work on the Line is currently in progress and work on the substation is expected to commence soon.
8.	132 kV radial feeder for 132 kV ELDECO Sitarganj	Stringing of 132 kVKichha-ELDECO Sitarganj line is under implementation.	The erection of two remaining towers is still pending due to RoW issues. All pther works have been completed

S.No.	Constraints in STU (PTCUL) observed by SLDC	Mitigation Actions	Status
9.	Single 40 MVA T/F at Laltapper Substation.	Additional 01 No of 40 MVA T/F is proposed.	Contract has been awarded for the shifting of Transformer from 220 kVJhahra S/s to 132 kVLaltappar S/s.
132 /33 kV transformers not peak Reliant			
1.	132 kVLaksar Substation.	Increasing capacity with additional 40 MVA T/F is under implementation.	Capacity incrementation at the 132 kVLaksar S/s is in progress
2	132 kVManglore Substation.	Increasing capacity with additional 40 MVA T/F is proposed.	Capacity incrementation at the 132 kVManglore S/s is in progress
3.	132 kVKhatima Substation.	132/33 kVKhatima-II is proposed.	The project to mitigate the constraint has been proposed in the Investment plan and is due for completion in FY 2021-22
4.	132 kVKichha Substation.	Increasing capacity with additional 40 MVA T/F is under implementation.	Capacity increment at the 132 kVKichha S/s is in progress
5.	132 kVJaspur Substation.	Increasing capacity with additional 40 MVA T/F is under implementation.	Capacity incrementation at the 132 kVJaspur S/s is in progress
6.	132 kVRamnagar Substation.	Increasing capacity with additional 40 MVA T/F in place of existing 20 MVA T/F is proposed.	Capacity incrementation at the 132 kVRamnagar S/s is in progress
7.	220 kVRishikesh Substation	Increasing capacity with additional 40 MVA T/F is proposed.	The project has been proposed for the coming Control Period. The DPR preparation is underway.
8.	132 Bindal Substation	Increasing capacity with additional 40 MVA T/F is under implementation.	Capacity incrementation at the 132 kVRamnagar S/s is in progress
9.	132 Kotdwar Substation	Increasing capacity with additional 40 MVA T/F is under implementation.	Capacity incrementation at the 132 kVKotdwar S/s is in progress

3.3. Operational Performance

Operational parameters and performance provide a basis for determining the financial viability and strategies for the company. Some of the operational performance parameters have been analysed in this section.

3.3.1. System Availability

PTCUL was awarded the prestigious "Gold Shield" for the year 2009-10 in the category of "Transmission System Availability" by Ministry of Power, Govt. of India. The availability factor of the transmission network for

the year 2018-19 (until September 2018) was 99.46%. PTCUL's transmission network availability level has been one of the most efficient among utilities in the country. It is a constant endeavour for PTCUL to improve the availability level significantly over the years. The table below shows the actual availability for FY 2016-17 to FY 2017-18, estimated availability for FY 2018-19 based on first half of the year and the projected availability for FY 2019-20 to FY 2021-22.

Table 5: System Availability for the last Control Period and projections for the upcoming Control Period

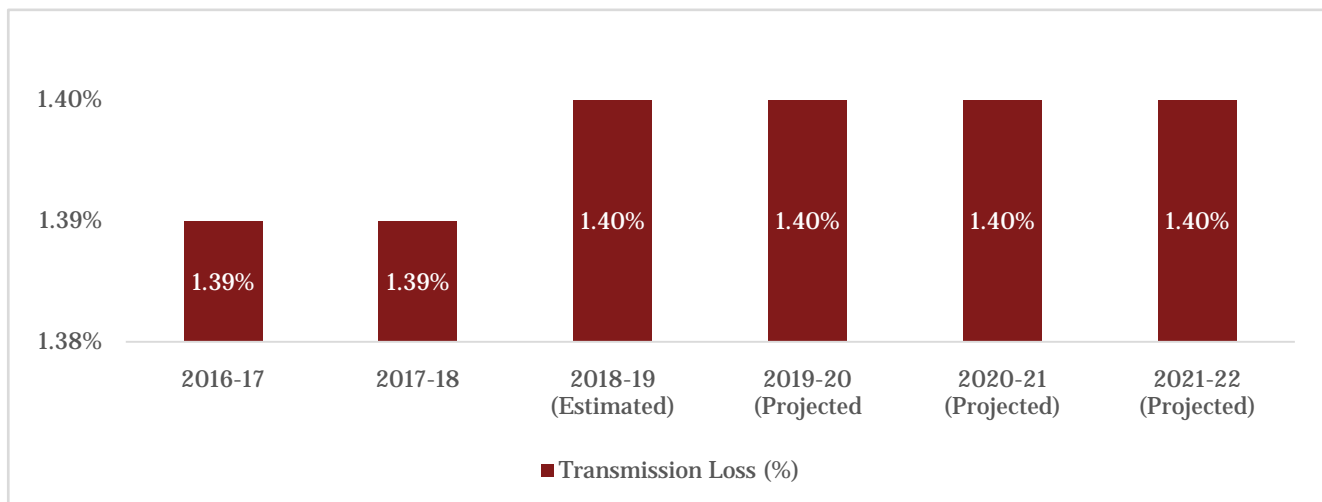
	2015-16 (A)	2016-17 (A)	2017-18 (A)	2018-19 (E)	2019-20 (P)	2020-21 (P)	2021-22 (P)
System Availability	99.46%	99.33%	99.15%	99.38%	99.38%	99.38%	99.38%

A – Actual; E - Estimated; P - Projected

3.3.2. Transmission Losses

PTCUL is one of the most efficient transmission utilities in the country. This is demonstrated by the low level of transmission losses in the network. The loss level over the past years has been below 2%. The table below shows the actual losses for FY 2016-17 to FY 2017-18, estimated losses for FY 2018-19 based on first half of the year and the projected losses for FY 2019-20 to FY 2021-22.

Figure 6: Projected Transmission Losses

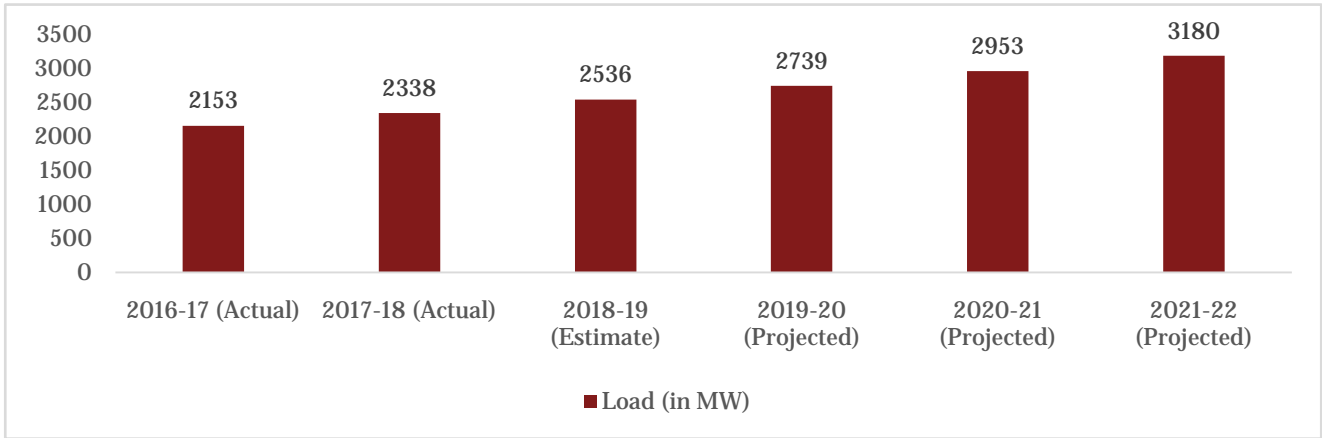


3.4. Projections of Growth in load and energy carried by the Transmission System

3.4.1. Load Growth

The expected Peak Load growth in Uttarakhand for the Control Period is as given in the figure below. The values have been taken from the 19th Electric Power Supply Forecast for the state of Uttarakhand conducted by the Central Electricity Authority.

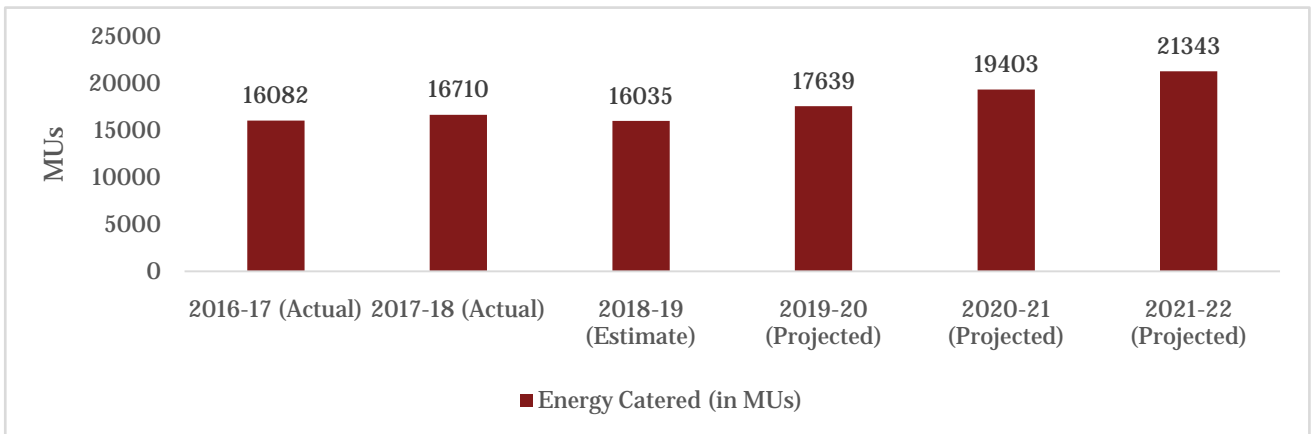
Figure 7: Expected Load Growth in the MYT Control Period



3.4.2. Energy Catered

PTCUL projects increase in the quantum of energy delivered to its transmission system by the trajectory given below:

Figure 8: Growth in energy catered



4. Regulatory Framework

4.1. Background

As per the Constitution, the power sector in India is the combined responsibility of Central and State Government. Over the years, reforms in Indian power sector have been driven by the Union and State Governments in an endeavour to achieve sustainable growth & improvement in operational efficiencies. One of the cornerstones of this reform Agenda is the Electricity Act, 2003.

4.2. Enabling Provisions in Electricity Act, 2003

The Government of India notified the Electricity Act, 2003 with effect from June 10, 2003, which required the State Governments to initiate major changes in the Industry Structure and Operations of the state power sector. The preamble to the Electricity Act, 2003 states its broad objectives:

“An Act to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and for taking measures conducive to development of electricity industry through way of reforms and restructuring, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalisation of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies, constitution of Central Electricity Authority, Regulatory Commissions and establishment of Appellate Tribunal and for matters connected therewith or incidental thereto.”

It introduced a number of new concepts in Indian power sector like de-licensing of generation, power trading, Open Access, etc., and special provisions for the rural areas. The Act made it mandatory for all the States to restructure the Electricity Boards. The major provisions of the Electricity Act 2003 related to transmission are:

- As per Section 3 of the Electricity Act 2003, the CEA has been entrusted with the responsibility of preparing the National Electricity Plan in accordance with the National Electricity Policy and notify such plans once in five years.
- Preparation, publication and notification of National Electricity Plan by the Central Electricity Authority. (Section 4)
- Private sector participation in transmission through grant of license by the appropriate Regulatory Commission. (Sections 12,13,14,15)
- CTU (Central Transmission Utility) / STU (State Transmission utility) to be deemed transmission licensee. (Section 14)
- Planning, coordination, development and undertaking transmission of electricity through inter-state system by the Central Transmission Utility. (Section 38)
- Planning, coordination, development and undertaking transmission of electricity through intra-state system by the State Transmission Utilities. (Section 39)
- Licensee to provide non-discriminatory open access to any licensee or generating company and to any consumer as and when open access is provided by SERC in Transmission. (Section 40)
- Open access to be provided against payment of transmission charges as determined by CERC/SERC. (Section 38)
- Advise to the Central Government on matters relating to the national electricity policy, formulate short-term and perspective plans for development of electricity system and coordinate the activities of the planning agencies. (Section 3)

- Governments, licensees or the generating companies for improved and coordinated operation of electricity system under their ownership, and advise the Appropriate Governments and Appropriate Commissions on technical matters relating to generation, transmission and distribution of electricity by the Central Electricity Authority. (Section 73)
- Regulation and tariff determination for inter-state transmission by the Central Electricity Regulatory Commission. (Section 79)
- Facilitation and tariff determination for intra-state transmission by the State Electricity Regulatory Commissions. (Section 86)

Also, the Electricity Act envisaged competition in transmission and carries provisions for grant of Transmission Licenses by the Central Electricity Regulatory Commission (CERC) as well as State Electricity Regulatory Commissions (SERCs). Further, the Act has created a conducive environment for investments in all segments of the industry, both for public sector and private sector, by removing barrier to entry in different segments.

The functions of CTU and STU as specified in the Act are:

- Transmission of electricity;
- Planning & co-ordination of transmission system;
- Development of efficient and economical transmission lines from generating stations to load centres;
- Providing non-discriminatory open access to the system to open access customers

4.3. Legal Structure of Power Sector in India

The Ministry of Power of the Government of India (GoI) is at the helm of Indian Power Industry, providing policy guidance to the sector. The Central Electricity Authority (CEA) constituted under Electricity Supply Act 1948, is a body for advising GoI on technical matters and is responsible for preparing National Electricity Plan in accordance with the National Electricity Policy.

The Central Electricity Regulatory Commission established as per the Electricity Regulatory Commission Act, 1998, regulates the power sector at national level including functioning of central power utilities like the NTPC and NHPC, which are engaged in generation of power, and PGCIL, which is engaged in inter-state power transmission.

At the state level, state governments controlled the sector through the erstwhile state electricity boards (SEBs) and electricity departments (EDs). In many states the SEBs are now unbundled and corporatized as per the EA 2003. Separate utilities are responsible for generation, transmission, and distribution, usually within their own states and territories.

Figure 9: Legal Structure of the Power Sector in India

Roles Discharged	Interstate & Inter Region Transmission	Intra State Transmission
Policy	Ministry of Power, GoI	Energy Departments and Ministries of the State Government
Planning and Standards	Central Electricity Authority	
Regulation	Central Electricity Regulatory Commission	State Electricity Regulatory Commission
Asset Creation/Operations	Central Transmission Utility	State Transmission Utility

4.4. National Electricity Policy

The National Electricity Policy was notified by GoI as per provisions of the Act on February 12, 2005. This Policy aims at accelerated development of the power sector, providing supply of electricity to all areas and protecting interests of consumers and other stakeholders keeping in view availability of energy resources, technology available to exploit these resources, economics of generation using different resources and energy security issues.

The development of the National Grid is an important feature of the Policy. The Policy states that the Transmission System requires adequate and timely investments and efficient and coordinated action to develop a robust and integrated power system for the country. It further recognizes that there is need for adequately augmenting transmission capacity in view of the massive increase planned in generation and for development of power market.

The Policy noted that in view of the required magnitude of the expansion of the sector, a sizeable part of the investment requirement will need to be brought in from the private sector. In keeping with this, it specified that special mechanisms would be created to encourage private investment in the transmission sector so that sufficient investments are made for achieving the objective of demand to be fully met by 2012.

The National Electricity Policy notified on February 12, 2005 inter-alia states that –

“5.3.1 The Transmission System requires adequate and timely investments and also efficient and coordinated action to develop a robust and integrated power system for the country.

5.3.2 Keeping in view the massive increase planned in generation and also for development of power market, there is need for adequately augmenting transmission capacity.....

5.3.10 Special mechanisms would be created to encourage private investment in transmission sector so that sufficient investments are made for achieving the objective of demand to be fully met by 2012.

5.8.1 Considering the magnitude of the expansion of the sector required, a sizeable part of the investments will also need to be brought in from the private sector. The Act creates a conducive environment for investments in all segments of the industry, both for public sector and private sector, by removing barrier to entry in different segments. Section 63 of the Act provides for participation of suppliers on competitive basis in different segments which will further encourage private sector investment.”

In order to facilitate the smooth and rapid development of transmission capacity in the country as envisaged in the National Electricity Policy, some transmission projects will be identified for tariff based competitive bidding, in which Private Investors and Transmission Utilities, both Central and State, can participate.

4.5. National Tariff Policy

Some important provisions in the National Tariff Policy pertaining to transmission of electricity are outlined in the following sections:

4.5.1. Objectives of the Policy

The tariff policy seeks to achieve the following objectives concerning Transmission:

- Ensuring optimal development of the transmission network ahead of generation with adequate margin for reliability and to promote efficient utilization of generation and transmission assets in the country;
- Attracting the required investments in the transmission sector and providing adequate returns

4.5.2. Pricing

- A Transmission tariff framework, sensitive to distance, direction and related to quantum of power flow, to be implemented with the objective of promoting effective utilization of all assets across the country and accelerated development of new transmission capacities that are required

- Transmission system users to share the total transmission cost in proportion to their respective utilization of the transmission system
- For smooth operation of the grid, efforts should be made to develop transmission system ahead of generation
- Tariff determination and adherence to Standards of Performance shall be carried out in accordance with the norms specified by the Central Commission

4.5.3. Other Issues

- Financial incentives and disincentives should be implemented for the CTU and the STU around the Key Performance Indicators (KPI) like efficient network construction, system availability and loss reduction.
- All available information should be shared with intending users by the CTU/STU and the load dispatch centers, particularly information on available transmission capacity and load flow studies
- If the Central Government, in case of some extraordinary circumstance, allocates power out of the unallocated share of the Central Generating Stations or otherwise, such allocation of power will have priority over short-term, medium-term and long-term access in this order
- The State Commission shall adopt the norms and framework for ancillary services as specified by the Central Commission in consultation with the Central Electricity Authority, SERCs/JERCs, CTUs/STUs and NLDC/RLDC/SLDCs

4.6. SERC Regulations

In accordance with Section 181 of the Electricity Act, 2003, the State Electricity Regulatory Commissions are empowered to notify Regulations consistent with the Act and the rules. Some of the currently applicable key regulations specified by the Uttarakhand State Electricity Regulatory Commission are outlined below:

Table 6: UERC - Current Regulations applicable in the state

S.No.	Purview	Name of Regulation
1.	Code Of Conduct	Uttarakhand Electricity Regulatory Commission (Conduct of Business) Regulations, 2014
2.	Tariff determination	Uttarakhand Electricity Regulatory Commission (Terms and Conditions for Determination of Multi Year Tariff) Regulations, 2018
3.	Fee and Fines	Uttarakhand Electricity Regulatory Commission (Fees and Fines) Regulations, 2002 (Second Amendment in 2018)
4.	Grid Code	Uttarakhand Electricity Regulatory Commission (State Grid Code) Regulations, 2016
5.	Open Access	Uttarakhand Electricity Regulatory Commission (Terms and Conditions of Intra-State Open Access) Regulations, 2015 (Second amendment in 2018)
6.	Appointment and functioning of Ombudsman	UERC (Appointment & Functioning of Ombudsman) Regulations, 2004 (Fourth amendment in 2016)
7.	Distribution Code	Uttarakhand Electricity Regulatory Commission (Distribution Code) Regulations, 2018

S.No.	Purview	Name of Regulation
8.	RE tariff	UERC (Tariff and Other Terms for Supply of Electricity from Renewable Energy Sources and non-fossil fuel based Co-generating Stations) Regulations, 2018

4.7. Regulatory Background for the Business Plan - UERC MYT Regulations, 2018

As per clause 8(1)(b) of UERC (Terms and Conditions for determination of Multi Year Tariff) Regulations, 2018, the Transmission Licensee has to submit a Business Plan containing capital investment with relevant information on expenditure, financing and capitalisation, as well as proposed transmission loss trajectory for the entire Control Period. The relevant extract is reproduced as under:

“b)The Business Plan for the Transmission Licenses shall be for the entire control period and shall, interalia, contain-

- (i) Capital investment plan which should be commensurate with load growth and quality improvement proposed in the business plan along with its cost-benefit analysis. The investment plan should also include yearly phasing of capital expenditure along with the source of funding, financing plan and corresponding capitalisation schedule. The system augmentation/expansion plan to be submitted as a part of Capital Investment Plan by the Transmission Licensee shall be consistent with the load growth forecast/ generation evacuation requirement during the control period. Further, the Capital Investment Plan shall be in conformity with the plans made by the CEA/CTU/STU/Distribution Licensee;*
- (ii) The appropriate capital structure of each scheme proposed and cost of financing (interest on debt) and return on equity, terms of the existing loan agreements, etc;*
- (iii) Transmission loss reduction trajectory for each year of the control period, including details of the measures proposed to be taken for achieving the target loss;”*

Further, the Regulation 8(2) of the UERC MYT Regulations, 2018 require the Petitioner to submit manpower planning for Control period as part of Business Plan.

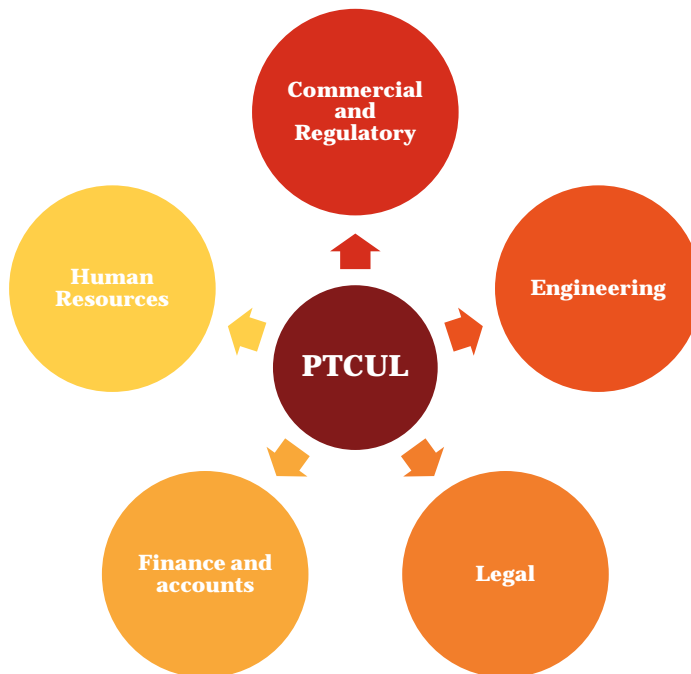
“(2)The Applicant shall also submit the details in respect of its manpower planning for the Control Period as part of Business Plan.”

5. Human Resources

5.1. Need for HR plan and initiatives

A vital ingredient in the effective functioning of an organization is the adequacy and efficiency of its work force. By employing competent professionals, the organization can not only achieve higher levels of efficiency, but also bring down costs and make itself more profitable. It is not a surprise then that PTCUL, which has been accorded the status of one of the best transmission utilities by the Ministry of Power, employs an excellent talent pool. A broad classification of the workforce in PTCUL is illustrated by the figure below:

Figure 10: Departments in PTCUL



Changing business environment, market competition and regulatory compliance requirements make it essential for any organization to regularly assess its staffing pattern for optimal utilization. In a typical state utility, the key issues in Human Resources where a focused approach is required are as follows:

- Shortage of appropriately qualified manpower for performing day to day responsibilities
- Norms and Standards of work not updated periodically leading to increased workload on field staff
- High level of employee stagnation, leading to lower motivation and efficiency levels
- No evaluation and incentive system in place
- Large number of Cadres giving rise to disparities
- Inadequate focus on Employee Development
- Misalignment between Performance management system and business needs
- Unclear demarcation between field and corporate offices
- Inefficient channels of communication in the organisation
- Inefficient documentation and referencing practices leading to misinterpretations and confusion
- Delays in implementation of Transfer and other Policies leading to discontent among the employees
- Basic Hygiene factors like claims processing, salaries, advances, loans take longer timeto clear
- Perception of malpracticesin employee deployment

Taking into consideration the short, medium and long-term needs of all the departments of the organization, a recruitment plan has been drawn. This plan seeks to ensure the presence of an adequate workforce comprising of employees who can discharge the duties delegated to them with efficiency and effectiveness.

PTCUL's recruitment performance for the upcoming MYT Control Period is tabulated below:

Table 7: Recruitment of employees in current MYT Control Period FY 2016-17 to FY 2018-19

Particulars	FY 2015-16 (A)	FY 2016-17(A)	FY 2017-18(A)	FY 2018-19 (E)
Opening number of Employees	752	798	775	743
Number of Employees recruited	85	1	5	265
Number of Employees retired	39	24	37	23
Closing Number of Employees	798	775	743	985

The HR plan proposed for the upcoming MYT Control Period FY 2019-20 to FY 2021-22 is provided by the table below:

Table 8: HR plan of PTCUL for the upcoming MYT Control Period FY 2019-20 to FY 2021-22

Particulars	FY 2018-19 (E)	FY 2019-20 (P)	FY 2020-21(P)	FY 2021-22(P)
Opening number of Employees	743	985	1144	1166
Number of Employees recruited	265	173	31	93
Number of Employees retired	23	14	9	11
Closing Number of Employees	985	1144	1166	1248

A – Actual; E - Estimated; P - Projected

5.2. HR initiatives proposed for the MYT Control Period

Aimed at the resolution of the issues mentioned above and assurance of conformity to the accepted standards of employee and organization performance, PTCUL frames Human Resource initiatives for every Control Period and strives for adherence to said initiatives. The initiatives for the upcoming MYT Control Period are listed below:

- The recruitment plan provided for the Control Period will be followed along with the induction training for the recruited employees as per the requirements of the utility
- Timely assignment of workforce to vacant posts
- Implementation of a Performance evaluation and incentivizing mechanism based on relevant KPIs
- Measures to motivate employees towards improving and aligning their skills with the Corporation's goals shall be devised based on the guidelines of the Government.
- In house and institutional training schedules as provided in the ARR shall be followed

The HR division at PTCUL bases its initiatives on three principles:

- **Maintaining a high level of Employee Motivation**
 - **Incentives:** In recognition of the sincere efforts put in by the employees which benefit the company and ensure its growth, PTCUL gives out part of its profits as incentives to the employees
 - **Promotions:** PTCUL, always dedicated to the welfare of its employees, has developed a system for timely promotion of employees deserving or due for promotions to senior ranks in the corporation

- **Activities:** Activities like sports and games on special occasions like Independence day, Republic day etc. inculcate a sense of co-ordination and teamwork and also help the employees break through the mould of monotony that often decreases their motivation levels

- **Human Resource Development**

PTCUL is of the view that its employees must stay abreast of all the ongoing developments in the power sector that may aid, directly or indirectly, it in realizing its Vision. Towards this goal, PTCUL organizes various trainings and enters into contracts with other training agencies to ensure the development of the skill sets of its employees. The training plan in the ensuing section discusses PTCUL's Human Resource Development ideology and methodology in detail.

- **Improving Administration:** PTCUL believes that a robust manpower administration system is an indispensable part of the corporation's HR policy and thus seeks to make changes and introduce practices that strengthen the administrative backbone that the corporation is based on.
 - Biometric attendance has been mandated for all employees in both corporate and field offices to develop and maintain a transparent attendance system that will encourage compliance and discipline
 - To meet its business targets, PTCUL has amended its recruitment methodology which now enables timely recruitment of employees and seamless acclimatization of recruits in their new posts

PTCUL recruited 50 (fifty) Assistant engineers (AEs) in April, 2018 and is currently engaged in recruiting 213 Group 'C' employees in the second half of FY 2018-19. The HR plan, submitted in an earlier section, sets ambitious but possible recruitment targets for the third Control Period FY 2019-20 o FY 2021-22.

5.3. Training and development plan

PTCUL recognizes the importance of training and development programs to:

- Ensure smooth inductions/transitions for new employees so that they are able to efficiently perform the duties assigned to them in a relatively short span of time
- Ensure that the existing workforce is sufficiently updated with recent developments in the sector, both from financial and technical perspectives

Towards the realization of these broad goals, PTCUL organizes various internal programs for both induction and continuous training. It also encourages its employees to participate in various conferences and symposiums to enhance their knowledge, learn best industry practices and assimilate them in the workings of the utility.

The key objectives for a sound training and development policy are:

- Upgrade standard knowledge for continual improvement
- Exhaustive enhancement of the employees' technical skills
- Bring about positive behavioral changes in employees and inculcate a sense of responsibility and ownership towards the organization
- Ensure safety and wellbeing of the field employees by regular sensitizations and trainings
- Creating a conducive work culture for the development of employees by encouraging knowledge sharing and healthy communication
- Provide opportunities to update repositories of business and technical best practices through external interactions and meetings

PTCUL has developed a detailed training plan for the MYT Control Period FY 2019-20 to FY 2021-22. Comprising of a vast array of programs, this comprehensive plan has the requisite coverage of topics to ensure that PTCUL meets its HR goals for the Control Period.

Table 9: Training plan of PTCUL for the MYT period

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
Induction Training								
1	For JE (3 Batch)	4 Weeks	C	45000	120	5400000	120000	5520000
2	For TG-I/II (2 Batch)	4 Weeks	C	45000	80	3600000	80000	3680000
3	For Asst. Accountant (1 Batch)	1 Week	C	17500	10	175000	10000	185000
4	For Steno. (1 Batch)	1 Week	C	14000	10	140000	10000	150000
Technical Training								
1	O&M Related Training for AE/JE (2 Batch)	2 Weeks	B & C	25000	60	1500000	90000	1590000
2	O&M Related Training for TG-I/II (2 Batch)	2 Weeks	C	22000	60	1320000	60000	1380000
Specialized Technical Training								
1	Project Management for Power System Engineers	5 Days	A & B	25000	10	250000	20000	270000
2	O&m of Transformers and Circuit Breakers	5 Days	A & B	25000	20	500000	40000	540000
3	O&M of EHV S/s & Transmission Lines	5 Days	A & B	27500	10	275000	20000	295000
4	Point of Connection Tariff Regulation & Tutorials	5 Days	A & B	25000	5	125000	10000	135000

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
5	Advanced Power System Protection	5 Days	A & B	25000	5	125000	10000	135000
6	Material Management, Procurement Procedures & e-Procurement	5 Days	A & B	27500	5	137500	10000	147500
7	Overhead Power Transmission Line Survey	5 Days	A & B	27500	5	137500	10000	147500
8	Project Planning Monitoring & Control System	5 Days	A & B	27500	5	137500	10000	147500
9	Testing & Commissioning of Electrical Equipment in Power Utility	4 Days	A & B	22000	5	110000	10000	120000
10	Disaster Management, Electrical Safety procedure and Accident prevention	4 Days	A & B	22000	5	110000	10000	120000
11	400kV/220kV Sub Station- Design, Operation & Maintenance (Latest Procedures)	5 Days	A & B	27500	5	137500	10000	147500
12	Development in Design & Construction of Transmission Lines	5 Days	A & B	27500	5	137500	10000	147500
13	Open Access, a Role of LDCs and Power Markets	4 Days	A & B	22000	5	110000	10000	120000
14	Reactive Power	4 Days	A & B	22000	5	110000	10000	120000

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
	Management							
15	Best Practices in O&M of EHV Switchgear	4 Days	A & B	22000	5	110000	10000	120000
16	Power Business, Tariff and Regulations	3 Days	A & B	16000	5	80000	10000	90000
17	IE Act, Rules and Deregulation	3 Days	A & B	16000	10	160000	20000	180000
18	Smart Grid	4 Days	A & B	22000	5	110000	10000	120000
19	Unified Load Dispatch & Communication	3 Days	A & B	16000	5	80000	10000	90000
20	Electricity Regulation Governance, Policy and Commercial Issues	2 Days	A & B	11000	5	55000	10000	65000
21	Safety in Power Transmission and Behavior Based Safety management	2 Days	A & B	11000	20	220000	40000	260000
22	Managing People Side & Risks in Projects	2 Days	A & B	22000	5	110000	10000	120000
23	Renewable Energy Grid Interface Technology & Regulatory Framework	4 Days	A & B	27500	10	275000	20000	295000
24	Solar Photovoltaic System Design And Installation	4 Days	A & B	27500	10	275000	20000	295000
25	Power System Communication	4 Days	A & B	27500	10	275000	20000	295000

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
	n SCADA & EMS							
26	Switchyard & GIS	4 Days	A & B	27500	10	275000	20000	295000
27	CSI Workshop on Cyber Security & Surveillance	1 Day	A & B	6000	5	30000	10000	40000
Professional Training								
28	IT & Computer Training	15 Days	A & B & C	6000	40	240000	60000	300000
29	Decision Making & Problem Solving	5 Days	B & C	27500	10	275000	20000	295000
30	Communication & Presentation Skills	4 Days	B & C	22000	10	220000	20000	240000
31	MDP on Contract Management & Arbitration	3 Days	A & B	32000	4	128000	8000	136000
32	Accounts and Finance Training	3 Days	B & C	15000	20	300000	40000	340000
	Presentation and Disclosures of Financial Statements- As per the revised schedule VI to the companies Act, 1956	2 Days	A & B & C	10000	20	200000	30000	230000
33	Domestic & Departmental Enquiry	4 Days	A & B & C	25000	4	100000	6000	106000
34	RTI Act - 2005	2 Days	A & B & C	1200	40	48000	60000	108000
Managerial & Supervisory								
35	Interpersonal Effectiveness and Team Building	3 Days	A & B	15000	10	150000	20000	170000

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
36	In-House Training Programme on Supervisory Skill Development of PTCUL Employees	3 Days	C	8000	50	400000	50000	450000
37	Tax Deduction at Source and Cash & Accounts Management including Double Entry System of Book-keeping	3 Days	B & C	15000	15	225000	22500	247500
38	Developing Efficiency and Effectiveness of Pas, PS, and Office Staff Including Multitasking Staff with Special Emphasis on Behaviourial Skills and Use of Latest Information Technology.	3 Days	C	20000	5	100000	5000	105000
39	Administrative Vigilance Dept. Proceeding and observing Norms & Guide of Apex Court for Protection of Women Employees against Sexual Harassment at Workplace	3 Days	A & B & C	20000	5	100000	7500	107500
40	Establishment Matter GPF/EPF, Gratuity, Pension,	3 Days	B & C	15000	20	300000	30000	330000

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
	Revised Pension, Family Pension, New Pension Scheme and Other Retirement benefits. Govt. Purchasing Procedure E-mail Tendering, Drafting of Contract, inspection Negotiation, delivery of Goods & Stores							
41	Development of Skill in field of Noting & Drafting, Filing System, Record Management and improving efficiency and effectiveness and in soft skills.	3 Days	C	20000	20	400000	20000	420000
42	Disciplinary Rules, Agencies and Procedure (Including CCA Rules & Constitutional Provisions)	3 Days	A & B & C	20000	5	100000	7500	107500
43	Labour Laws	4 Days	A & B & C	22000	10	220000	15000	235000
44	Interpersonal Skills at workplace	2 Days	B & C	12500	5	62500	7500	70000
45	Works and Works Accounts Management Executive of Civil/Electrical Work keeping of Accounts,	2 Days	A & B & C	12500	20	250000	30000	280000

S.No	Training Name	Duration	Employee Grade	Fee per Employee	Number of employees per batch	Total Fee	Allowances	Total expenditure
	Duties and Responsibilities of Executive Engineers, Asstt. Engineers & Divisional Accountant.							
46	Management of Change for Employee Engagement	3 Days	A & B & C	20000	5	100000	7500	107500
47	Stress Management	3 Days	A & B & C	15000	5	75000	7500	82500
48	Goods & Service Tax	4 Days	B & C	22000	10	220000	15000	235000
49	Yoga & Meditation	3 Days	A & B & C	3000	20	60000	30000	90000
	Total					2086600	1289000	22155000

6. Technical Initiatives taken by PTCUL

The Operations and Maintenance (O&M) division of PTCUL plans periodic initiatives aimed at improvement of the existing transmission system and standardized maintenance of the different components of the system to ensure their satisfactory performance. Following are the major initiatives it has undertaken and proposes to undertake in the upcoming MYT Control Period:

- To enhance communication, MS Earth wires have been replaced with Optical Power Ground Wires (OPGW) which are based on the principle of optical communication and provide for higher speed, lower noise levels and increase the overall efficiency of the SCADA system
- To ease the overloading of transmission lines in Laksar and Manglore area, the transmission lines have been enhanced by replacing old ACSR conductors with High Temperature Low Sag (HTLS) conductors that are capable of transmitting greater amounts of energy at higher loads with lower losses
- To resolve the recurring Right of Way (RoW) issues it faces while Commissioning new transmission assets, PTCUL has been decided to use Monopole towers connected with EHV lines so as to minimize the area infringed by the project and minimize the required proximity between towers
- A 100 KW rooftop solar plant has been Commissioned at the corporate headquarters along with proposals to equip all sub stations with solar power plants to meet their energy requirement
- PTCUL seeks to incorporate EHV lines in its transmission system to minimize losses and maximize the quanta of energy carried; an EHV testing laboratory and training centre has been proposed to accomplish the pre requisite R&D for such a large scale transformation.

PTCUL has achieved a Transmission System Availability of 99.36% with the transmission losses at a mealy 1.39% for first half of FY 2018-19. This commendable performance is, in part, due to the modern practices employed and progressive initiatives taken by the O&M division.

6.1. Transmission Losses of PTCUL

In the process of supplying electricity to consumers, energy losses occur mainly due to technical and commercial reasons. Energy losses in PTCUL network (transmission system) are purely technical in nature due to energy dissipation in conductors and other equipment used in the transmission lines, and electromagnetic losses in the transformers at various sub stations of PTCUL. Actual Transmission losses in Northern region for the ongoing year (until Oct'18) have fluctuated between 2.8% to 7.8% (data obtained from the NRLDC website from the web-page -<https://nrlcdc.in/Websitedata/OpenAccess/docs/OAlosses.pdf>) whereas the actual Transmission losses of Intrastate transmission network of Uttarakhand owned and operated by PTCUL for the last year are 1.39% of the total energy input into the system. The transmission losses in the Intrastate Network owned by PTCUL are significantly lower than the Northern region's average, highlighting PTCUL's imitable performance in controlling Transmission losses.

At present, there is no tool available to predict the exact values or the range of losses in the network for the upcoming Control Period. But, considering the prevalent trends, the estimated losses of PTCUL (Intrastate transmission network of Uttarakhand) for the ensuing years can be estimated at 1.4%. The PTCUL plans to incorporate EHV lines in its Transmission system and shall plan for the same in the upcoming Control Period. EHV lines will enable further reduction in Transmission losses and Transmission of greater amount of electricity over longer distances.

7. Operational Plan for the Control Period

7.1. Physical targets for the Control Period

The following table summarizes the physical targets of transmission capacity – Length of lines in ckt..Km and transformer capacity at the substations. PTCUL seeks to achieve these targets by Commissioning of new lines and substations as well as renovations and augmentations to the existing ones.

Table 10: Physical targets for the Control Period

		Units	2018-19 (Upto Sep' 18)	2018-19 (Estimate)	2019-20	2020-21	2021-22
No. of Sub Stations	400 kV	No./MVA	3/2455	3/2455	3/2930	3/2930	3/2930
	220kV	No./MVA	10/3445	10/3745	12/3835	12/3935	15/4445
	132kV	No./MVA	29/2337.5	31/2367.5	32/2852.5	33/2937.5	33/2957.5
Growth in Network	400 kV	Ckt.. Km.	422	422	422	422	422
	220 kV	Ckt..Km.	807	812	837	839	947
	132 kV	Ckt..Km.	1575	1645	1821	1867	1919
Number of Sub-stations		No.	42	44	47	48	51
Total Substation Capacity		No./MVA	8237.5	8567.5	9617.5	9802.5	10332.5
Total Network Length		Ckt.Km.	2888.07	2962.6	3163.54	3212.14	3372.14

7.2. Current Projects

Tabulated below are some ongoing projects that were undertaken by PTCUL to enhance its transmission system capability. These projects were initially planned for the MYT Control Period FY 2016-17 to FY 2018-19 but due to uncontrollable factors, are now expected to be completed in the upcoming MYT Control Period:

Table 11: Current Projects of PTCUL expected to be completed in the upcoming MYT Control Period

S.no.	Name of the Project	Region	Approved Cost (in INRCr)	Estimated Date of Completion
132 kV Lines				
1.	LILO of 132 kV Chilla-Nazibabad line at 132/33 kV S/s Patanjali Padartha Haridwar	Garhwal	6.41	June 2019
2.	132kV D/C line from 132kV S/s SIDCUL, Sitarganj to 132kV Sitarganj Kichha line	Kumaon	2.05	December 2019
3.	Replacement of ACSR Panther Conductor in single Ckt.. Sitarganj (PGCIL) -SIDCUL Sitarganj Line (22 KM) with HTLS Conductor	Kumaon	20.93	January 2020

S.no.	Name of the Project	Region	Approved Cost (in INRCr)	Estimated Date of Completion
4.	Replacement of ACSR Panther Conductor of 1st Ckt. of 132 kV Kichha-Sitarganj Line with HTLS Conductor	Kumaon	29.73	January 2020
5.	Stringing of Second Circuit of 132 kV S/C line on D/c tower between 400 kV S/s Kashipur to 132 kV Bazpur S/s on HTLS conductor alongwith Construction of 132 kV bay at 132 kV S/s Bazpur	Kumaon	13.86	March 2020
6.	132 kV S/C Line on Panther Conductor on Double Circuit Towers from 220/132 kV S/s Pithoragarh (PGCIL) to 132/33 kV Sub-station Lohaghat (Champawat) of PTCUL	Kumaon	40.89	March 2020
7.	Construction of 132 kV D/c line from 220 kV S/s Mahuakheraganj to 132 kV S/s Jaspur	Kumaon	26.00	March 2021
8.	Replacement of ACSR Wolf Conductor in D/c Of 132 kV Khatima-Pilibhit Line (44.54 Kms) by HTLS Conductor	Kumaon	65.78	March 2021
Sub Total			199.24	
132 kV S/s				
1.	Increasing Capacity of 132/33 kV S/s Jaspur from 2x40 MVA to 3x40 MVA including construction of associated 01 No. 132 kV bay and 01 No. 33 kV bay and bisection of 132 kV & 33 kV Bus	Kumaon	7.39	September 2019
2.	Construction of 02 nos 132kV bay at 132kV S/s Jaspur	Kumaon	2.76	September 2019
3.	Augmentation of 132/33 kV Transformer capacity at 132 kV S/s Pithoragarh from 2x20 MVA+2x3x5 MVA to 1x20 MVA + 1x40 MVA+2x3x5 MVA	Kumaon	4.24	September 2019
4.	Augmentation of 132 kV S/s Bindal from 2x40 MVA (132/33 kV) to 3x40 MVA (132/33 kV) by Procurement, Installation & Commissioning of 132/33kV, 40 MVA Transformer at 132 kV S/s Bindal, Dehradun	Garhwal	5.38	July 2019
5.	Construction of 2x20 MVA 132 kV GIS S/s at Lohaghat	Kumaon	67.41	March 2020
6.	Construction of 132/33 kV S/s, Patanjali Padartha, Haridwar.	Garhwal	19.35	June 2019
7.	Supply, erection, testing and Commissioning of 01 no. 40 MVA 132/33 kV Power T/F at 132 kV S/s	Kumaon	3.87	September 2019

S.no.	Name of the Project	Region	Approved Cost (in INRCr)	Estimated Date of Completion
	Kichha for augmentation of T/F capacity 2x40 MVA to 3 x40 MVA			
8.	Augmentation of Transformation capacity from 2x40 MVA (132/33 kV) to 3x40 MVA (132/33 kV) by Commissioning of 01 No. additional 132/33 kV 40 MVA T/F, HV & LV bay & oil pit for NIFPES & construction of 03 Nos. new 33 kV feeder Bays at 132 kV S/s Jashodharpur, Kotdwar (Pauri Garhwal).	Garhwal	5.70	May 2019
9.	Procurement and Erection Commissioning of 01 No. 40 MVA, 132/33 kV T/F complete with 132 kV& 33 kV bay for increasing capacity of 132 kV S/s Laksar	Garhwal	4.81	May 2019
Sub Total			120.91	
220 kV Lines				
1.	Construction of 220 kVPiranKaliyar (220 kV S/s) to Puhana (400 kV S/s) PGCIL S/c Line on D/c Towers.	Garhwal	11.12	September 2019
2.	Stringing of 2nd Circuit of 220 kVPiranKaliyar-Puhana (PGCIL) D/c line on D/c towers.	Garhwal		September 2019
3.	Laying of 220 kV Cable at Puhana (PGCIL) S/s end	Garhwal	10.47	September 2019
4.	Replacement of ACSR Zebra Conductor in 220 kVMahuakheraganj (220 kV)-Kashipur (400 kV) I stCkt.. line with high capacity ACCC conductor	Kumaon	23.89	March 2020
Sub Total			45.48	
220 kV S/s				
1.	Construction of 2x25 (MVA), 220/33 kV S/s Baram (Jauljivi)	Kumaon	60.38	June 2019
2.	Augmentation of 132/33 kV Transformer capacity at 220 kV S/s Haldwani from 2x40 MVA to 3x40 MVA including construction of associated 01 no. 132 kV bay and 01 no. 33 kV bay and extension & bisection of 132 kV& 33 kV bus	Kumaon	4.87	September 2019
Sub Total			65.25	
220 kV Lines				
1.	Construction of LILO line of one Circuit 220 kVDhauliganga-	Kumaon	15.72	June 2019

S.no.	Name of the Project	Region	Approved Cost (in INRCr)	Estimated Date of Completion
	Pithoragarh(PGCIL) line at proposed 2x25 MVA Baram			
Sub Total			15.72	
400 kV S/s				
1.	Supply and Installation of 01 no 160 MVA T/F and its associated 220 kV HV side & 132 kV LV side bay at 400 kV S/s Kashipur.	Kumaon	18.39	March 2020
2.	Augmentation of 400 kV S/S Kashipur from 2X315 MVA to 3X315 MVA T/F capacity including construction of associated 400 kV and 220 kV bays.	Kumaon	32.10	March 2020
Sub Total			50.49	
Miscellaneous				
1.	Supply and Installation of 125 MVAR Reactor and its associated bay and related work at 400 kV S/s Kashipur	Kumaon	14.75	January 2020
2.	Installation of Intra-State ABT Metering Scheme for On-Lining of ABT Meters to be installed at Interface Points for Energy Accounting & Transmission Level Energy Auditing at PTCUL	Kumaon/Garhwal	19.47	January 2020
Sub Total			34.22	
Total			465.47	

7.2.1. Status of currently ongoing Projects

- **LILO of 132 kV Chilla-Nazibabad line at 132/33 kV S/s Patanjali Padartha Haridwar**–The forest case forwarded to Nodal Officer Forest Dehradun. The work is in progress and is expected to be completed by the estimated date
- **Replacement of ACSR Panther Conductor in single Ckt. Sitarganj (PGCIL) -SIDCUL Sitarganj Line (22 KM) with HTLS Conductor** – The project is currently in the tendering stage and work is expected to be started towards the end of the current financial year
- **Replacement of ACSR Panther Conductor of 1st Ckt. of 132 kV Kichha-Sitarganj Line with HTLS Conductor**- The project is currently in the tendering stage and work is expected to be started towards the end of the current financial year
- **Stringing of Second Circuit of 132 kV S/C line on D/c tower between 400 kV S/s Kashipur to 132 kV Bazpur S/s on HTLS conductor alongwith Construction of 132 kV bay at 132 kV S/s Bazpur** - The replacement of conductor by HTLS conductor work is currently in the tendering stage. The construction of 132 kV bay at 132 kV S/s Bazpur is past the tendering stage and is in techno commercial evaluation phase.
- **132 kV S/C Line on Panther Conductor on Double Circuit Towers from 220/132 kV S/s Pithoragarh (PGCIL) to 132/33 kV Sub-station Lohaghat (Champawat) of PTCUL** – The work for this project is in progress and is expected to be completed by the estimated date

- **Replacement of ACSR Zebra Conductor in 220 kV Mahuakheraganj (220 kV)-Kashipur (400 kV) Ist Ckt. line with high capacity ACCC conductor**–The finalizing of awarding of the contract is due to be completed in the next meeting of the Board of Directors (BoD) of PTCUL. This will allow the work to begin.
- **Construction of 132 kV D/c line from 220 kV S/s Mahuakheraganj to 132 kV S/s Jaspur**–The Techno-commercial evaluation of the various bids received is in progress and the tender is expected to be awarded soon
- **Replacement of ACSR Wolf Conductor in D/c Of 132 kV Khatima-Pilibhit Line (44.54 Kms) by HTLS Conductor**–The scope of work is under review in light of the upcoming Substation of UPPTCL that will be energized via a LILO on 132 kV Khatima-Pilibhit & 132 kV Sitarganj-Pilibhit line. After this process is complete, the tendering phase will start.
- **Increasing Capacity of 132/33 kV S/s Jaspur from 2x40 MVA to 3x40 MVA including construction of associated 01 No. 132 kV bay and 01 No. 33 kV bay and bisection of 132 kV & 33 kV Bus** - Work on the project is currently in progress and is expected to be completed by the estimated date
- **Construction of 02 nos 132kV bay at 132kV S/s Jaspur** – Work on the project is currently in progress and is expected to be completed by the estimated date
- **Augmentation of 132/33 kV Transformer capacity at 132 kV S/s Pithoragarh from 2x20 MVA+2x3x5 MVA to 1x20 MVA + 1x40 MVA+2x3x5 MVA** - Work on the project is currently in progress and is expected to be completed by the estimated date
- **Augmentation of 132 kV S/s Bindal from 2x40 MVA (132/33 kV) to 3x40 MVA (132/33 kV) by Procurement, Installation & Commissioning of 132/33kV, 40 MVA Transformer at 132 kV S/s Bindal, Dehradun** - Work on the project is currently in progress and is expected to be completed by the estimated date
- **Construction of 2x20 MVA 132 kV GIS S/s at Lohaghat**–DPR has been revised considering that the scope has changed from construction of an AIS to that of a GIS S/s. The project is currently in the tendering stage.
- **Construction of 132/33 kV S/s, Patanjali Padartha, Haridwar** – Work on the substation is currently in progress and is expected to be completed by the estimated date
- **Supply, erection, testing and Commissioning of 01 no. 40 MVA 132/33 kV Power T/F at 132 kV S/s Kichha for augmentation of T/F capacity 2x40 MVA to 3 x40 MVA**–The System augmentation project is currently in progress and is expected to be completed by the estimated date
- **Construction of 220 kV Pirankaliyar (220 kV S/s) to Puhana (400 kV S/s) PGCIL S/c Line on D/c Towers** – Work on the transmission line is currently in progress and is expected to be completed by the estimated date
- **Stringing of 2nd Circuit of 220 kV Pirankaliyar-Puhana (PGCIL) D/c line on D/c towers** – Stringing work on the transmission line is currently in progress and is expected to be completed by the estimated date thereafter enabling it to start functioning as a D/c line
- **Laying of 220 kV Cable at Puhana (PGCIL) S/s end** – Work on the transmission line is currently in progress and is expected to be completed by the estimated date
- **Augmentation of 132/33 kV Transformer capacity at 220 kV S/s Haldwani from 2x40 MVA to 3x40 MVA including construction of associated 01 no. 132 kV bay and 01 no. 33 kV bay and extension & bisection of 132 kV & 33 kV bus** – The various system improvement works at the 220 kV S/s are currently works in progress and are expected to get completed by the estimated date of completion

- **Supply and Installation of 125 MVAR Reactor and its associated bay and related work at 400 kV S/s Kashipur**–The techno commercial evaluation of bids received is under process and the tender is expected to be awarded soon
- **Supply and Installation of 01 no 160 MVA T/F and its associated 220 kV HV side & 132 kV LV side bay at 400 kV S/s Kashipur** – The system augmentation project is currently in the tendering stage and work is expected to be started by the end of the current financial year
- **Augmentation of 400 kV S/S Kashipur from 2X315 MVA to 3X315 MVA T/F capacity including construction of associated 400 kV and 220 kV bays**–The tender award activities are under process for this project; Work on the project is expected to start once the tendering activities are completed
- **Installation of Intra-State ABT Metering Scheme for On-Lining of ABT Meters to be installed at Interface Points for Energy Accounting & Transmission Level Energy Auditing at PTCUL** – Work on the Intra-state ABT Metering scheme is currently in progress and is expected to be completed by the estimated date

7.2.2. Brief Description of Major ongoing projects

- **Construction of 132 kV D/c line from 220 kV S/s Mahuakheraganj to 132 kV S/s Jaspur** - This line will meet the additional load of Jaspur area and will increase the reliability of power supply in the same.
- **Construction of 132/33 kV S/s, PatanjaliPadartha, Haridwar** – The substation will relieve the excess load on the existing transmission system and also serve to meet the increasing energy demands arising from load growth in the region after its energization by the LILO of Chilla – Nazibabad line at the location of the substation.
- **Replacement of ACSR Panther Conductor in single Ckt..Sitarganj (PGCIL) -SIDCUL Sitarganj Line (22 KM) with HTLS Conductor** – Replacement of the existing conductor by the HTLS conductor will enable the lines to carry much larger quanta of electricity while making their operation and maintenance more efficient
- **Stringing of Second Circuit of 132 kV S/C line on D/C tower between 400 kV S/s Kashipur to 132 kV Bazpur S/s on HTLS conductor alongwith Construction of 132 kV bay at 132 kV S/s Bazpur**– On completion, this project will:
 - Allow the complete utilization of the D/C towers and enable carriage of larger quanta of electricity
 - Allow the full usage of HTLS conductor will further enhance the transmission capability and efficiency.
 - Strengthen the 132 kV Bazpur substation and thus will be instrumental in catering to the increasing demand in the Bazpur region
- **Construction of 2x20 MVA 132 kV GIS S/s at Lohaghat** – After its Commissioning, the GIS at Lohaghat will cater to the increasing demand of the Champawat region and will enhance the transmission capability of the district
- **132kV S/C Line on Panther Conductor on Double Circuit Towers from 220/132 kV S/s Pithoragarh (PGCIL) to 132/33 kV Sub-station Lohaghat (Champawat) of PTCUL** – Commissioning of a line from the 220/132 kV S/s Pithoragarh to the proposed 132/33 kV S/s at Lohaghat and improve reliability and capacity of the transmission system.
- **System Strengthening/Augmentation projects** – Apart from the major projects described above, large scale system strengthening projects are also underway across all the substations and lines

of varying capacity, these schemes aim at improving the existing assets thereby enhancing the power transmission system without the construction of new substations or transmission lines.

- Construction of 02 nos 132kV bay at 132kV S/s Jaspur
- Capacity incrementation at 132/33 kV S/s Jaspur from 2x40 MVA to 3x40 MVA including construction of associated 01 No. 132 kV bay and 01 No. 33 kV bay and bisection of 132 kV & 33 kV Bus
- Augmentation of 132 kV S/s Bindal from 2x40 MVA to 3x40 MVA
- Augmentation of 132/33 kV Transformer capacity at 220 kV S/s Haldwani from 2x40 MVA to 3x40 MVA including construction of associated 01 no. 132 kV bay and 01 no. 33 kV bay and extension & bisection of 132 kV & 33 kV bus
- Supply and Installation of 125 MVAR Reactor with its associated bay and related work at 400 kV S/s Kashipur – To regulate the voltage and reactive power, thereby improving the voltage profile of the line

7.2.3. Ongoing UITP Projects

PTCUL has some projects that were initiated as a part of the Uttarakhand Integrated Transmission Project (UITP) scheme. The UITP was conceived to develop an optimal evacuation system for evacuating power from the cluster of hydroelectric generating stations in the four river basins of the State to the common pooling points from which power will be evacuated by PGCIL. The following table encapsulates some ongoing projects that are expected to be completed in the upcoming Control Period:

Table 12: Ongoing UITP Projects

S.no.	Name of the Project	Region	Approved Cost (in INRCr)	Estimated Date of Completion
400 kV Lines				
1.	400 kV DC Vishnugad-Pipalkoti Line & LILO of 400 kV D/C Vishnuprayag-Muzaffarnagar line at Pipalkoti District Chamoli	Garhwal	114.00	September 2019
2.	400 kV DC Pipalkoti-Karanprayag-Srinagar line under (Package-I) Pipalkoti-Pokhari (Simlasu) District Chamoli	Garhwal	314.32	September 2019
3.	400 kV DC Pipalkoti-Karanprayag-Srinagar (Package-II) (Pokari (Simlasu) to Narkota (Rudraprayag)	Garhwal	288.10	September 2019
4.	400 kV DC Pipalkoti-Karanprayag-Srinagar line under (Package-III) from Narkota (Rudraprayag to Srinagar (Garhwal).	Garhwal	301.09	September 2019
5.	400 kV Khandukhal (Srinagar)-Rampura (Kashipur) Line			
5.1.	Package 1 Hilly terrain	Kumaon	576.74	September 2020
5.2.	Package 2 Plain terrain	Kumaon	522.67	September 2020
Total			2116.92	

Works on the lines and the LILO are in progress in the Garhwal division of Uttarakhand; the final Commissioning of the same will be synergized with that of the NTPC Vishnugad (520 MW) Project i.e. September 2020. The Kumaon division projects are currently in the tendering stage and are expected to be awarded soon.

7.3. Project Schemes

As per the UERC tariff Regulations, 2018, the Transmission Licensee is to submit a Capital Investment Plan, which should be commensurate with load growth and performance improvement proposed in the Business Plan.

The following works have been proposed for the third MYT Control Period as part of Project Schemes under PTCUL's Capital Investment Plan. These schemes will create new lines and sub stations for the transmission utility and aid in meeting the increasing demand for power with greater efficiency.

Table 13: Project Schemes

S.No.	Scheme/Funding Agency	Year	Project Details	Proposed Completion Date	Cost (in INR Crore)	Increase in Capacity
132 kV lines						
1.	PFC/REC/IR	2021-22	LILO of 132 kV Khatima-Sitarganj line at proposed 132/33 kV substation Khatima-II	March 2022	28.00	50 ckt..Km
Sub Total (132 kV Lines)					28.00	
220 kV Lines						
1.	PFC/REC/IR	2020-21	LILO of 220 kV Khodri-Jhajhra line at proposed 220 kV GIS S/s Selaqui (Dehradun)	March 2021	50.21	2.2 ckt..Km
2.	PFC/REC/IR	2021-22	Construction of LILO of 220 kV Roorkee - Nara line at proposed 220 kV Substation Manglaur	March 2022	7.04	2 ckt..Km
3.	PFC/REC/IR	2021-22	Construction of LILO of 132 kV Manglore-Asahi line & Manglore-Air Liquid line at proposed 220 kV S/s Manglaur	March 2022	4.00	2 ckt..Km
4.	PFC/REC/IR	2021-22	Construction of 220kV LILO of 220kV Kashipur (400 kV S/S) - Pantnagar at Barheni to connect 220kV S/s Kamaluaganja on existing corridor of 132kV Bazpur-Kamaluaganja on Multi voltage/Multi Circuit Tower	March 2022	66.00	26 ckt..Km
5.	PFC/REC/IR	2021-22	Construction of 220 kV D/C from Jaulgibi (PGCIL) to Thal Transmission Line on Single Zebra conductor	March 2022	135.00	80 ckt.. Km
Sub Total (220 kV Lines)					262.25	
220 kV S/s						

S.No.	Scheme/Funding Agency	Year	Project Details	Proposed Completion Date	Cost (in INR Crore)	Increase in Capacity
1.	PFC/REC/IR	2020-21	220/33 kV GIS S/s Selaqui, Dehradun	March 2021	114.25	220/33 kV - 100 MVA
2.	PFC/REC/IR	2021-22	220/33 kV GIS S/s at Rudrapur (Brahamwari)	April 2021	189.24	220/33 kV - 60 MVA
3.	PFC/REC/IR	2021-22	220 /132/33 kV Mangalore substation	March 2022	223.29	220/132 kV-320 MVA 132/33 kV - 80 MVA
4.	PFC/REC/IR	2021-22	220/33 kV GIS S/s Thal (Nachini)	March 2022	150.00	220/33 kV-50 MVA
Sub Total (220 kV S/s)					676.78	
Total					967.03	

7.3.1. Brief Descriptions of some Major Projects

The projects tabulated above aim at relieving excess load, augmenting the existing capacity of the Transmission network, mitigating the constraints faced by the system and meeting the increasing demands and needs of the generation and distribution sectors. Some major projects are listed with their brief descriptions:

7.3.1.1. Projects proposed for Capitalization in 2019-20

- **Construction of 220 kV Piran Kaliyar (220 kV S/s) to Puhana (400 kV S/s) PGCIL S/c Line on D/c Towers** – The line will connect the newly Commissioned 220 kV Piran Kaliyar S/s to the 400 kV Puhana S/s and increase the Transmission capability of the state.

7.3.1.2. Projects proposed for Capitalization in 2020-21

- **220/33 kV GIS S/s Selaqui, Dehradun** – The current load of the Selaqui region is met by the 220/132/33 kV substation Jhajhra, Commissioning of the new 220/33 kV substation will relieve the load on the Jhajra station and also contribute in meeting the rapidly increasing demand of the region (approx. 40 MW) over future years.
- **LILo of 220 kV Khodri-Jhajhra line at proposed 220 kV GIS S/s Selaqui (Dehradun)** – A LILo of the Khodri-Jhajhra Line at the location of the Selaqui GIS will serve to energize the new substation.
- **220/33 kV GIS S/s at Rudrapur (Brahamwari)** – This substation is proposed to evacuate power from upcoming Small Hydro Plants of UJVNL, namely, Kaliganga-I (4MW), Kaliganaga-II (4.5MW) and Madhyamaheshwar (15MW) and to meet the increasing load of the Brahamwari area (approx.. 25 MW) for five years after its Commissioning

7.3.1.3. Projects proposed for Capitalization in 2021-22

- **220 /132/33 kV Mangalore substation** – The proposed substation at Mangalore will serve the following purposes:
 - Strengthening the Transmission system of Roorkee, Mangalore and Laksar area
 - Providing relief to existing 220 /132/33 kV S/s Roorkee and 132/33 kV S/s, Mangalore

- Meeting increased load in the region (approx. 40 to 50 MW) for the next 5 years
- The substation will also be accompanied by a LILO of the 220 kVRoorkee - Nara Line at the proposed location to energize it
- **Construction of LILO of 132 kVManglore-Asahi line &Manglore-Air Liquid line at proposed 220 kV S/s Manglaur** - This LILO line will connect the existing 132/33 kV S/s Mangalore with proposed 220/132/33 kV S/s Mangalore for increasing the reliability of the power system and meeting the additional load in the area.
- **132/33 kV S/s at Khatima-II** – This substation is expected to relieve the load on the 132/33 kV S/s, Khatima HEP and meet the load growth requirements of the area for ten ensuing years after its COD, the work on the substation will be accompanied by the LILO of the Khatima - Sitarganj line for its energization.
- **220/33 kV GIS S/s Thal (Nachini)** -

7.3.2. Proposed UITP Projects

The Uttarakhand Integrated Transmission Project (UITP) was conceived to develop an optimal evacuation system for evacuating power from the cluster of hydroelectric generating stations in the four river basins of the State to the common pooling points from which power will be evacuated by PGCIL. PTCUL has taken the initiative to develop UITPs and proposes to build a 400 kV GIS Switching Substation at Pipalkoti, District-Chamoli. However, due to opposition by the locals, PTCUL has not been able to finalize the land purchase. Tenders for the work will be invited once the land acquisition has taken place.

7.4. System Strengthening/Augmentation Schemes

Apart from the Project Schemes mentioned above, which will directly add new components to the transmission system, PTCUL also plans to augment and strengthen the existing lines and sub stations by replacement of old transformers, commissioning of new bays, increasing capacity of existing sub stations, replacing the conductors in transmission lines etc. These schemes are being submitted as a part of the Capital Investment Plan as System Strengthening/Augmentation/Improvement schemes.

Table 14: System Improvement Schemes proposed for the MYT Control Period FY 2019-20 to FY 2021-22

S.No.	Year	Project Details	Proposed Completion Date	Cost (in INR Crore)	Increase in Capacity
132 kV Lines					
1.	2019-20	Re-Conductoring of 132kVJhajhra-Majra TL with HTLS Conductor	December 2019	19.00	16.04 ckt. km
2.	2020-21	Replacement of Conductor of 132 kVBindalRishikesh With HTLS Conductor	March 2021	45.00	44.773 ckt. km
3.	2020-21	Replacement of old ACSR panther conductor with HTLS conductor in 132 kV S/C Rishikesh - Srinagar (400 kV S/s) line.	December 2020	40.00	66.662 ckt. km
4.	2021-22	Strengthening of 132kVHaldwani-Bhowali line by replacement through HTLS conductor.	March 2022	14.56	14 ckt. km

S.No.	Year	Project Details	Proposed Completion Date	Cost (in INR Crore)	Increase in Capacity
5.	2021-22	Strengthening of 132kV D/ckt.Amariya (UPPTCL's proposed 220kV S/s)- Khatima (UJVNL's S/s) line by replacing existing Wolf conductor to Panther equivalent HTLS conductor.	March 2022	48.00	43 ckt. km
Sub Total (132 kV Lines)				166.56	
132 kV S/s					
1.	2019-20	Increasing capacity of S/S by 1x80 MVA at 132 kV S/S Manglore	December 2019	13.00	2x40 MVA to 1x40+1x80 MVA
2.	2019-20	Increasing capacity of 132 kV S/S Ramnagar from 1x20+1x40MVA to 2x40MVA	March 2020	4.16	1x20+1x40MVA to 2x40MVA
3.	2019-20	Replacement of 1x3x5MVA Transformer bank - 1 with new 20MVA Transformer at 132kV S/s Bhowali .	March 2020	2.08	1x20MVA
4.	2019-20	Supply & Erection of 40MVA T/F & Supply & Erection of 132/33kV Bay at 132/33 kV Substation Virbhadrarishieksh.	March 2020	6.00	
5.	2019-20	Increasing Capacity of 132 kV S/s Purkul from 40+20 MVA to 2*40 +20 MVA	March 2020	5.91	1x10 MVAR
6.	2020-21	Installation of 20MVA 132/66 kV Transformer alongwith construction of associated bays and extension of 132 kV bus and associated work at 132 kV Substation Simli	June 2020	5.81	2x5 MVAR
7.	2020-21	Construction of 2 nos. 132 kV Bay at 132 kV Substation Satpuli	June 2020	2.20	1x20 MVA
8.	2020-21	Increasing capacity from 2x40 MVA +1x20 MVA (132/33 kV) to 3x40 MVA (132/33 kV) at 132 kV S/S Roorkee	June 2020	5.00	2 nos. 132 kV bay
9.	2020-21	Increasing capacity of 132 kV S/S Bazpur from 1x80+1x40MVA to 1x80+2x40MVA	March 2021	4.60	1x20MVA
10.	2020-21	Provision of Hybrid module (due to space constraint) for construction of Transfer Bus at 132kV S/s, Pithoragarh	March 2021	1.65	2X5 MVAR TO 2X10 MVAR
11.	2021-22	Replacement of Old 2X3x5 MVA Transformer with 2X20 MVA Transformer at 132 kV Substation, Ranikhet	March 2022	4.29	01 no. bus bar

S.No.	Year	Project Details	Proposed Completion Date	Cost (in INR Crore)	Increase in Capacity
12.	2021-22	Replacement of Old 2X3x5 MVA Transformer with 2X20 MVA Transformer at 132 kV Substation, Pithorgarh	March 2022	4.30	1x20 MVA
Sub Total (132 kV S/s)				59.00	
220 kV Lines					
1.	2019-20	Cold galvanising on rusted towers of 220 kVRishikesh-Chamba, 220 kVRishikesh-Dharasu line ckt. 1st and 220 kVRishikesh-Dharasu line ckt. 2nd	October 2019	0.79	-
2.	2020-21	Replacement of 220 kVRoorkee-Puhana old Deer conductor by new AAAC/ HTLS conductor	March 2021	13.63	9.67 ckt.. Km
3.	2020-21	Replacement of Conductor of 220 kVKhodri-Jhajhra line with HTLS Conductor	March 2021	30.00	27.45 ckt.. Km
Sub Total (220 kV Lines)				44.42	
Miscellaneous Projects					
1.	2019-20	Cold galvanising on rusted towers of 132 kVRoorkee-Manglore line to increase life of towers	October 2019	1.00	60 towers
2.	2019-20	Additional bay for 50 MVAR reactor at 400 kV S/s Rishikesh	December 2019	1.24	50 MVAR
3.	2019-20	Extension of 220 kV transfer bus at 400 kV S/s Rishikesh	December 2019	0.80	-
4.	2019-20	Installation of 1x10 MVAR Cap. Bank at 132 KV S/S Bhagwanpur	December 2019	0.40	10 MVAR
5.	2019-20	Strengthening of Tower Foundation of 132 kVBindal-Rishikesh D/C line	December 2019	3.00	-
6.	2019-20	Construction of Boundary wall for flood protection at 132kV S/s, Bazpur	March 2020	2.00	1.2 KM
7.	2019-20	Increasing Capacity of capacitor bank from 2x5MVAR to 4x5MVAR at 220 kV S/s Jhajhra	March 2020	0.84	2x5MVAR to 4x5MVAR
8.	2019-20	Increasing capacity of existing 33kV Capacitor Bank from 2X5 MVAR TO 2X10 MVAR at 132kV Substation, Jaspur	March 2020	0.83	2X5 MVAR TO 2X10 MVAR
9.	2019-20	Increasing capacity of existing 33kV Capacitor Bank from 2X5 MVAR to	March 2020	0.42	2X5 MVAR TO 3X5 MVAR

S.No.	Year	Project Details	Proposed Completion Date	Cost (in INR Crore)	Increase in Capacity
		3X5 MVAR at 132kV Substation, Almora			
10.	2019-20	Supply and Commissioning of 2X5MVAR capacitor bank at 132 kV Substation, Kathgodam	March 2020	0.47	2x5MVAR
11.	2019-20	Provision of additional 2X5 MVAR 33 kV Capacitor Bank at 132 kV Substation, Pithorgarh	March 2020	0.58	2x5MVAR
12.	2019-20	Construction of Boundary wall for protection at 220kV S/s, Kamaluaganja	March 2020	2.00	1.2 KM
13.	2019-20	Installation of 1x10 MVAR Cap. Bank at 132 kV S/S Chudiyala	March 2020	0.40	40MVA T/F
14.	2019-20	Increasing Capacity of 2x5MVAR to 4x5MVAR at 132 kV Bindal	March 2020	0.40	40+20 MVA to 2*40 +20 MVA
15.	2020-21	Construction of 132 kV transfer bus and extension of switchyard at 132 kV S/S Bazpur	March 2021	3.64	1x80+1x40MVA to 1x80+2x40MVA
16.	2020-21	Increasing of existing 33kV Capacitor Bank from 2X5 MVAR TO 2X10 MVAR at 132kV Substation, Bazpur	March 2021	0.83	01 no. bus bar with extension
17.	2020-21	Replacement of 1X3x5MVA Transformer bank- 2 with new 20MVA Transformer at 132 kV Substation, Bhowali	March 2021	2.08	2x40 MVA + 1x20 MVA to 3x40 MVA
18.	2021-22	Construction of 02 Nos. 220kV Bay at 220kV S/s, PGCIL, Sitarganj	March 2022	5.20	02 Nos. 220kV Bay
Sub Total (Misc.)				26.13	
Total				296.11	

7.4.1. Brief descriptions of major System Strengthening Projects proposed for the Control Period

7.4.1.1. Projects to be Capitalization in FY 2019-20

- **Cold galvanising on rusted towers of 132 kV Roorkee-Manglore line, 220 kV Rishikesh-Chamba, 220 kV Rishikesh-Dharasu line 1st ckt. and 220 kV Rishikesh-Dharasu line 2nd ckt. to increase life of towers** – The project proposes to increase the age of rusted towers by galvanization of these towers by applying cold zinc coating which will offset the detrimental effects of rust and prevent further rusting
- **Increasing capacity of S/s by 1x80 MVA at 132 kV S/S Manglore** – Increasing the capacity of the 132 kV Manglore S/s will enable it to cater to the increasing load of the region

7.4.1.2. Projects to be Capitalization in 2020-21

- **Construction of 132 kV transfer bus and extension of switchyard at 132 kV S/S Bazpur**– The project is being undertaken to improve the system reliability in the Bazpur area.
- **Replacement of Old 2X3x5 MVA Transformer with 2X20 MVA Transformer at 132 kV Substation, Pithoragarh** – Replacing the old transformer will increase the transformation capacity of the region and help deal with the growth in demand.
- **Increasing capacity from 2x40 MVA +1x20 MVA (132/33 kV) to 3x40 MVA (132/33 kV) at 132 kV S/s Roorkee** – Project to increase the capacity of the 132 kV S/s Roorkee will be undertaken to improve the system capability and cater to the growth in demand in the region

7.5. Unique Features of the Capital Investment Plan

The Capital Investment Plan has been made with due consideration given to the the load growth forecast/ generation evacuation requirement during the Control Period. Further, it is in conformity with the plans made by the CEA/CTU/Distribution Licensee. The PTCUL proposes to build GIS substations and renovate existing lines by replacing old conductor with HTLS conductors.

7.5.1. GIS Sub Stations

For the third MYT Control Period FY 2019-20 to FY 2021-22, PTCUL has proposed the construction of four GIS (Gas Insulated Sub Station):

- 132 kV GIS at Lohaghat
- 220 kV GIS at Selaqui (Dehradun)
- 220 kV GIS at Brahmawari (Rudrapur, Garhwal)
- 220 kV GIS at Thal (Nachini)

Listed below are some major advantages of GIS sub stations:

- Lower land development cost due to lesser space requirement for substation
- Lower maintenance cost as compared to AIS (Air Insulated Sub Stations) as all the switching devices operate in the SF6 (Sulphur Hexafluoride) insulating medium
- GIS increase the availability and reliability of power system as all parts are sealed inside closed metallic enclosures and thus are shielded from the deteriorative environmental effects
- Automation systems are easier to install in GIS due to their modular design making it possible for such sub stations to be operated from remote locations (Load Despatch Centres) which in turn reduces the operation cost
- GIS, being smaller and more compact, are possible to build in hilly regions which abound in Uttarakhand
- GIS are more eco-friendly than their air insulated counterparts as they don't require excessive land development activities (which involve deforestation)
- Renovation costs are much lower for GIS equipment as their life is higher as compare to AIS equipment

The 220 kV GIS at IIP Harrawala was commissioned in FY 2018-19. It will help PTCUL in meeting the increasing load demand in the Dehradun region.

PTCUL has more GIS planned for completion in the fourth MYT Control Period:

- 400/220/132 kV GIS S/s Landhora

- 220/33 kV GIS S/s Phoolchaud (Haldwani)
- 132/33 kV GIS S/s at Araghar
- 132/33 kV GIS S/s Gairsain

7.5.2. Renovation of existing lines by using HTLS conductors

PTCUL, in its Capital Investment plan has proposed the replacements of old ACSR Wolf/Panther conductors with High Temperature Low Sag (HTLS) conductors on its transmission lines.

With a different composition (ACCC – Aluminium Conductor Composite Core) than aluminium-conductor steel-reinforced (ACSR) cables, these have the ability to transmit approximately twice as much energy as an ACSR cable of the same size and weight. Apart from this, HTLS cables are lighter and have a lower coefficient of thermal expansion; making them ideal for higher temperatures, (often prevalent in the lower reaches of Uttarakhand).

These properties render advantages to the HTLS conductor lines over normal ACSR conductor lines and makes it an ideal retrofitting option for old transmission cables.

Some important HTLS replacement projects proposed to be completed in the third MYT period are listed below:

- 132 kV Sitarganj-SIDCUL Line
- 132 kV Kiccha-Sitarganj Line
- 132 kV Kashipur-Bazpur Line
- 132 kV Jhajhra-Majra Line
- 132 kV Bindal-Rishikesh Line
- 132 kV Rishikesh-Srinagar Line
- 132 kV Haldwani-Bhowali Line
- 132 kV Amariya-Khatima Line
- 220 kV Roorkee-Puhana Line
- 220 kV Khodri-Jhajhra Line

Retrofitting of existing lines by HTLS conductor cables was completed for the Roorkee-Laksar and Roorkee-Manglore lines in FY 2017-18. The newer, technologically advanced cables have already been instrumental in managing the load in the region and have set a template of high performance for the upcoming works.

7.6. Funding Structure

The Petitioner proposes to finance the projects in debt:equity ratio of 70:30. The debt shall be raised from institutions like REC, PFC or other financial institutions. Considering this funding scheme, the debt and equity addition corresponding to the proposed capitalization in the MYT Control Period FY 2019-20 to FY 2021-22 is shown in the table below.

Table 15: Debt and Equity for the MYT Control Period FY 2019-20 to FY 2021-22

Particular	FY 2019-20	FY 2020-21	FY 2021-22
Capitalization Proposed (in INR Cr)	508.50	410.69	878.92
Debt - 70% (in INR Cr)	355.9	287.5	615.2
Equity - 30% (in INR Cr)	152.5	123.2	263.7

7.7. Capital Investment Plan-Phasing

As per the UERC Tariff Regulations, 2018, Regulation 8(b), clause (i), a Transmission Licensee must submit:

“Capital investment plan which should be commensurate with load growth and quality improvement proposed in the business plan along with its cost-benefit analysis. The investment plan should also include yearly phasing of capital expenditure along with the source of funding, financing plan and corresponding capitalisation schedule”

PTCUL has included a year wise phasing of the proposed capital investment in its capital investment plan based on trends with works of similar nature carried out in the past which is provided in the table below:

Table 16: Year Wise Capital Investment in INRCr

Particular	2019-20 (P)	2020-21 (P)	2021-22 (P)	Total
Capital Expenditure	799.98	818.26	663.61	2281.85

A – Actual; E - Estimated; P - Projected

The Capital Expenditure provided in the table above also includes expenditure towards projects proposed to be capitalized in the next Control Period.

8. Future Business Plans

With focus on relieving congestion points, growing infrastructure and improving quality and quantity of energy delivered, PTCUL has drawn a long-term plan comprising of projects expected to be completed after the third MYT period FY 2019-20 to FY 2021-22. Some major projects from this long term plan are tabulated below.

Table 17: Future Business Plans

S.No.	Name of the Project	Region	Approved Cost (INRCrore)	Estimated Date of Completion
1.	132/33 kV S/s at Khatima-II	Kumaon	50.00	April 2022
2.	LILO of 220 kV Haldwani-Pantnagar line at proposed 220/33 kV GIS Phoolchaud (Haldwani) substation	Kumaon	7.00	March 2023
3.	220/33 kV GIS S/s Phoolchaud (Haldwani)	Kumaon	114.00	March 2023
4.	LILO of 132 kV Majra-Laltappar at 132 kV S/s Araghar line through laying of 132 kV cable	Garhwal	40.00	March 2023
5.	132/33 kV GIS S/s at Araghar	Garhwal	71.36	March 2023
6.	LILO of 400 kV Kashipur-Puhana line at Proposed 400/220/132 kV S/s Landhora	Garhwal	40.00	March 2024
7.	400/220/132 kV GIS S/s Landhora	Garhwal	400.00	March 2024
8.	LILO of 220 kV Roorkee-Manglore (Proposed) line at Proposed 400/220/132 kV S/s Landhora	Garhwal	40.00	March 2024
9.	LILO of 132 kV Laksar -Chandok line at Proposed 400/220/132 kV S/s Landhora	Garhwal	24.00	March 2024
10.	LILO of 132 kV Manglore -Shadipur line at Proposed 400/220/132 kV S/s Landhora	Garhwal	9.00	March 2024
11.	132 kV Simli-Gairsain line	Garhwal	60.00	March 2024
12.	132/33 kV GIS S/s Gairsain	Garhwal	50.00	March 2024
Total			865.36	

8.1. Brief Description of Major Projects:

- **220/33 kV GIS S/s Phoolchaud (Haldwani)** – The main objective behind the project is to relieve the excess load on the 220/132/33 Kamaluaganja S/s and meet the load growth of the nearby region for

around ten years, the substation will be Commissioned alongside the LILO of the Haldwani – Pantnagar for its energization.

- **132/33kV GIS S/s at Araghar** - The main objective behind the project is to relieve the excess load on the 132/33 kVMajra S/s and meet the energy requirements due to the load growth in the Araghar-Dehradun region, it is proposed to be energized by a LILO on the Majra - Laltappar line.
- **400/220/132 kV GIS S/s Landhora** – This large substation will strengthen the transmission system of Roorkee and surrounding areas and will greatly enhance the reliability and capability of the transmission network by connecting with the D/C Kashipur-Puhana PGCIL line via a LILO that will also energize the S/s on its Commissioning.
- **LILO of 220 kVRoorkee-Manglore(Proposed) line at proposed 400/220/132 kV S/s Landhora** – This LILO is proposed to connect the 220/132/33 kV S/s Roorkee and proposed 220/132/33 kV S/s Mangalore with proposed 400/220/132 kV S/s Landhora to further enhance the transmission capability and reduce losses.
- **LILO of 132kVLaksar -Chandok line at proposed 400/220/132 kV S/s Landhora** – This LILO is proposed to connect the 132/33 kV S/s Laksarwith the proposed 400/220/132 kV S/s Landhora to further enhance the transmission capability and reduce losses.
- **LILO of 132kVManglore -Shadipur line at proposed400/220/132 kV S/s Landhora-** This LILO is proposed to connect the 132/33 kV S/s Manglorewith the proposed 400/220/132 kV S/s Landhora to further enhance the transmission capability and reduce losses.
- **132/33 kV GIS S/s Gairsain** – This project, proposed to be energized by the 132 kVSimli-Gairsain line will provide reliable power supply to the Gairsain area and meet future load growth of the area.