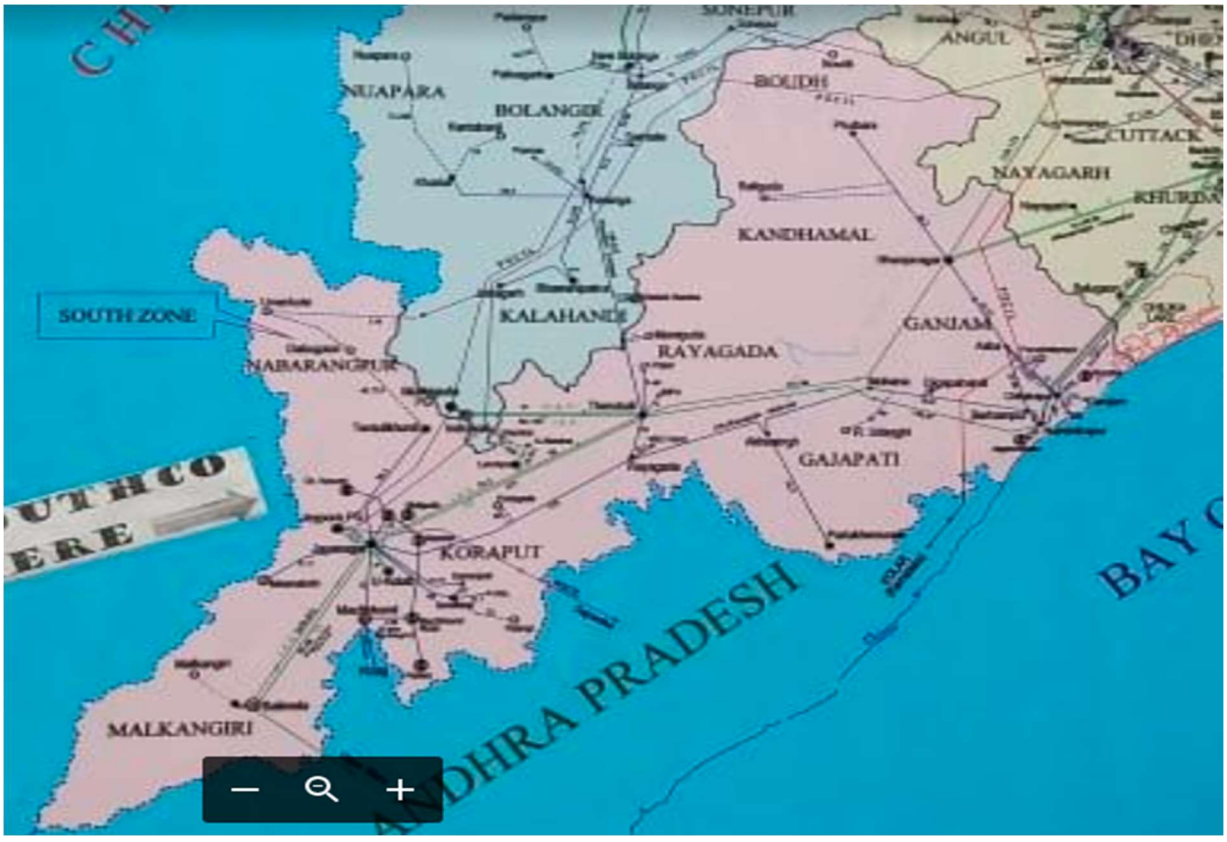
CAPEX Plan- FY 2021-22

Detailed Project Report (DPR)



TP Southern Odisha Distribution Limited

Contents

Glossary			Glossary	
AB SWITCH	Air Break Switch		**MBC**	Metering Billing and Collection
AC	Alternating Current		**MCC**	Master Control Centre
ADMS	Advanced Distribution Management System		**MCCB**	Moulded Case Circuit breaker
AMC	Annual Maintenance Contract		**MM**	Material Management
AMI	Automatic Meter Infrastructure		**MMG**	Meter Management Group
AMR	Automated Meter Reading		**MPG**	Maintenance Planning Group
APS	Area Power System		**MPLS**	Multi-Protocol Label Switching
AT&C	Aggregate Technical and Commercial		**MRT**	Meter Reading & Testing
BA	Business Associate		**MS**	Microsoft
BCC	Backup Control Centre		**MTTR**	Mean Time to Repair
BO	Business Output		**MU**	Million Unit
BPL	Below Poverty Limit		**MV**	Medium Voltage
BW	Business Warehouse		**MVA**	Mega Volt Ampere
CAIDI	Customer Average Interruption Duration Index		**MW**	Mega Watt
CAPA	Corrective Action and Preventive Action		**NABL**	National Accreditation Board for Testing and Calibration Laboratories
CAPEX	Capital Expenditure		**NCC**	No Current Complaint
CC	Control Centre		**NESCO**	North Eastern Electricity supply Company of Odisha Ltd.
CIS	Customer Information System		**O&M**	Operation & Maintenance
Ckt.KM	Circuit Kilo meters		**ODSSP**	Odisha Distribution System Strengthening Project
COTS	Commercial of the shelf		**OEM**	Original Equipment Manufacturer
COVID	Corona Virus Disease		**OERC**	Odisha Electricity Regulatory Commission
CPSCC	Central Power System Control Centre		**OFC**	Optic Fibre Cable
CRM	Customer Relationship Management		**O/H**	Over head
CSR	Corporate Social Responsibility		**OMS**	Outage Management System
CT	Current Transformer		**OPEX**	Operational Expenditure
CWIP	Current Work In Progress		**OPGW**	Optical Ground Wire

CYMDIST	Distribution System Analysis Package of CYME		**OPTCL**	Odisha Power Transmission Corporation Limited
DC	Direct Current		**OS**	Operating System
DCP	Data Collection Point		**OT**	Operational Technology
DD	Drop Down		**PBMC**	Performance Based Maintenance Contracts
DMS	Distribution Management System		**PC**	Personal Computer
DPR	Detailed Project Report		**PGCIL**	Power Grid Corporation of India Limited
DSS	Distribution Sub-Station		**PoC**	Proofing of Concept
DT	Distribution Transformer		**POSH**	Policy on Sexual Harassment
EHT	Extra High Tension		**PP**	Production Planning
ELCB	Earth Leakage Circuit Breaker		**PSCC**	Power System Control Centre
EPC	Engineering Procurement and Construction		**PT**	Potential Transformer
ERP	Enterprise Resource Planning		**PTR**	Power Transformer
FCC	Fuse Call Centre		**PTW**	Permit To Work
FPI	Fault Passage Indicator		**RoW**	Right of Way
FY	Financial Year		**R&R**	Reward & Recognition
GIGO	Garbage in, garbage out		**RCA**	Root Cause Analysis
GIS	Geographical Information System		**RMU**	Ring Main Unit
GoI	Government of India		**SAIDI**	System Average Interruption Duration Index
GoO	Government of Odisha		**SAIFI**	System Average Interruption Frequency Index
GRIDCO	Grid Corporation of Odisha		**SAP**	System Application and Products
GSAS	Grid Station Automation System		**SBM**	Spot Billing Module
GSS	Grid Sub Station		**SCADA**	Supervisory Control and Data Acquisition
HMC	Hub Maintenance Crew		**SD**	Sales and Distribution
HT	High Tension		**SDO**	Sub Divisional Officer
HTCT	High Tension Current Transformer		**SHG**	Self help Group
HVAC	Heating, Ventilation and Air Conditioning		**SITC**	Supply Installation Testing and Commissioning
HVDS	High Voltage Distribution System		**SLA**	Service Level Agreement
IEC	International Electro technical Commission		**SLDC**	State Load Dispatch Centre

IED	Intelligent Electronic Devices		**SLMC**	System Line Maintenance Crew
IEMS	Input Energy Monitoring System		**SMC**	Substation Maintenance Crew
IMS	Integrated Management System		**SMS**	Short Message Service
IPDS	Integrated Power development scheme		**SOP**	Standard Operating Procedure
ISU	Industry Specific Solution Utility		**SSL**	Secure Sockets Layer
IT	Information Technology		**STS**	Sub Transmission System
ITIA	IT Implementation Agency		**STS**	Sub transmission system
JE	Junior Engineer		**T&D**	Training & Development
KM	Kilo meter		**TBEM**	TATA Business Excellence Model
KV	Kilo Volt		**TCOC**	TATA Code of Conduct
KVA	Kilo Volt Ampere		**TPCODL**	TP Central Odisha Distribution Limited
LDMS	Local Data Monitoring System		**TPWODL**	Tata Power western Odisha Ltd.
LT	Low Tension		**U/G**	Under Ground
LTCT	Low Tension Current Transformer		**UPS**	Uninterrupted Power Supply
LV	Low Voltage		**VPN**	Virtual Private Network

1. Introduction

Tata Power South Odisha Distribution Limited (TPSODL) ~~is~~ incorporated as a joint venture of The Tata Power Company (51%) and Odisha Government (49%) on the Public-Private Partnership (PPP) model. TPSODL took over the license to distribute electricity in the southern part of Odisha, which was earlier served by erstwhile SOUTHCO, through a competitive bidding process. The business of TPSODL utility shall be governed by the provisions of license issued by Hon'ble Odisha Electricity Regulatory Commission (OERC) for distribution and retail supply of electricity in South Odisha. OERC regulates the working of the entire power sector of Odisha state, including determination of tariff chargeable to end consumers and establishing performance norms (mainly related to Loss reduction, Safety, Reliability of power supply and Consumer service delivery). The core business activities of TPSODL are summarized as follows:

1. Operation and maintenance of distribution network
2. Expansion of distribution network
3. Electricity supply and after sales services
4. Connection of new customers to the distribution network
5. Meter reading, billing and revenue collection
6. Customer complaint resolution
7. Restoration of power after interruptions
8. General customer care including provision of information on services
9. Customer sensitization on energy efficiency, energy losses and safety

2. Our Business Area

TPSODL Utility shall carry out the business of distribution and retail supply of electricity in the Eight districts of Odisha namely Ganjam, Gajapati, Boudh, Kandhamala, Rayagada, Koraput, Nabarangpur and Malkangiri over an area of supply 48751 sq km and serves the registered consumer base of 2.324 million. For effective operations; license area is divided in 6 circles namely City Circle, Berhampur Circle, Aska Circle, Bhanjanagar Circle, Rayagada Circle and Jeypore Circle which is further sub divided in 19 Divisions and 51 Sub-division which manages the commercial and O&M activities in order to serve its consumers. The details is provided in table below.

Circle Name	Division Name	Sub-Division Name	SDO CODE
CITY CIRCLE	BED-I, Berhampur	Medical Sub-Division,Berhampur	3411
		Industrial Sub-Division,Berhampur	3414
		Gopalpur Sub- Division , Berhampur	3412
	BED-II, Berhampur	SSD No-I, Berhampur	3421
		SSD No-III, Berhampur	3422
	BED-III, Berhampur	SSD No-IV, Berhampur	3432
		Kanisi S/D	3431
BERHAMPUR CIRCLE	GNED, Chatrapur	Chatrapur S/D	2111
		Rambha S/D	2112
		Khallikote S/D	2113
	PSED , Purusottamput	Kodala S/D	2143
		Purushottampur S/D	2141
		Polasara S/D	2142
	HED,Hinjilicut	Sheragada S/D	2152
		Hinjilicut S/D	2151
ASKA CIRCLE	AED-I, Aska	Aska S/D	3511
		Nuagam S/D	3513
	AED-II, K.S.NAGAR	K.S.NAGAR	3522
		BUGUDA	3523
	GSED, Digapahandi	Digapahandi S/D	3531
		Chikiti S/D	3532
BHANJANAGAR CIRCLE	BNED, Bhanjanagar	No.1,Bhanjanagar Sub-Division	2911
		No.2,Bhanjanagar S/D	2915
		Bellaguntha S/D	2912
		Sorada S/D	2913
	PED , Phulbani	Phulbani S/D	2921
		Balliguda S/D	2922
		G.Udayagiri S/D	2923
	BoED ,Boudh	BOUDH S/D	2931
		MANMUNDA S/D	2932
RAYAGADA CIRCLE	RED, Rayagada	Rayagada S/D	3111
		Therubali S/D	3112
		Bissam Cuttack S/D	3113
	PKED,Paralakhemundi	Paralakhemundi S/D	3121
		Kasinagar S/D	3122
		Upalada S/D	3124
		R.Udayagiri S/D	3125
		Mohana S/D	3123
		Gunupur S/D	3131

Circle Name	Division Name	Sub-Division Name	SDO CODE
	GED,Gunupur	Gumuda S/D	3132
JEYPORE CIRCLE	JED, JEYPORE	JESD-1 JEYPORE	7111
		JESD-2 JEYPORE	7114
		SDO, BORIGUMMA	7115
	KED, KORAPUT	Koraput S / D	7141
		Sunabeda S / D	7142
		Laxmipur S / D	7143
	MED, MALKANGIRI	Malkangiri S / D	7131
		Balimela S / D	7132
	NED, NABARANGPUR	Nabarangpur S / D	7121
		Umarkote S / D	7123
		Papadahandi S / D	7124

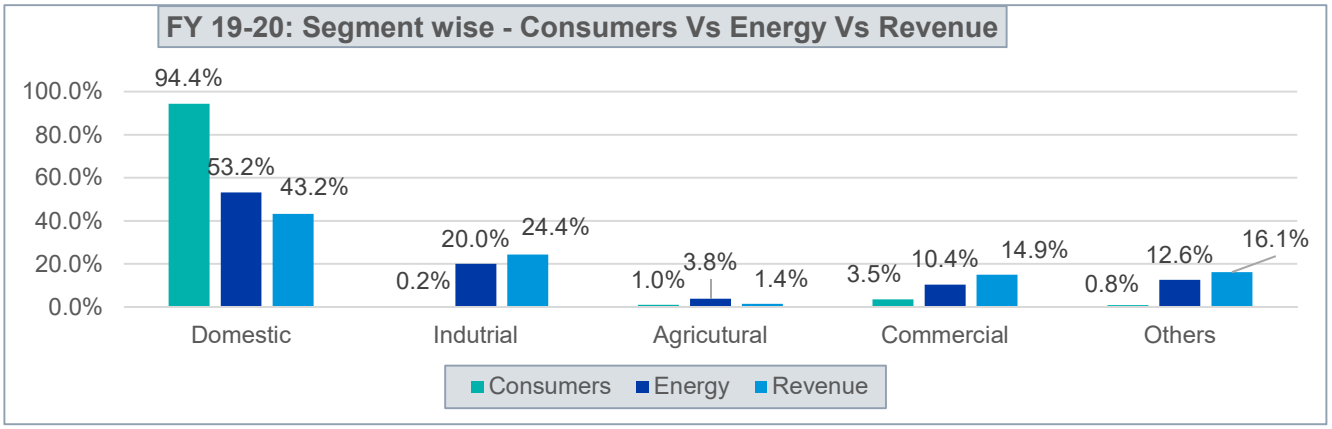
3. Existing Supply System

TPSODL receives electrical power at 33kV level from 28 numbers of transmission stations (TS) out of which 4 nos. TS are rated at 220/132/33kV, 2 nos. at 220/33kV and 22 nos. at 132/33kV located within and in the vicinity of TPSODL operational area. TPSODL distributes the power at 33kV / 11kV / 440V / 230V depending on the demand of the consumers.

At present, there are 110 numbers of 33 kV feeders with a combined circuit length of approximately 3636 Ckt.KMs supplying power to 224 numbers of 33/11kV Primary Substations The 33kV supply is stepped down to 11kV level through 459 numbers of 33/11kV power transformers with an installed capacity of 2986 MVA at these primary substations. Nearly 794 numbers of 11 kV feeders emanates from the 33/11 kV primary substations having cumulative length of approximately 40487 Ckt.KMs and supply power to HT consumers connected at 11 kV level and LT customers connected to 11/0.415 kV & 11/0.230 kV distribution substations. 53658 numbers of distribution transformers are installed in all six circles with an installed capacity of 2250MVA. The length of the LT network is approximately 36637 Ckt.KMs. These LT feeders supply power to three phase and single phase consumers. The information is summarized in the table below.

CIRCLE	Unit	CITY CIRCLE	BERHAMPUR CIRCLE	ASKA CIRCLE	BHANJANAGAR CIRCLE	RAYAGADA CIRCLE	JEYPORE CIRCLE	Total
No. of Consumers	No.	214928	327546	245094	417818	383260	736131	2324777
No of 33/11kV Substations	No.	18	24	20	42	52	68	224
Transformers 33/11	No.	41	64	53	81	87	133	459
Transformation Capacity 33/11	MVA	226.2	1233.8	244	363.45	374.3	544.1	2985.8
Transformer Distribution 33/0.415 kV, 11/.415/0.230 kV	No.	2246	5116	3754	13073	7858	21611	53658
Transformation Capacity 33/0.415 kV, 11/.415/0.230 kV	MVA	249.36	333.75	212.72	394.83	286.48	773.18	2250.3
33kV Line - O/H	Ckt.Km	139.23	373.94	227.9	819.88	797.6	1273.5	3632.06
33kV Line - U/G	Ckt. Km	3		0.9				3.9
11kV Line - O/H	Ckt. Km	1114.8	3370.6	2116.2	9876.9	7972.1	15990	40440.2
11kV Line - U/G	Ckt. Km	7.08	11.11	8.95	20.1	0	0	47.2
LT Line – Bare	Ckt. Km	1024	1092.7	646.13	1525.3	2759.3	2552.8	9600.15
LT Line – ABC	Ckt. Km	557.97	3251.99	1531.7	6853.3	3670.12	11171.87	27036.95

The graph below represents the share of customer base, their energy consumption and contribution in revenue based on FY 19-20 data.



4. Key Challenges:

The brief inspection of the network reveals that the network in TPSODL is in very poor state and seriously lacks compliance with respect to the statutory guidelines. While this affects the system reliability due to frequent breakdowns, it may pose threat to safety of employees, public at large and animals.

4.1. 33 kV Lines/Feeders

33kV feeders connect a Primary substation (PSS) to the Transmission substation (TS) and supply primary substations and some 33/0.415 kV distribution transformers. These feeders are the main source of supply and reliability to the PSS. We have the following observations on 33 kV feeders.

1. Most of the feeders have long length and radially connected. The long overhead feeders are prone to faults. It is always difficult to inspect the feeder after occurrence of a fault leading to high equipment downtime and SAIDI.

2. At many of the locations these lines are installed on damaged, bent and tilted poles which is unsafe for the asset as well as the general public. Further these lines are observed with undersized & worn out bare conductor, having extremely long spans, multiple and poorly executed joints and compromised safety clearances.

3. Most of the locations of feeders do not have guard wire beneath conductors, even in urban areas, for safety of public against conductor snapping and subsequent accidents.
4. We observed encroachment on RoW i.e. houses / structures constructed below 33 kV, 11kV and LV overhead feeders at many locations both in urban and rural areas.
5. At many locations two feeders running on single pole structure.
6. It is also observed that no intermediate H pole is used in 33 kV feeders for mechanical strength and for conductor jointing. These H poles are essential to avoid cascading effect of failure of a pole.
7. The installation of majority of poles is not as per standards.

4.2. 33/11 kV Primary Substations (PSS)

Primary substations transforms 33 kV voltage to 11kV level. There are one or more 33 kV feeders supplying power to the PSS. 33 kV voltage is stepped down to 11kV through power transformers of various capacity viz. 1.6 MVA, 3.15 MVA, 5 MVA, 8 MVA, 10 MVA. At many of 33/11 kV primary substations, the Power Transformers are not appropriately maintained. The silica gel, in most of the power transformers, is moisturized which can lead to breakdown of the power transformers. The silica gel can be replaced at very small cost and can avoid breakdown of the most costly equipment of the power distribution network. The connections in the outdoor yard, between bus bar and equipment, are done with poor jointing methods, leading to hotspots which may add to the technical losses. The technical loss due to poor jointing can be reduced significantly by using latest wedge connectors.

The analysis shows that some of the existing 33/11kV sub-stations are already overloaded or approaching the overload limit. It is anticipated that some of the sub-stations may be overloaded in next 2 to 3 years with the current load growth of around 8% per annum. There is an obvious reliability concern for substations with only one power transformer in service at some substations.

Boundary walls for most of the substations are in damaged condition and there is no fencing between the substation premises and 33kV outdoor switchyard. This makes the PSS highly unsafe as there are chances of entry of unauthorized persons and animals into the live switchyard which may result in accidents.

Earthing system is most important for safety & protection of men and equipment. The existing earthing system is in very bad condition and ineffective.

Many circuit breakers and CTs are lying bypassed since long for want of spares. This is another major threat for protection of the equipment. The failure of the substation equipment can result in substantial revenue loss due to breakdown of the equipment.

Automobile batteries and underrated battery chargers are used at many substations due to non-availability of standard equipment in stores. This makes the basic protection system ineffective and there are chances of major damage to substation capital intensive equipment if the defects are not addressed urgently.

Some of the pictures depicting the network condition and violation of statutory compliance posing safety threat to Public, Employees and animals are captured and presented in **Annexure - 1**

4.3. 11 kV Lines /Feeders

11kV feeders connect a Primary substation (PSS) to the distribution transformers and TPSODL have a large number of long overhead feeders and some of these are more than 100 Ckt.KM length. We have identified following observations on the 11 kV feeders.

1. Most of the feeders are radially connected have longer length compared to the standard engineering practices. Some of the feeders are more than 100 Ckt. km long. The long overhead feeders are prone to faults. It is always difficult to inspect the feeder after occurrence of a fault leading to high equipment downtime and SAIDI.
2. At many of the locations these lines are installed on damaged, bent and tilted poles which is unsafe for the asset as well as the general public. Further these lines are observed with undersized & worn out bare conductor, having extremely long spans, multiple and poorly executed joints and compromised safety clearances.
3. Most of the locations of feeders do not have guard wire beneath conductors, even in urban areas for safety of public against conductor snapping and subsequent accidents.
4. We observed encroachment on RoW i.e. houses / structures constructed below the overhead feeders at many locations both in urban and rural areas.

5. It is also observed that no intermediate H pole is used in 11 kV feeders for mechanical strength and for conductor jointing. These H poles are essential to avoid cascading effect of failure of a pole.
6. The installation of majority of poles is not appropriate to the standards.

4.4. Distribution Substations (DSS)

TPSODL has three types of distribution substations according to voltage levels i.e. 33/0.415 kV, 11/0.415 kV and 11/0.230 kV .The substations are either plinth mounted or pole mounted. DD fuse is the primary protection equipment for the distribution transformer in a DSS which protects the DT, the most costly equipment of the DSS, in case of faults. It is noticed that AB switch and DD fuse are bypassed in some of the 11/0.415 kV Distribution Substations (DSS), thus compromising the life of the equipment beside network reliability.

4.5. LT network

LT feeders emanate from DT secondary side and serve the electrical energy to the end customers. There is no effective LT feeder protection system in place on the secondary side of most of the DSS. In place of LT Fuse box/MCCB box; aluminum wire are used as fuses on the secondary side of the distribution substations at almost all substations. These fuse units are installed at very low height without any fencing of the DSS. The rating of the aluminum wires, used as fuses is not appropriate to the rating of the DT, and thus compromising the life of the distribution transformer, in case of fault in the LT network. This is a potential safety threat to general public at large and animals

4.6. Earthing

Earthing of the electrical installation is very important for safety of the men, animal and equipment. Earthing system is in very bad condition in almost all feeders, Primary and distribution substations. All of the above deficiencies makes the distribution substations highly unsafe and unreliable. There are chances of serious accidents and fatalities if not addressed on urgent basis.

4.7. Metering System

On commercial front, Energy Meter installed at consumer premises is a mix of electro-mechanical meters, consumer owned meters and electronic meters etc. These meters are connected to TPSODL system through PVC insulated service cable supported by GI wire

which also serves as earth point to the consumer installation. Many of the meters are faulty which add to the non-technical losses as the energy consumption is not recorded and therefore bills are not raised as per the actual consumption. Further many of the meters are not provided with seals which creates a potential source for theft of the electrical energy.

In FY 19 – 20, against the total input energy of 3469 MU, billed energy was 2620 MU resulting into billing efficiency of around 76%. Out of this 2620 MU billed energy, approximately, 53.2% of the energy billed in a particular year is supplied to Domestic Consumers. Commercial and Industrial Consumers contribute to 10.4% and 20% of the total billed units respectively. Balance 16.4% energy is billed to others like Railways/Public Street Lighting/Public Water Work/Irrigation and Agriculture etc. In terms of Revenues, Domestic Consumers contribute to around 43.2%, Commercial 14.9%, Industrial 24.4% and others 17.5% respectively. Overall input has reduced by 5% in FY 19-20 vis a vis FY 18-19, maximum reduction in billed MU is of HT customer as it has reduced by around 6% from 285.3 MU in FY 18-19 to 269.7 MU in FY 19-20.

TPSODL is also planning to review the meter seals to avoid chances of meter tampering or any other type of undesired activity by consumer resulting into loss of revenue to TPSODL. TPSODL is planning to use insulated Polycarbonate meter box, armoured service cable and proper meter seals on meter boxes and terminal covers to eliminate chances of theft of electricity.

4.8. IT Issues

Current IT landscape is using multiple Decentralized Legacy Billing system for single phase and three phase and Decentralized TALLY system for Accounts payable, Receivable, Asset Accounting. This software is very basic and most of processes and its activities are managed manually outside the system. Also system is not upgradable due to outdated technology. There is only one Oracle database using Oracle 8 version, which is not supported by OEM any more. Many of the mission critical application like call center applications, Cash Collection application, SBM applications are managed by multiple agencies which have a lot of integration issues resulting in data inconsistencies across various systems. Legacy AMR system currently installed is not communicating.

4.9. Housekeeping in working place

The level of hygiene and sanitation at the work places and different offices is poor. Office buildings, in general, are very old which need strengthening through major civil works. Infrastructure of the offices need revamping and major civil works are to be addressed for ensuring conducive work environment for Employees and consumers visiting the offices. Substantial investment is required to address the above stated challenges and to safe guard the assets, public & animals from the accident and ensuring statutory compliant network.

Besides TPSODL is also planning to improve the office infrastructure through revamping and other civil interventions. These activities are urgently needed to provide conducive work environment to TPSODL employees and all consumers visiting TPSODL offices. Many of the office buildings are very old and need urgent strengthening to avoid mishap. Call Centre and Customer care Centers needs to be established / developed further to provide better connectivity to all category of consumers with TPSODL and provide them a unique service experience

5. Issues of Network Infrastructure

5.1. Unsafe Horizontal and Vertical Clearance

Any responsible Power distribution utility is bound to comply all statutory compliance. Any non-compliance to the statutory guidelines attracts penalties apart from damage to brand image. TPSODL has taken over the assets of erstwhile SOUTHCO on “as is where is” basis. In erstwhile SOUTHCO area, there was lack of compliance to statutory guidelines at many locations. For example, the height of the lowest conductor in many MV feeders from the ground is not meeting the safe clearances as mentioned in the Regulation 58 of CEA regulations (Measures relating to Safety and Electric Supply – 2010). In many cases the span length varies from 60-120 mtrs., which further worsens the problem. More span length causes high sag and results in low clearance from ground level.

In TPSODL licensed area, there are many locations which are not complying with the statutory guidelines and hence require huge funds and efforts to make the network safe. At some places vertical clearances of the lines have reduced, due to re-construction of the roads, to the dangerous level causing violation of statutory guidelines. TPSODL proposes to take up refurbishment/life enhancement work for lines to rectify all such defects. Since the

volume of such locations are high, huge investment spread across many years would be required to rectify all the deficiencies.

5.2. Damaged Poles / Conductors / Stay / boundary Walls.

The network is in very poor state due to vast geography, wide spread network and absence of preventive maintenance practices. Major elements of the weak network comprise damaged poles, worn out conductors, damaged stay wires and ineffective earthing. At some locations, poles or support structure are damaged, rusted or tilted. Major factors causing damage to the poles includes structural deterioration of poles, flood, cyclone, heavy vegetation etc. Tilting of poles has resulted in increase in conductor sag and if replacement / refurbishment of the tilted or broken pole is not undertaken on priority, mechanical strength of the line will reduce and may result into falling of line during high speed winds / storms. Falling of line can cause fatal accident. It is also a major concern for ensuring reliable power supply to the consumers as restoration may take many days depending upon the location and severity of damage to the line. To prevent tilting of any pole from its normal position due to abnormal wind pressure, installation of Stay wire is required. At many places egg (stay/guy) insulators are either missing or damaged, which may cause major safety concern not only for the safety of Public but animal also in case of leakage current. Especially animal use the stay wire for rubbing their skin and if the stay wire is live, the animals are likely to get electrocuted.

Moreover, there are other reasons, which have resulted into depletion of existing network such as use of undersized conductor in overhead feeders, poor condition of the conductor, multiple joints in a single span in many sections, poor binding wire joints etc. witnessed in the sections causing hot spot and may result into jumper parting. At some locations, stay wire are also damaged resulting into weaker mechanical support to the poles. Under the refurbishment/life enhancement activity TPSODL has planned to replace damaged poles, replacement of worn out conductor, re-sag the conductor, install mid-span pole, introduce stay-wire at start, end and at every H-pole with at least two stay together with two-anchor rod in same pit. This will strengthen the line and will reduce the effect of the bad weather conditions and at the same time will help to reduce accident due electrocution caused by leakage current.

5.3. No or poor Earthing of the Poles & Structure

In an electrical installation, earthing system plays important role for proper working of the power distribution system, and protection of human beings against electric shock. Metal frame of all power distribution equipment are connected with the general mass of the earth which is always at zero potential. It's worth mentioning that the general mass of the earth don't have any resistance. As per Central Electricity Authority Regulations (Measures relating to Safety and Electric Supply,2010) rule 41, there is provision of earthing, neutral wire in a 3-phase, 4-wire system and the additional third wire in a 2- phase, 3-wire system.

The grounding system must have minimum of two or more distinct earth pits (electrodes) to ensure effective grounding. Further, according to rule 42, installation with connected load of above 5 kW, and voltage exceeding 250 V shall have a suitable earth leakage protective device to isolate the load in case of earth fault or leakage in the circuit. In case the earthing of any power equipment or network becomes weak or defective due to corroded connections or damaged connection, clearance of fault may take more time and putting stress on the equipment connected in the network. During the site visits, it is observed that at most of the places proper earthing was not evident and at some of the 33/11kV primary substation, DSS and poles earthing is not adequate. Further the condition of earthing in old installations is observed to be extremely bad due to exhaustion of earthing electrodes/spikes and connections. This situation is dangerous for the stability of power system and there are chances of electric shock to the human beings and animals if corrective actions are not taken urgently. Therefore there is urgent need to strengthen the earthing system to ensure safety of man and material. TPSODL proposes to strengthen the earthing system by introducing fresh earthing in both DSS and PSS as part of refurbishment activity. This will enhance life not only of equipment but shall also help in proper functioning of protection relays.

5.4. Absence of Cradle/Guard wire in Overhead feeders crossing the road

Guarding is an arrangement provided in overhead MV/HV/LV feeders, by which a live conductor, when accidentally gets broken, is prevented to come in contact with public or animals and vehicles moving beneath the road. By having cradle guards in place, immediately after a live conductor breaks, it first touches the cradle guard, which is connected to earth, thus completing the electrical circuits necessary for the operation of the

protection relays installed at substations. This in-turn trips the circuit breaker and danger to any living object is averted.

At present, most of the network is overhead and there is no provision of guard or cradle wire installed beneath the overhead conductors. This poses serious safety threat to the general public since the network is in very poor condition and possibility of conductor snapping cannot be ruled out. In such scenario, cradle guard will help in avoiding accidents caused by snapping of conductors of overhead MV feeders. TPSODL proposes to put in place the cradle wire/guard wire on all road crossings and vulnerable public locations as part of the refurbishment activity of lines.

5.5. Poor condition / Absence of fencing at most of the Distribution Substations & 33/11kV Primary Substations (Structures)

Absence of boundary walls and fencing around the Primary Substation and Distribution Substations has exposed the live power distribution equipment to the human beings and animals, who are not aware of the consequences of coming in direct contact or in the arching zone of high voltage equipment. Our site visits indicate that most of the 33/11kV Primary Substations and 11/0.415kV Distribution Substations either have broken boundary fence or there is no boundary fence, specifically in rural areas.

It is also observed that there is no fence between the substation premises and live 33kV switchyard in almost all 33/11kV Primary Substations. There are high chances of entry of unauthorized persons or animals in high voltage switchyards. There are information's regarding electrocution of human beings and animal's at substations in the past. TPSODL proposes to put up fencing/build boundary wall under the DSS and PSS Refurbishment job.

5.6. Temporary work for restoration of supply post cyclones

Site visits in the coastal areas and interactions with the technical team revealed that the overhead network was hit hard by various cyclone and a result major portion of the network got collapsed. Due to scarce manpower, and in order to restore the power supply to affected areas, the quality of workmanship was compromised and major focus shifted from doing the work right to fix the issues without following the best construction practices. Many parts of the network even today are temporary. Efforts and investment are needed to make the temporary systems permanent at the earliest as the temporary installations are unreliable

and unsafe for operations. Although the funds are provided for rectifying the issues developed due to temporary restoration however TPSODL proposes to correct the network adequately under 33 kV & 11 kV Line Refurbishment activity to improve reliability, system improvement & mitigate unsafe situation.

5.7. Non-availability of safety equipment & PPEs.

Personal protective equipment, or PPE, protects its user against any physical harm or hazards that the workplace environment may present. It is important because it exists as a preventative measure for industries that are known to be more hazardous, like manufacturing, mining and Electricity Distribution. It is important that PPEs and safety equipment provided to staff to carryout construction and maintenance activities should meet safety regulations and guidelines. Availability of appropriate specifications and type of PPE's for different activities ensures safety of workforce against injuries, incidents and accidents. Reduction in injuries, incidents and accidents helps to improve the productivity.

Any power distribution utility is bound to comply with all statutory requirements. Non-compliance results in enforcement action, penalties, harassment and loss of brand image. The network in TPSODL is highly non-compliant to statutory guidelines, as a result of which huge number of accidents takes place every year. We as a responsible organization have to ensure that network is complaint to the statutory guidelines/requirements so that safety of employees, public at large and animals can be ensured.

To meet above stated objective and ensure safe and reliable network, it is proposed to carry out refurbishment (Life Enhancement) activities to extend the useful life of the assets. All expenditure involved in refurbishment of Substations and Feeders shall be covered under Capital Expenditure.

Benefits of Proposal:

Refurbishment of substations and feeders will benefit TPSODL through

- Improvement of voltage profile.
- Reduction in number of outages.
- Increase in vertical clearances.
- Reduction in equipment downtime.
- Reduction in unserved energy.

- Enhanced reliability of power supply.
- Reduction in number of accidents.

The detailed expenditure is attached in Annexure No. 3.

6. Network Analysis- Statutory Guidelines

In TPSODL, each division has different characteristics and thus have different challenges. However, some common challenges which were witnessed during our limited site visits, appears to be unsafe network from safety point of view to our employees, public and animals. Objective of site visit was to understand the issues, reasons and area where improvement can be made. The following issues were observed and the same needs urgent attention to make the network safe, reliable and statutory compliant:

- ❖ Unsafe horizontal / vertical clearances in 33 kV and 11kV feeders. **(Regulation 58)**
- ❖ Damaged Conductor / Poles / Stay wire / Boundary walls.
- ❖ No or poor earthing of the Poles & Structure. **(Regulation 41 & 72)**
- ❖ Absence of cradle wire in overhead MV feeders. **(Regulation 70)**
- ❖ Damaged / Missing fence at most of the Distribution Transformers Substations & 33/11kV Primary Substations (Structures) resulting into easy accessibility for Public and animals.
- ❖ Non-availability of Safety Equipment & PPEs.

Regulations mentioned in the bracket are the applicable regulation of CEA (Measures relating to Safety and Electric Supply – 2010). Details are in ***Annexure 2***

Having done analysis of last ten years accident data, it is observed that most of the accident happened either due to deficiency in the network infrastructure or easy accessibility of the live parts to the Public and Animals. Even to operate network, necessary PPEs are also not available in sufficient quantity. Some of the PPEs were never procured by the erstwhile SOUTHCO. Table below shows Year wise details of Fatal / Non-fatal Electrical accidents occurred under SOUTHCO's operational area during Calendar Year 2010-2020.

Sl No	Financial Year	Human			Animal			TOTAL Victims
		Fatal	Non-fatal	Total	Fatal	Non-fatal	Total	
1	2010-11	30	23	**53**	23	0	**23**	**76**
2	2011-12	23	18	**41**	39	0	**39**	**80**
3	2012-13	18	10	**28**	29	0	**29**	**57**
4	2013-14	23	21	**44**	26	0	**26**	**70**
5	2014-15	28	15	**43**	33	0	**33**	**76**
6	2015-16	45	11	**56**	40	0	**40**	**96**
7	2016-17	37	10	**47**	16	0	**16**	**63**
8	2017-18	23	5	**28**	15	0	**15**	**43**
9	2018-19	18	5	**23**	1	0	**1**	**24**
10	20219-20	28	47	**75**	2	0	**2**	**77**
11	2020-21(till Dec'20)	21	4	**25**	10	0	**10**	**35**
TOTAL		**294**	**169**	**463**	**234**	**0**	**234**	**697**

It is pertinent to mention here that the number of fatal accident outgo the number of non- fatal accident, for both Human and Animals. **Further, almost 56% of fatal accident involved humans, which is very serious.**

Below figure shows the detailed analysis of Humans accident.

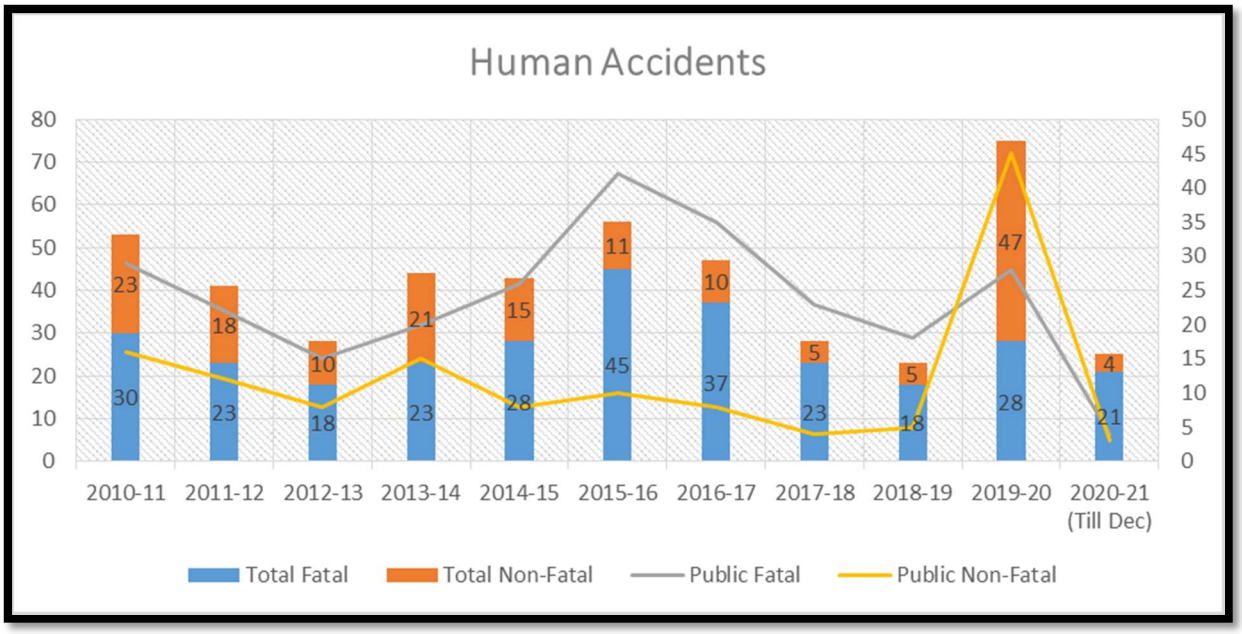


Table below shows the Fatal and non-fatal accident happened during the last 2.75 Years at different voltage level.

Voltage Level	FY 18-19				FY 19-20				FY 20-21(Till Dec'20)			
	Fatal		Non-Fatal		Fatal		Non-Fatal		Fatal		Non-Fatal	
	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal
33KV	0	0	2	0	2	0	0	0	2	0	0	0
11KV	12	0	2	0	18	2	42	0	12	9	3	0
LV	6	1	2	0	6	0	1	0	7	1	0	0
Total	18	1	6	0	26	2	43	0	21	10	3	0

From the above table, it is observed that majority of the fatal and non-fatal accident occurred in 11kV & LV network and thus focused approach must be followed on these segments to make the network safe & secure. As a responsible distribution utility, we need to curtail it further. Hence potentially unsafe locations needs to be addressed in time so as to ensure safe network for employees, Public and Animals.

Apart from high number of Accidents; other major problem is DT failure and extremely high number of interruption at 11 kV and 33 kV level due to bad network condition. This affects

the supply system very badly. The interruption at 11 kV feeders is too high by any utility standard. The table below gives a snapshot of feeder tripping recorded at the 33/11 kV Substations in different circles. In one year total tripping are at a staggering 1.93 lacs. Total count of 11 kV feeder is 794. In year 18-19 &19-20 1656 and 1425 numbers Distribution Transformers failed.

7. Proposed CAPEX Plan for FY 21 -22

As explained earlier, TPSODL has identified a number of challenges related to Safety, 33kV/11kV/0.415kV/0.230 kV network, Metering infrastructure, Customer Services and Technology usage. These challenges are planned to be addressed through a systematic investment plan by TPSODL. The proposed CAPEX plan represents a justified and efficient level of total capital investment estimated by TPSODL to meet the service obligation; improving safety, reliability of network, level of service standards.

In order to improve the reliability and reduce the losses, major interventions like Network reinforcement, Meter replacement, Technology adoption is proposed in this plan so that equipment failure / tripping can be reduced and reliability, billing & collection efficiency can be improved. The network demands urgent refurbishment like re-conductoring of feeders, optimization of feeder length, dedicated feeders for industrial/ commercial customers, replacement of damaged / tilted poles, provision of intermediate poles, replacement of joints, enhancing system protection, replacement of sick equipment and network augmentation to improve the reliability of power supply.

Faulty Energy Meters replacement, introduction of advanced technologies and analytics will be prime focus area for improving the accuracy of the meter reading, curtail tampering of the meters and providing better and effective customer services. Leveraging meter technology and conducting drives of meter replacement and installation of meters at distribution transformers shall be critical for improving energy accounting.

Further Business process re-engineering is required to improve the customer services. Technology adoption is also required to provide quality customer services, manage revenue cycle processes for reduction of AT&C losses and efficiently manage to deliver reliable and quality supply in safe manner to its consumer by meeting various standards of operation.

During the initial phase, capital investments are proposed under the following broad cost centers that shall be aligned with multiple initiatives and schemes so as to reduce AT&C losses, improve system reliability and augment the network to support continuous load growth. Further, a need is also felt to improve the existing facilities and infrastructure to provide a better consumer experience and a modern, rich, and conducive work environment to all employees for better performance.

With this objective of ensuring reliable power supply and ensuring best customer services to the end consumers, TPSODL has come up with a capital investment plan under the major heads. These heads are detailed in subsequent sections along with fund requirement and activities to be performed.

1) Statutory Compliance/Safety
2) Loss Reduction
3) Reliability Improvement
4) Load Growth
5) Technology & Civil Infrastructure

TPSODL proposes Capital Expenditure of INR 408.47 Crores. for FY 21-22 to carry out various activities under 5 major categories.

S. No.	Major Category	Activity	DPR Cost (In Crores)	Annexure
1	Statutory & Safety	PPEs, Safety & Testing Equipment	19.98	*Annexure 3*
		Cradle guard at major road crossings	8.53	*Annexure 4*
		Fencing of Distribution substations (DSS)	15.00	*Annexure 4*
		Boundary wall for Primary substations(PSS)	15.40	*Annexure 4*
		Establishment of Meter Testing Lab	2.47	*Annexure 5*
		Total (1)	**61.37**	
2	Loss Reduction	Input Energy Monitoring System (ABT/AMR) –IEMS	10.97	*Annexure 6*

		Replacement of burnt, Faulty and Electromechanical meters and meter installation at no Meter cases	62.98	*Annexure 6*
		LT Bare to ABC conversion	11.98	*Annexure 6*
		Demand Side Management	5.00	*Annexure 6*
		Total (2)	**90.93**	
3	Reliability	33 KV Network refurbishment	10.08	*Annexure 7*
		Installation of 33 KV AB Switch	2.23	*Annexure 9*
		PSS Refurbishment	12.17	*Annexure 8*
		11 KV Network refurbishment	11.16	*Annexure 7*
		Installation of 11 KV AB Switch	5.00	*Annexure 9*
		DSS Refurbishment	10.00	*Annexure 8*
		Installation of LV protection at DSS	10.09	*Annexure 10*
		Installation of Auto reclosure / Sectionalizers ,RMUs, &FPIs	8.72	*Annexure 9*
		Trolley Mounted Pad Substations	1.31	*Annexure 11*
		Package Distribution Substations	1.64	*Annexure 11*
		Total (3)	**72.41**	
4	Load Growth	Network augmentation / addition to meet load growth/11 KV line, PTR,DTR,LT line	26.52	*Annexure 12*
		Meter Installation for all new connections	12.71	*Annexure 13*
		Total (4)	**39.23**	
5	Technology & Civil Infrastructure	Installation of Smart Meters along with back end IT Infrastructure	28.28	*Annexure 14*
		Augmentation of IPDS Software licenses pan TPSODL	18.24	*Annexure 15*
		IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)	29.26	*Annexure 15*
		Communication Network Infra	5.38	*Annexure 15*
		SCADA Implementation	16.71	*Annexure 15*

		GIS Implementation	10.46	*Annexure 15*
		Civil Infrastructure	20.00	*Annexure 16*
		Civil Work for Meter Test Bench	2.00	*Annexure 16*
		Civil work for Call centre &PSCC	4.00	*Annexure 16*
		Upgradation of DT workshop	1.00	*Annexure 16*
		Security system in Central Store	4.25	*Annexure 16*
		Assets for Offices	4.95	*Annexure 16*
		Total (5)	**144.53**	
Grand Total (1+2+3+4+5)			**408.47**	

For each of the above cost centers, the investment has been further segregated in the following sub-centers:

1. Statutory & Safety

i. Provision of Safety Equipment & PPEs to workforce
ii. Cradle guard at major road crossings
iii. Fencing of 11kV Distribution Substations (DSS)
iv. Boundary wall for Primary Substation(PSS)
v. Establishment of Meter Testing Lab.

2. Loss Reduction

A. Defective Meter Replacement

i. Input Energy Monitoring System (ABT/AMR)
ii. Defective Meter Replacement
    a. Burnt Meter Replacement
    b. Faulty Meter replacement
    c. Electromechanical meters Replacement
    d. Meter Installation at no Meter cases.
iii. LT Bare to LT ABC Conversion
iv. Demand Side Management

3. Reliability Improvement

i. 33 kV Network refurbishment
ii. Installation of AB switches in 33kV & 11kV feeders for sectionalisation at different locations
iii. Refurbishment/Life enhancement of 33/11kV Primary Substations (PSS)
iv. 11 kV Network refurbishment
v. DSS Refurbishment
vi. Installation of RMUs, Auto Reclosures, Sectionalizers , FPIs & AB Switches
vii. Installation of LV protection at DSS
viii. Trolley Mounted Pad Substations
ix. Package Distribution Substations

4. Load Growth

i. Network Addition or Augmentation(11 kV Lines, Distribution Transformers, Power Transformers & LT lines)
ii. Energy Meter Installation for all new Connections

5. Technology & Civil Infrastructure

i. Installation of Smart Meters along with back end IT Infrastructure
ii. Augmentation of IPDS Software licenses pan TPSODL
iii. IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)
iv. Communication Network Infra
v. SCADA Implementation
vi. GIS Implementation
vii. Security System in Central Store
viii. Improvement of Civil Infrastructure
ix. Admin assets

7.1 Statutory & safety

7.1.1 Safety PPEs & Equipment:

It is proposed to implement Tata Safety & Health Management System (TSHMS) at TPSODL to prevent work-related injuries & ill-health to the workers and to provide a safe & healthy workplace to the employees.

The implementation of TSHMS will also help in improving the safety of all stakeholders (consumers, Business Associate employees & general public).

Personal protective equipment, or PPE protects its user against any physical harm or hazards that the workplace environment may present. It is important because it exists as a preventative measure for industries that are known to be more hazardous, like manufacturing, mining and Electricity Distribution. It is important that PPEs and safety equipment provided to staff to carryout construction and maintenance activities should meet safety regulations and guidelines. Availability of correct type and size of PPE's for different activities ensures safety of workforce against injuries, incidents and accidents. Reduction in injuries, incidents and accidents helps to improve the productivity.

Any power distribution utility is bound to comply with all statutory requirements. Non-compliance results in enforcement action, penalties, harassment and loss of brand image. In view of above, below mentioned PPE need to be procured for Metering Team for carrying out activities in safe manner.

Tree Trimming

State of Odisha being a coastal state leads to growth of heavy vegetation. Tree branches usually grow fast and come in close proximity with our electrical lines, which may cause transient faults and harm to general public and stray animals. To prevent this, we carry out patrolling as a part of our feeder maintenance activities and schedule branch cutting activities for parts of the tree which enters beyond the given electrical clearance limits. To carry out smooth and faster tree cutting, we have proposed for tree pruning machines.

Expenses for procurement of Personal Protective Equipment (PPEs):

PPEs will be required to be provided to the workforce for the safe execution of work. PPE such as Safety Shoes, Safety Helmet with induction tester, Full body safety harness, safety hand gloves, and reflective jacket will be provided to each employee.

Expenses for procurement of Safety Equipment:

a) **Aerial Tower Wagon**: It is proposed to bring the technological interventions in the safety to reduce the risk of fall from height while carrying out the work on the poles of trimming the trees. It is proposed to procure two nos. Aerial Tower Wagon to carry out the height work.

b) **Lock out-locks:** It is proposed to use the unique locks on the isolating points while issuing the line clearance permits so that safety of the working personnel will be ensured. Such LOTO locks will be provided to the lineman & substation operators to lock the isolating points to avoid the inadvertent charging of the feeders/lines.

c) **Neon Tester & Discharge Rod:** It is proposed to provide the set of neon tester & discharge rod with each fuse call center & sections so that the linemen can easily carry it at the working site to carry out the testing & discharging of the high voltage lines.

d) **FRP ladders:** FRP ladders will be required to be given to each fuse call center, substations & section offices to carry out the maintenance work on the poles. Fiber glass ladders of 9 meters & 12 meters will be provided to access the height so that workmen will not require to climb without following safety norms.

e) **Tool kit:** It is proposed to provide the standard tool bag with set of insulated tools for the linemen so that linemen will perform the all electrical activities in safety manner.

f) **Cable spiking tools**: Cable spiking tools also to be provided for efficient execution of the work during cable jointing work.

Benefits of the Project:

- Personal protective equipment and Safety and Testing Tools protects its user against any physical harm or hazards that the workplace environment may present.

- It is important because it exists as a preventative measure for industries that are known to be more hazardous, like manufacturing, mining and Electricity.
- An employee will be aware on which equipment is required of which tasks, and what it is meant to protect will help employee use of PPE that are provided to employee by the employer, which is the best way to ensure no or less injury or illness.
- Use of PPE also increases the quality of your workday and reduce the Man-hour lost due to any kind of injuries or illness

7.1.2 Cradle Guard at major road crossings

Cradle guards are provided in overhead MV/HV/LV feeders, by which a live conductor, when accidentally gets broken, is prevented to come in contact with public or animals and vehicles. By having cradle guards in place, immediately after a live conductor breaks, it first touches the cradle guard thus completing the electrical circuits necessary for the operation of the protection relays installed at substations. This in-turn trips the circuit breaker and danger to any living object is averted. At present, most of the network is overhead and there is no provision of guard or cradle wire installed beneath the overhead conductors. This poses serious safety threat to the general public and possibility of conductor parting cannot be ruled out. In such a scenario, cradle guard will help in avoiding accidents caused by snapping of conductors of overhead MV feeders. TPSODL proposes to put in place the cradle wire/guard wire. Detailed Cost estimate is attached in annexure No.4

7.1.3 Installation / Construction of Plinth fencing for DSS and Boundary wall for PSS:

Distribution Substation are located at various locations catering the power supply requirement to the consumers. Since these are installed at various scattered locations along the Road, public places, near the commercial areas etc. During the survey, it is observed that boundary walls or fencing are either damaged or do not exist thus posing a safety threat to stray animals and public at large.

At many of the places it was found that the condition of the Fencing of DSS and Boundary wall for PSS is in a very bad condition. Ensuring safety of People & equipment is very much needed for safe operation. Hence it is proposed for Construction of fencing for DSS and Boundary wall of PSS, wherever required.

Distribution Substation (DSS) comprises of various equipment which perform specific task to ensure delivery of power supply at appropriate voltage to the end consumers. Main components are 11 kV Switching device, 11 kV Protection, Transformer, LV Protection, Earthing, fencing and O/G LV feeders. The most expensive equipment in the DSS is the Transformer and its life depends upon healthy condition of all other components be it LV Protection, HV Protection, Earthing or fencing. Thus fencing is one of the most important part which ensures overall first-hand protection of the transformer. Therefore, installation of fencing and boundary wall to safeguard the DSS and PSS equipment and to maintain safety clearances is one of the major needs.

It will benefit by improving the safety of people and the equipment DSS failure will be reduced, hence power cuts will decrease.

Safety of general public and stray animals

In this proposal, TPSODL intends to carry out new fencings in phase manner. In this year around 1500 numbers of locations are being proposed for carrying out Boundary Wall & Fencing for PSS &DSS.

Detailed cost estimates for Boundary Wall & Fencing are attached in annexure No.4.

Circle wise Requirement of Fencing of DSS:

Circle Name	No of Divisions	Total Fencing required on priority based (in Nos.)	1st year no of DSS Fencing to be considered in FY21-22(Nos.)	Unit Cost for each DSS Fencing(in Crore)	Total Cost for DSS Fencing(in Crore)
City	3	540	250	0.01	2.5
Berahmpur	3	1240	250		2.5
Aska	3	630	250		2.5
Bhanjanagar	3	805	250		2.5
Raygada	3	417	250		2.5
Jeypore	4	680	250		2.5
Total	**19**	**4312**	**1500**		**15.0**

Circle wise Requirement of Boundary wall for PSS:

Circle Name	No of Divisions	Total Boundary wall required (in mtrs)	Total quantity considered in FY21-22 (in meters)	Unit Cost for per meter Boundary wall for PSS (in Crore)	Total Cost for PSS Boundary wall(in Crore)
City	3	5880	1000	0.0026	2.64
Berahmpur	3	2370	1000		2.64
Aska	3	1550	900		2.37
Bhanjanagar	3	25000	1034		2.73
Raygada	3	6609	900		2.37
Jeypore	4	16460	1000		2.64
Total	**19**	**57869**	**5834**		**15.40**

7.1.4 Establishment of Meter Testing Lab:

As per the clause no. 102 (d) of OERC Supply code 2019 “The licensee/supplier shall set up appropriate number of accredited testing laboratories or utilize the services of other accredited testing laboratories. The licensee/supplier shall take immediate action to get the accreditations of their existing meter testing laboratories from NABL, if not already done”

Meter testing labs are existing in TPSODL at 3 locations (Behrampur, Aska and Jeypore) to cater to meter testing requirements. Presently, in 3 labs, 3 meter test benches are operational for testing of Single Phase and Three Phase meters. Key challenges in this testing processes are:

1. Existing 3 meter test benches are not fully functional for testing of meters in Labs.
2. Sufficient field testing equipment are not available with TPSODL to perform testing at site for EHT/HT and LTCT meters against statutory compliance and against consumer complaints of fast/slow meters.

The details of three test benches installed across 3 locations are as follows:

Sr. No.	Lab Name	Test Bench Details & Status
1	MRT Behrampur	a. MTE make: One Bench Single Phase 10 position bench (Pre 2000 Manufacturing Yr.)-Defunct

		b. Pyro Gyr. make: 2 Bench 10 position each (1995 Manufacturing Yr)
		c. Local Assembled : One 5 Position 3 Phase Bench (Pre 2000 Manufacturing Yr)
2	MRT Aska	Pyro Gyr make: 1Bench 10 position each
3	MRT Jeypore	Pyro Gyr make: 1 Bench 10 position each

Pyro Gyr Company ceased to exist in operation long ago. No standard spare parts of these benches are available through OEM or with TPSODL. Hence, these test benches are maintained by Lab staff, by purchasing spare parts from local manufacturers / intermittent arrangements for ensuring business continuity. This often disrupts the testing of meters on regular basis leading to high pendency of meter testing.

The infrastructure and equipment at Meter testing Labs at Behrampur, Aska and Jeypore locations (details mentioned at Sr. No 1, 2 & 3 in above table) are not in a condition that business continuity can be sustained in long term. In addition **NABL** accreditation as per clause no 102 of Supply code 2019 cannot be attained for these labs.

Meter testing group is responsible for performing the following testing activities on day to day basis:

1. Sample meters are to be tested in NABL accredited lab prior to installation, so as to ensure high quality of the meters. However, existing 7 benches are not fully functional to carry out tests as per NABL requirements due to aging.
2. As per Requirement of Statutory testing, meters installed at Grids, HT & LT customers needs to be tested in pre-defined time, based on voltage level, on which meter is serving. Officials have to undertake testing of these meters at site as per IS 15707, with calibrated standard meters, specific for defined voltage levels. In order to perform these testing, sufficient equipment are not available with TPSODL.

3. Consumer complaints regarding fast / slow meters after meter installation / during life cycle of meters need to be addressed by testing meters at site as per IS 15707. In order to perform these testing, sufficient equipment are not available with TPSODL.

   Hence there is requirement of new meter testing bench and details of CAPEX required is mentioned below.

   These labs will ensure the statutory requirement of meter testing across TPSODL.

REQUIREMENT OF METER TESTING BENCH	
Material	Qty. (No.)
SINGLE PHASE 20 POSITION BENCH	1
THREE PHASE 20 POSITION BENCH	1
SINGLE PHASE/ THREE PHASE PHANTOM LOAD TEST BENCH	3

Similarly requirement of testing equipment for LT & HT meters is given below:

REQUIREMENT FOR HT-LT METER TESTING EQUIPMENT	
Testing equipment	Qty. (No.)
LT meter- testing equipment(onsite testing)	20
HT meter- testing equipment(onsite testing)	6
HT-CTPT testing equipment	6
TRMS Value Measuring Multimeter With high Accuracy and High Insulation Class	20
TRMS Value Measuring Clamp on Meter With high Accuracy and High Insulation Class	20
CMRI with Bluetooth, Memory 500 MB	20
IR+PI Value Measurement in Step of 500V to 5kV (Megger)	20

7.1.5 CAPEX requirement for Statutory & Safety:

For FY 2021-22, TPSODL proposes capital expenditure of INR 61.37 Crores to ensure Safety and Statutory compliant network. Since the geography is vast and huge investment is required to make the network fully compliant to safety and statutory standards, and since this huge investment is not possible in a single year, TPSODL shall address network deficiencies at critical locations. Table below suggest the activities to be performed along with funds required under Statutory and Safety Head.

S. No.	Major Category	Activity	DPR Cost TPSODL(In Crores.)	Annexure
1	Statutory & Safety	PPEs,Safety & Testing Equipment	19.98	*Annexure 3*
		Cradle guard at major road crossings	8.53	*Annexure 4*
		Fencing of Distribution substations (DSS)	15.00	*Annexure 4*
		Boundary wall for Primary substations(PSS)	15.40	*Annexure 4*
		Establishment of Meter Testing Lab	2.47	*Annexure 5*
		Total (1)	**61.37**	

7.2 Loss Reduction:

During limited site inspections, energy meters were not found at consumer's premises which were energized under Saubhagya scheme, an initiative of GoI. Further, at number of places where energy meters are installed and available at site, the same are not functioning properly. The above issues are resulting into reduction in billing efficiency, high AT&C losses, increased provisional billing, defective bills, and increased consumer complaints leading to customer dissatisfaction. Errors in bills leads to non-payment of bills and thus hampers the collection efficiency.

Further, it is also observed that, meters are not installed on all Distribution Transformers leading to no energy accounting at DT level. As a result, it is not possible to determine the level of energy input and hence the AT&C losses at DT level. Energy accounting provides the means to identify areas of leakages, wastage and inefficient energy usage.

Therefore in this head, following activities are planned for execution:

- Replacement of burnt, Faulty and Electromechanical meters and installation at no Meter cases
- Installation of DT meters for Energy accounting
- Input Energy Monitoring System(ABT/AMR)
- LT bare to ABC Conversion

7.2.1. Input Energy Monitoring System (ABT/AMR)

Presently TPSODL as a distribution utility receives power from OPTCL at various voltage levels namely 220/132/33 kV. All the EHT consumers (including traction points of supply) who are in the geographical area of TPSODL have direct connection with the OPTCL grids, the billing is done by the TPSODL as they are consumers of the utility. All such EHT metering for these consumers (which is also the input energy into the DISCOM) for the purpose of billing is carried out at the OPTCL grid end with the metering system either commissioned by OPTCL or by the consumer.

All the 33kV feeders are metered at the grid level again by OPTCL which are the billing points for the export of the power and the DISCOM receives a monthly bill indicating the power exported into the DISCOM area. There is a real time data sharing of most of these points by OPTCL into TPSODL HO for real time viewing of the input energy into the DISCOM. The system helps in monitoring the actual demand vs the forecasting done for every 15 minutes demand on day ahead basis.

The system worked well and was acceptable when OPTCL and SOUTHCO were government entities. Now that TPSODL has stepped in, as a matter of prudent practice and to allow a fairly good chance to TPSODL to set up its own monitoring and efficient system. it is proposed to have an Input Energy Monitoring System (IEMS) which will cover all the exchange points from 220kV to 33kV where the power flows from OPTCL into TPSODL territory.

The proposed system envisages to install and commission ABT compliant meters at all the exchange points (currently around 90). These meters would use the same CT metering core which is used by OPTCL for their own metering & billing and if there is a spare CT metering core available then in consultation with OPTCL, we may use the spare core for IEMS. The project will be planned and executed in close co-ordination with OPTCL.

All the ABT meters would be connected on a common communication bus which will be linked to the central server at PSCC. The real time data will be made available to PSCC but in addition, the 15 minutes cumulative data, of each meter would be pushed in to the main server which then can be used for gainful analysis.

The IEMS will bring in lot of benefits in the long run. To illustrate few of them:

1. TPSODL is looking to get ready for its own PSCC from where all the tie points and the entire distribution network will be managed for efficient and safe operation on day to day basis. PSCC will be forecasting the 15-minute demand on day ahead basis as required under DSM settlement mechanism, which we expect to be enforced in Odisha in near future, and such IEMS system will not only help monitor the schedule v/s actual but it would also help take mid-course corrective action and prevent any penalties. IEMS will help mitigate financial losses to the DISCOM in the long run.

2. The DISCOM need to have its own monitoring system for energy input into the system to enable it to assess correct Distribution Loss levels. The IEMS will be the foundation stone for a good and effective Energy Audit system which TPSODL intends to put in place in its very first year.

3. IEMS will allow TPSODL to have a real time view of the entire network and once the required Energy Audit (EA) features get built into the network, like Smart Meters, AMR based feeder and DT meters etc, a very comprehensive and effective EA system will get implemented. Basis such system, corrective actions can be planned & implemented to ensure that technical and financial losses are minimized.

4. Currently the EHT consumers are billed using OPTCL meters. The consumers of TPSODL should be billed on the basis TPSODL metering system. With IEMS, this will be ensured.

5. The 15 minute data of all parameters of the power system will get captured by IEMS and the ownership of such data will then be truly that of TPSODL. The operations and demand management of TPSODL can be immensely improved basis the data mining and analysis. This will also benefit OPTCL and GENCOs in future to optimise their own planning.

6. From Audit point of view, IEMS will also serve the purpose of cross checking the input energy flow as measured & billed by OPTCL metering systems and if and when any difference arises, the same can be immediately acted upon.

7. We expect additional EHT consumers in TPSODL area in the future. Under the envisaged system of IEMS, the future growth in the DISCOM will get streamlined as far as consumer metering system is concerned and also every single new energy input

point will automatically be part of the growing IEMS and can be monitored immediately.

The CAPEX to cover all the existing points of input energy and creating a complete backbone with communication link is estimated to be around Rs 10.97 Crores which will be spent in year FY 2022. The benefits will start accruing immediately. The detailed cost estimate is mentioned in annexure 6.

Sub Category	Activity	DPR Cost (In Crore.)	Annexure
Input Energy Monitoring System (ABT/AMR)	Input Energy Monitoring System (ABT/AMR))	10.97	*Annexure 6*

7.2.2. Meter Replacement:

Proposed Initiatives for replacement of Defective/Mechanical / No Meter

To curb the loss level in TPSODL, it is proposed that in next three years all No Meter, Defective meters shall be replaced with Static Meters. In no meter or defective meter cases, it is estimated that service cable replacement would be required wherever found defective or missing and thus certain percentage of service cable is also considered in plan. For installation of Meters, Meter boxes will also be required to protect the meters from energy theft and environmental hazards.

In FY 21-22, it is planned to replace around 3.86 Lacs faulty meters which are directly contributing to the losses.

Following table enumerates the requirements of meters along with its supply cost and installation cost which are considered for replacement in next 3 years for as loss reduction in different categories of meters.

Type of meter	Reason for replacement	Qty. - (No.)	Total Cost (In Crores) Supply + Installation
Single Phase meters	No Meters	2,129	43.27
	Old Defective Meters***	3,00,000	
	New Defective Expected	77,589	

	Electromechanical Meter	0	
Three Phase Whole Current meters	No Meters	0	1.62
	Defective Meters	4,808	
	New Defective Expected	230	
	Electromechanical Meter	0	
Three Phase LT CT meters	No Meters	0	0.08
	Defective Meters	66	
	New Defective Expected	5	
	Electromechanical Meter	0	
Three Phase HT CT meters(11kV/110V)	No Meters	0	8.89
	Defective Meters	1,422	
	New Defective Expected	15	
	Electromechanical Meter	0	
Three Phase HT CT meters(33kV/110V)	No Meters	0	0.44
	Defective Meters	35	
	New Defective Expected	2	
	Electromechanical Meter	0	
Grand Total		**3,86,301**	**54.29**

**As on date M/s Linkwell is replacing the defective meters under OPTCL/PMU/DDIP/LOA/1-PH METER/LINKWELL/64/2018/2511 dated 12.10.2018. As per GoO Order PT3-ENG-EL-RGGVY-0026-2014/7782 dated 04-09-2020 and PT1-ENG-EL-IPDS-0001-2016/9120 dated 15-10-2020,this project shall be closed by 31st March'21. Under these conditions, around THREE lakhs meters will remain unchanged and will have a big hit on our AT&C targets. Hence an additional Capex for Rs 34.20 Cr is proposed for FY22 for replacing these balance three lakhs meters. As an alternative, M/s Linkwell may please be allowed to extend the deadline of this project for another 12 months, i.e. Mar'22. As on date the replacement capacity of M/s Linkwell is 800-1000 meters per day due to vast geographical area and difficult terrains.

Service Cable Requirement:

In "no meter" and "defective meter" cases, it is expected that in majority of cases will be there in which cable replacement will be required on account of defective or poor condition of cable:

It is pertinent to mention here that armoured service cable will be used as they are more robust and their failure rate is less as compared to unarmoured cable.

REQUIREMENT OF SERVICE CABLES 21-22		
Cable Size (Sq mm)	**Required Qty. (in Mtr)**	**AMOUNT (in Crore.)**
2*4	7,11,356	4.60

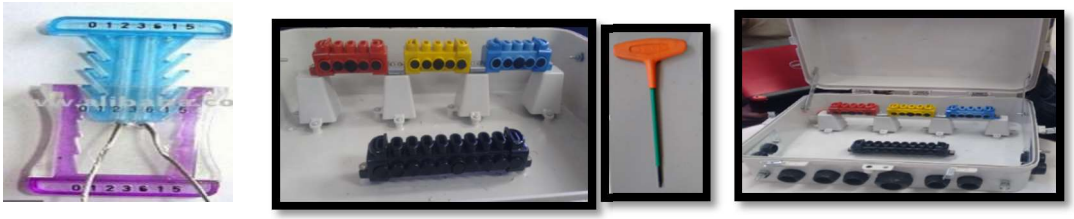
2*10	1,77,839	1.52
4*10	52,899	0.55
4*25	746	0.01
4*95	15,089	0.70
4*150	389	0.03
Grand Total	**9,58,317**	**7.41**

Metering Accessories requirements:

Modem and Polycarbonate seals are required to ensure communication of right revenue meter to maintain the uniqueness in seals, embossed and laser printed nos will be used on poly carbonate seals. In addition, separate colour seals will be used in different circles to ensure seals are not misused in other geographical area. Further, manufacturer specific identification marks will be provided to identify duplicate seals.

In future, we are going to introduce talk back seals which have special composition of material, which cannot be duplicated. The genuineness of the seal can be identified by using a scanner provided by manufacturer.

Accessories	Qty. (No.)	Total Cost (In Crore)
Poly carbonate seals	14,31,503	0.77
Modem	1,000	0.50
Total In Crores		1.27



Seal, Terminal, Polycarbonate Box

7.2.3. LT Bare Line to ABC conversion:

In TPSODL, LT network plays important role of the Power supply distribution system and spread across TPSODL licensed area for power distribution. The bare overhead used is more prone to transient fault due to tree branch touching or any foreign particle fall on the line. Due to this, consumer's experiences frequent fault however, this can be reduced by structured maintenance. Moreover, Bare conductor is easier to maintain and faster to restore during any fault but at the same time, it requires more clearances. These bare conductor lines are more subject to electricity theft through direct hooking and thus causing revenue leakage in the system.

Although, LT AB cables exists in the system and constitute approx. 70% of the total LT network across TPSODL.

To improve the safety factor, minimize the safety accident risk, reduce the chances of fault & strengthen existing 415V network, it is suggested for replacement of overhead bare conductors with new aerial bundled cables. This in turn will help in providing reliable power supply for all consumers & stakeholders.

Moreover, during the survey, it is observed that LT bare conductor are more prone to hooking result into direct theft of the electricity. To avoid direct hooking, it is proposed to convert LT OH bare conductor into LT AB cable. This will help in eliminating the direct theft and thus protecting the revenue leakage.

The same resulted in reduced direct 'hooking' done on bare LT conductor lines thereby reducing commercial losses drastically in theft prone areas. LT Bare Line to ABC conversion would encompass following scope:

1. LT Bare shall be replaced with LT ABC.
2. Erection of mid span pole.
3. Earthing of every 5th Pole and poles which are installed across the road.
4. Erection of Mid span pole wherever the span length is more than 40 Mtrs to reduce the Sag.
5. Installation of Distribution Box and removing of jumbling of service line cables

Benefit to customer:

By executing the proposals as made in this head, 415V network can be strengthened and we would be able to serve our consumers in much better way. Following benefits are envisaged from this investment:

1. Reliable Power supply to the Consumers since bare conductor will get converted into insulated cable.
2. Comparatively safer than the LT Bare conductor and eliminate the element of risk if comes in close proximity.
3. Simpler installation, as crossbars and insulators are not required.
4. Suitable for congested lanes as well.
5. Electricity theft is becomes hard as hooking would not be possible.
6. Less required maintenance and necessary inspections of lines.

To summarize, TPSODL proposes capital expenditure of 90.93 Crores for Loss reduction. Detailed estimate is attached in Annexure 6.

7.2.4. Demand Side Management Initiative

Institute for Sustainable Communities (ISC) along with Energy Efficiency Service Limited (PSU under the Ministry of power) is planning of implement a utility based demand side management (DSM) Program or Upfront Payment model for the benefit consumers of Odisha. The overall aim of the program is to accelerate adoption of energy efficient technologies resulting into reduction in energy consumption and GHG emission reduction.

The consumers of the participating DISCOM shall be able to procure energy efficient motors superefficient AC and energy efficient fans and avail associated financial benefits of various National Scheme and flagship program of EESL. The project envisages for mass scale replication of energy efficiency measures in consumer premises with due regulatory approval which shall also help the DISCOM in implementation of better Demand Side Management and anti-reduction in T&D Loss

The proposed DSM program includes effective management of electricity deficit, and shall be able to address the rising power supply costs, energy subsidies, climate change,

environmental degradation and energy security concerns. All the upfront and initial investment for implementation of the project shall be made by EESL and same shall be recovered from the participating consumers in periods of 3 to 5 years' time and DISCOM of Odisha shall be beneficiary of the project and will have financial benefit by way reduction of T & D Loss, Deemed Bulk supply Price Saving better demand side management and additional incentive from Hon'ble OERC based on the provision of OERC Demand Side Management Regulations.

Utility Base Demand Side Management

Demand Side Management (DSM) is the selection, planning, and implementation of measures intended to have an influence on the demand or customer-side of electric meter, DSM program can be reduce energy costs of utility, and in the long term, it can limit the requirement for further generation capacity augmentation and strengthening of transmission and distribution system.

Demand Side Management involves steps taken by the customer on their meter to change and regulate the amount or timing of energy consumption. Power Supply utilities offer a variety of measures that can reduce energy consumption and consumer energy expenses. To mitigate the acute shortage of power in the country, utility are faced with the challenge to enhance end-use efficiency and manage the power demand of the country for sustainable and environmental friendly development due to which DSM has gained importance and a key enabler for DISCOM for their commercial viability.

DSM Objective

- Improve the efficiency of energy system.
- Reduce financial needs to build new energy facilities (Generation).
- Minimize adverse environmental impacts.
- Lower the cost of delivered energy to consumers
- Reduce power shortage and power cut.
- Improve the reliability and quality of power supply.

Sr No.	Particulars	Unit	Quantity
1	Super Energy Efficient Fans	Nos	118136
2	Super Efficient Air Conditioners	Nos	11814
3	Premium Efficiency Electric Motor	Nos	2476
4	Total Reduction in the Demand due to Utility based DSM Program	MW	14.91
5	Annual Energy Savings due to Utility based DSM Program	MU	36.53
6	Total Investment of Utility based DSM Program	Crore Rs	102.24
7	Financial Saving for the consumer	Crore Rs	17.24
8	Financial Saving for Discom	Crore Rs	1.545

Cost Estimate for Demand Side Management

Sr No.	Particulars	Unit	Quantity	Unit Cost (Rs) In Crore.	Total Cost (Rs.) In Crore.
1	Super Energy Efficient Fans	Nos	15235	1800	27423000
2	Super Efficient Air Conditioners	Nos	500	39990	19995000
3	Premium Efficiency Electric Motor	Nos	550	4702.5	2586375
Total					**5.00**

7.2.5. CAPEX requirement for AT&C Loss Reduction

S. No.	Major Category	Activity	DPR Cost (In Crores.)	Annexure
2	Loss Reduction	Input Energy Monitoring System (ABT/AMR) -IEMS	10.97	*Annexure 6*
		Replacement of burnt, Faulty and Electromechanical meters and meter installation at no Meter cases	62.98	*Annexure 6*

		LT Bare to ABC conversion	11.98	*Annexure 6*
		Demand Side Management	5.00	*Annexure 6*
		Total (2)	**90.93**	

7.3 Network Reliability

TPSODL have a large number of long overhead feeders. The present power distribution network is in bad condition resulting into frequent tripping's and as a result consumers are not getting reliable and quality power supply. There are total 224 numbers of 33/11kV Primary Substations.

Table below shows tripping occurred in 1st six months of FY 20-21 and its comparison with the 1st and last six months period of FY 19-20. From the below table it is clear that Tripping in first six months of FY 19-20 were 493 numbers whereas the number of tripping's in the same period of FY 20-21 were 1398 which is increased drastically. The number of tripping's are extremely high when compared to best in class utilities.

Category of Feeder	**First six months of the previous year**		**Last six months of the previous year**		**First six months of the current year**	
	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping	No. of tripping	Duration of tripping
	No.	Min	No.	Min	No.	Min
ALL 33 kV Incoming Feeders	493	9124	1002	21456	1398	32717
ALL 11 kV outgoing Feeders	104163	2087232	88793	2033722	137416	3492075

TPSODL intends to implement the following actions to improve the reliability of power supply

- Identification and replacement of faulty / sick equipment causing frequent trippings.
- Introduction of technology to ensure faster restoration of supply in case of any tripping.

S.NO	CIRCLE	NAME OF THE DIVISION	Total no of interruptions each longer than 5 Min in the feeder (Ai)	Connected load of the feeder in KW (Ni)	Total Duration of interruption in the feeder in minute (Bi)	Total Number of interruptions each lesser than 5 minutes in the feeder (Ci)
1	City circle	BED-I, BERHAMPUR	3558	84278	100623	1798
		BED-II, BERHAMPUR	329	140769	5188	285
		BED-III, BERHAMPUR	2000	62228	18780	2842
2	Berhampur Electrical Circle	GNED , CHATRAPUR	11756	70862	327010	3118
		PSED , Purushuttampur	2990	73467	105026	2337
		HED, Hinjili	3321	21628	98078	1793
3	Aska Circle	GSED, Digapahandi	4883	80037	305244	1148
		AED-I, Aska	10309	51775	272895	3139
		AED-II, Aska	13167	38860	167876	4321
4	Bhanjanagar Electrical Circle	BNED, BHANJANAGAR	3748	95883	153047	1294
		PED, PHULBANI	9686	46130	371923	12142
		BOED, BOUDH	2802	52039	117606	1238
5	Rayagada Electrical Circle	RED, RAYAGADA	3342	57110	189862	2584
		GED, GUNUPUR	8785	38251	357906	6140
		PKED, PARALAKHEMUNDI	4522	55081	188070	1619
6	Jeypore electrical Circle	JED , JEYPORE	3050	50266	161726	1798
		KED, KORAPUT	5832	47187	88816	3167
		NED, NAWARANGAPUR	14486	113078	385064	8512
		MED, MALKANGIRI	16523	141961	706214	8592
GRAND TOTAL			**125089**	**1320888**	**4120954**	**67867**

Similarly at 11kV level also, as per past year's (FY19-20) data, lot of tripping have been observed causing interruption in power supply to the end consumers. Circle wise and Division wise momentary and sustained tripping's are given in the table below:

Faults on overhead lines fall into following two categories:

1. Momentary (Less than 5 minutes duration)
2. Sustained. (More than 5 minutes duration)

Most faults that occur on overhead lines are transient faults caused by lightning and tree branches touching the live line conductor. The transient fault caused by lightning results in damage to insulators if lightning arresters are not provided or not working. Transient faults caused by tree branches interfering with line conductor are removed immediately by operation of a protection relay.

Regular inspection of feeders followed by tree trimming regularly helps to minimize transient faults and in most cases trial recloser are found to be successful in feeder with higher transient fault. However each time the feeders are tripped due to transient fault, all customers connected to the feeder experience outage. Utilities at times finds it difficult to identify the exact reason of the fault. In a long distribution feeder with many unprotected branches, it becomes difficult to identify the faulty and healthy sections of the feeder. TPSODL intends to use auto reclosers, sectionalizers, and fault passage indicators to improve the reliability of overhead feeders. Apart from installing the above stated equipment, it is also planned to introduce AB switches at 33kV & 11kV long feeders so as to sectionalize at the appropriate location for any planned / unplanned shutdown thereby reducing the no. of affected consumers.

As discussed earlier, most of the LT feeders emanating from 11/0.415/0.230kV distribution substations don't have protection and control as a result, fault in any one LT circuit is likely to affect the supply of all customers connected on the same DT. Same is true with maintenance outages. To overcome this situation, TPSODL is planning to provide circuit breakers on LT feeders for control and protection of the feeder. Various initiatives proposed to improve the reliability of power supply in 11kV and downstream network are given below

i. 33 kV &11 kV Network refurbishment to ensure Horizontal / Vertical clearances and as per Load flow distribution planning done by GRIDCO.

ii. Primary Substation(PSS) Distribution Substation (DSS) Refurbishment.

iii. Installation of Auto Reclosure & Sectionalizers in important and critical feeders.

iv. Installation of Communicable overhead FPIs for faster identification of faults.

v. Installation of LV protection at Distribution substation to arrest the LT faults at LT level itself instead escalating to the 11kV feeder level.

vi. Replacement of Battery & Battery Charger to strengthen the DC protection system in 33/11kV Grid Substations.

vii. Installation of AB switches at 33kV & 11kV lengthy feeders for improving Reliability during planned / unplanned outages.

viii. Proposal for Trolley mounted pad substations.

ix. Proposal for Package substations.

7.3.1 33 kV & 11 kV Network Refurbishment:

33kV or 11kV feeders are important asset for a distribution utility which connects various substations and provide power to end consumers. TPSODL has nearly 3636 Ckt.KMs of 33kV and 40487 Ckt.KMs of 11kV feeders under its operational area. Besides, nearly 36637 Ckt.KMs of LT feeders provides power to the end customers out of which nearly 9600 Ckt.KMs of LT network is overhead.

Proper upkeep of the feeders is important for ensuring safety and reliability of power supply. During site visits, it was observed that most of the 33kV / 11kV / LV lines are in very poor condition and pose safety threat to the human beings and animals. Most of the feeders have binding wire / multiple joints. As a result there are chances of snapping of conductors and subsequent electrocution of human beings or animals since cradle guards are not provided. Due to scarcity of staff and materials, there is no structured maintenance program. Tree branches / creepers are interfering with live conductor at many locations. Huge number of tripping's are reported on 33 and 11kV feeders in previous years. With poor condition of network and absence of maintenance program, it is difficult for utility to ensure delivery of reliable and quality power supply to the end users. During site visits, it has been observed that conductor of different sizes are used in different phases which restricts the circuit

capacity limiting to the lowest size of the conductor used in the circuit. Moreover, over sagged wires in 33kV or 11kV feeders are posing major threat to the lives of human beings and animals. At some places, due to re-construction/ widening of roads, vertical clearances of the feeders have reduced to the dangerous level. This is not only causing violation of statutory guidelines but also enhancing chances of fatal accidents.

To ensure safety of equipment and human beings / animals, refurbishment of 33kV, 11kV and LV lines is urgently required in phase manner starting from critical area where movement of public / animals is high. Refurbishment job would encompass following scope.

1. Straightening of tilted poles.
2. Replacement of damaged poles, insulators and accessories.
3. Earthing of every 5th Pole and poles which are installed across the road.
4. Erection of Mid span pole wherever the span length is more than 50 Mtrs to reduce the Sag.
5. Restringing of conductor to increase the vertical clearance by reducing the sag.
6. Replacement of the conductor in the sections having multiple joints.
7. Installation of cradle guard wire in the feeder crossing the roads. While installing the cradle guard wire, pole across the road shall be converted into double pole structure to increase the height and provide mechanical support to the section. All conductor in the section crossing the road shall be replaced if found to have even single joint.
8. Replacement of weak Jumpers and connections.
9. Replacement of binding wire joints with wedge connector to remove hotspots.
10. Installation of Danger boards, Anti climbing devices, stay sets etc. to ensure safety & statutory compliance.

7.3.2 Refurbishment of Primary Substations (PSS)

The Power distribution network & its equipment health is a critical factor for ensuring reliable & quality power supply to the end consumers. Although field teams are committed to upkeep the equipment by doing preventive maintenance, but still some of the equipment gets faulty and may result into pre-mature failure due to frequent tripping.

Pre-mature failure of the equipment results into long duration outage as it becomes difficult to restore the power supply if it happens during odd hours or if spare equipment is not available in the inventory. Hence, to ensure highest reliability, all equipment needs to operate properly at all the time.

To strengthen the existing network, it is suggested to replace the sick equipment in the existing network. Further, this replacement will help in utilization of the resource to the optimum level, managing the load in case of any exigency and mitigate the issue of overloading etc.

Budget is proposed for Sick equipment replacement to improve reliability of Power supply for which detailed cost estimate is attached in annexure No. 8.Also, to ensure better operation & control of the network & faster restoration of supply in case of interruptions.

1. Replacement of the sick equipment (VCB,CT/PT,CRP,Isolator,etc) in PSS.
2. Replacement / provision of AB switches.
3. Provision of new / additional earthing as per site requirement.
4. Carry out civil works as per site requirement.
5. Replacement of damaged support structure at PSS. This includes MS / GI structure, channels etc. Dismantling of existing structure and erection of new structure at same location has been considered in scope of the work.
6. Replacement of Battery and Charger.
7. Replacement of all undersize bus bars with standard size to remove hotspot.
8. Carry out civil works as per site requirement.
9. Detailed technical inspection and testing of the equipment.

Battery & Battery Charger:

During the field visits, it is learnt that some of the Battery and Battery charges are not operational and needs immediate replacement. Replacement of Battery & Battery

Charger is essential to strengthen the DC protection system in 33/11kV Grid Substations to improve reliability. Installation of Battery & Battery charges have been proposed to strengthen the DC system in the 33/11kV Grid Substations. In this year, 50 sets of Battery & Battery chargers are proposed to be replaced.

7.3.3 Refurbishment of Distribution Substation (DSS):

Distribution Substation (DSS) comprises of various equipment which perform specific task to ensure delivery of power supply at appropriate voltage to the end consumers. Main components are 11 kV Switching device, 11 kV Protection, Distribution Transformer, LV Protection, Earthing, fencing and O/G LV feeders. The most expensive equipment in the DSS is Distribution Transformer and its life depends upon healthy condition of all other components be it LV Protection, HV Protection, Earthing or fencing. The age of Distribution Transformer can be enhanced by ensuring healthiness of all other components. Generally, in power distribution utility, most of the transformers are either approaching or have outlived their operational life. TPSODL, however, is of opinion that replacement of power distribution equipment merely on the basis of ageing is not advisable and other factors such as health of the assets & their associated components, loading conditions, and other operational criticalities also needs to be considered. The above exercise is necessary as replacement of equipment is capital intensive and has direct impact on tariff.

In our preliminary site visits, it is observed that existing DSS are in shabby condition with damaged or ill-maintained HT & LT protection equipment. All connections at pole mounted or plinth mounted substations are in very bad condition which not only cause high technical loss but also give rise to undue interruptions. The Aluminium lug / sockets used in DTs and other equipment in the substations are observed to be of inadequate size and proper crimping of lugs with the help of crimping tools found missing at almost all places. This is resulting into generation of hotspots and failure of connections.

At all location, fuse cut-out arrangement found with oversize fuse wire. Most of the fuse cut-outs are installed at a lower height accessible to general public and animals thus creating safety hazard. Analysis of distribution transformer's failure data for the last few years also suggest that effective HV & LV protection might have reduced the transformer failure. For example, if there is no effective protection on LV side and any fault occur on the load side, the fault current will pass through the transformer for a longer duration till such time the fault

is isolated by upstream network. Since the magnitude of the fault current is high, it is likely to produce mechanical and thermal stresses in the transformer causing pre-mature failure of the transformer.

During the survey, it is observed that boundary walls and fencing are either damaged or do not exists thus poses safety threat to stray animal and public at large. At many of the places it was found that the condition of the Fencing of DSS and Boundary wall for PSS was in a very bad condition.

Ensuring safety of People & equipment is very much needed for safe operation. Hence it is proposed for Construction of fencing for DSS & Boundary wall of PSS wherever required. Refurbishment/Life Enhancement of DSS helps in addressing the above mentioned issues, improve the reliability of power system and above all ensures safety. TPSODL proposes for activities under Refurbishment of Distribution Substation:

- Detailed technical inspection and testing of the equipment.
- Replacement of damaged support structure at DSS. This includes MS / GI structure, channels etc. Dismantling of existing structure and erection of new structure at same location has been considered in scope of the work.
- Installation of palm connectors at HT and LT side of Distribution Transformers and ensuring that all connections are through palm connectors.
- Replacement of all undersize conductors with standard size to remove hotspot.
- Replacement / provision of AB switch, DD Fuse units, LT ACB or MCCB (depending on Transformer ratings) and all associated cables / conductors.
- Provision of new / additional earthing in all DSS as per site requirement.
- Installation of fencing to safeguard the DSS equipment and to maintain safety clearances.
- Installation of danger boards, anti-climbing devices, stay-sets etc. to ensure safety & statutory compliance.
- Carry out civil works as per site requirement.

7.3.4 Installation of Auto reclosure / Sectionalizers, FPI, RMU and AB switches :Auto-reclosures, Sectionalizers, RMU and AB switches:

Auto-reclosures are very efficient in minimizing outages from transient faults on overhead feeders. When installed along with Sectionalizers, they can isolate the faulty sections of the feeder while re- energizing the rest of the feeders. In case of very long circuits, the sectionalizers can also be connected in series.

TPSODL currently has a large number of very long overhead feeders. Moreover, it is observed that multiple 11kV feeders are controlled through single 11kV breaker or AB switch in some primary substation. Fault in any 11kV feeder or maintenance activity in 11kV breaker at primary substation affects the supply of consumers connected on all 11kV feeders controlled from that breaker. In order to improve reliability of power supply at such substations, installation of auto-recloser, sectionalizers and Ring Main Units (RMU) is being proposed in phase manner. In first year a total of 12 numbers of autoreclosers and 36 numbers of sectionaliser have been proposed for installation.

TPSODL is also planning to install 18 numbers of RMUs to improve reliability .AB switches are proposed at lengthy 33kV & 11kV Feeders to have provision of isolation of section during any planned / unplanned outages. This will help in improving the reliability since currently entire feeder is forced tripped for such outages.

Fault Passage Indicator (FPIs): Installation of overhead Fault Passage Indicators (O/H FPIs) is proposed for faster identification and restoration of faults on long 11kV feeders with multiple sections. In first year, 200 sets of communicable FPIs are proposed for installation on pilot basis.

S.No.	Description	UOM	Priority based requirement (Nos.)	Quantity Considered in 1st Phase (Nos.)	Amount in Crore
1	Supply and Installation of Auto-reclosers	EA	163	12	2.04
2	Supply and Installation of Sectionalisers	EA	260	36	3.09

3	Supply and Installation of FPIs	SET	New product Introduced	200	1.34
4	Supply and Installation of 3 Way RMUs	EA	102	21	2.26
5	Installation of AB Switch on 33KV Feeders	EA	494	70	2.23
6	Installation of AB Switch on 11KV Feeders	EA	2788	180	5.00
Total					**15.96**

Circle	Auto-recloser	Sectionalizer	FPI	RMU	33 kV AB Switches	11 kV AB Switches
CITY CIRCLE	3	9	40	6	12	30
BERHAMPUR CIRCLE	3	9	40	3	12	30
ASKA CIRCLE	2	6	30	3	12	30
BHANJANAGAR CIRCLE	2	6	30	3	12	30
RAYAGADA CIRCLE	1	3	30	3	11	30
JEYPORE CIRCLE	1	3	30	3	11	30
Total	**12**	**36**	**200**	**21**	**70**	**180**

Benefits

FPI - Benefits

1. Easy fault identification.
2. Easy to install, even on live network.
3. Detects both short circuit and low current earth faults.
4. Indicates both permanent and transient faults.
5. Highly visible red flash light.
6. Reduction in supply restoration time by 1-2 hrs.
7. Reduction in unserved Energy
8. Enhancing customer satisfaction

Auto-Recloser and Sectionaliser-Benefits

Continuity of power supply for the consumers resulting in less complaints from citizens.

1. Reduce the time of power supply disconnection in cases of transient faults.
2. Reduce the unsold energy due to faults.
3. Reduce the cost of manpower operating in managing disconnected lines.
4. Maximum utilization of the network components.
5. Event Log and Remote control.
6. Reduce cost of fault finding.

RMU- Benefits:

1. The major advantage of Ring Main Units is the safety they provide to the operators. Like the operation of switching devices with interlocking system requires less knowledge and effort.
2. Working with IEDs allows remote operation. SCADA implementation is easy with smart Ring main units.
3. The space occupied by RMUs is less as they are Gas Insulated Switchgear.
4. The time taken for installation and commissioning of RMUs is very less. RMUs require less maintenance.
5. Beautification in the network

AB Switch - Benefits:

1. The major advantage of installing AB switches in 33kV and 11kV feeders is that field engineers would have flexibility to isolate the section locally instead of switching off entire feeder.
2. In case of any tripping, maintenance engineer can isolate the faulty section and restore the supply of remaining consumers thereby improving the reliability.

7.3.5. Installation of LV protection at DSS

During site visit it was observed that there are no LT Protection at DT secondary side so any fault occurred during in LT shifts to 11kV System due to which 11kV feeders trips most

of the time. The Tripping on 11kV feeders has impact of SAIFI and SAIDI and more and more consumers are being effected by the fault, which in turn reduces the reliability of the system.

In order to reduce the effect of LT fault on 11kV System, it is recommended to install the MCCB on Pole Mounting substation for 100 kVA and 250 KVA Distribution Substations and ACB on 500 KVA Substations.

S.No.	Description	UOM	priority based LT Protection requirement in DSS (Nos.)	Quantity Considered in 1st Phase (Nos.)	Amount (in Crores)
1	Supply and Installation of MCCB-100 KVA	EA	3282	500	3.33
2	Supply and Installation of MCCB-250 KVA	EA		400	4.17
3	Supply and Installation of ACB-500 KVA	EA		140	2.59
Total			3282	**1040**	**10.09**

Need of the Project

During site visit it was observed that there are no LT Protection at DT end so any fault occurred during in LT shifts to 11kV System due to which 11kV feeders trips most of the time. The Tripping on 11kV feeders has impact of SAIFI and SAIDI and more and more consumers are being effected by the fault, which in turn reduces the reliability of the system.

Recommendation:

In order to reduce the effect of LT fault on 11kV System, it is recommended to install the MCCB on Pole Mounting substation at 100 kVA and 250 KVA Distribution Substations and ACB on 500 KVA Substations

7.3.6. Proposal for Trolley Mounted Pad Substation and Package Distribution Substations:

Trolley Mounted Pad Substation

In case of Refurbishment of a DSS or Distribution Transformer failure, about 10-12 hrs. are required to complete the total job of DSS refurbishment or change of DT for which the supply remains off for whole durations leads to customer dissatisfaction and loss of revenue.

Mobile trolley mounted Pad substations can rapidly restore electrical service. Compact and easy mobility for emergency Service, forced outage repairs, temporary service restoration and regularly scheduled maintenance. Mobile substations are designed to withstand the road travel requirements and maximum stability and protection for safe movement over uneven pavement.

Supply interruption for this considerable amount of time leads to customer dissatisfaction apart from loss of MUs that would have been consumed.

Inclusion of some Trolley mounted Pad substations will lead to:

Flexible and faster temporary restoration-Total time for restoration is equal to that required to move the trolley at the location and to connect the HT and LT jumpers

In this proposal, TPSODL intends to procure 6 Nos. 630 kVA new trolley mounted Pad Substations on priority basis.

In this scheme, TPSODL proposes use of trolley mounted Pad substations to make the process of immediate power restoration at the time of natural calamities like storms and cyclones more flexible.

1. This will reduce the restoration time, apart from lowering the requirement of man-hours.
2. Faster power restoration at time of DT failure
3. Public Safety
4. Lesser Road Congestion

Package Distribution Substation

The package substation is a combination of Ring Main unit, Transformer and Low-Voltage panel.

These substations are used for effective electrical power distribution.

The fully equipped package substation comprises of outdoor duty enclosure, medium voltage switchgear, distribution transformer, low voltage panel which is a state of art equipment for all power distribution requirements. The assembled self-contained package substation is a complete weather proof solution. It only requires to connect incoming and outgoing cables and hence the site work involved is an absolute minimum.

In this scheme, TPSODL proposes use of Package Distribution Transformers and following are the benefits

1. Public Safety.
2. Mitigation of space constraint cases where DTs are not being installed due to unavailability of space for installation of equipment although DTs are overloaded may be resulting into failure.
3. Improve Reliability as RMU included in the Package Substation.
4. LT protection as LT switchgear included in the Package Substation.
5. Easy to install and takes lesser time and complete weather proof solution.
6. Lesser Road Congestion in congested overcrowded area like city, town, public places.
7. New Technology to be introduced on pilot basis.

Detailed cost estimate attached in Annexure 11.

7.3.7. CAPEX requirement for Network Reliability

S. No.	Major Category	Activity	DPR Cost (In Crores.)	Annexure
3	Reliability	33 KV Network refurbishment	10.08	*Annexure 7*
		Installation of 33 KV AB Switch	2.23	*Annexure 9*

		PSS Refurbishment	12.17	*Annexure 8*
		11 KV Network refurbishment	11.16	*Annexure 7*
		Installation of 11 KV AB Switch	5.00	*Annexure 9*
		DSS Refurbishment	10.00	*Annexure 8*
		Installation of LV protection at DSS	10.09	*Annexure 10*
		Installation of Auto reclosure / Sectionalizers , RMUs & FPIs	8.72	*Annexure 9*
		Trolley Mounted Pad Substations	1.31	*Annexure 11*
		Package Distribution Substations	1.64	*Annexure 11*
		Total (3)	**72.41**	

7.4 Load Growth

Every year DISCOM have to release applied new connection and in this FY 20-21 till September 73884 Nos. of new connections are released. In order to meet this load growth, both network infrastructure needs to be extended, strengthened or augmented and new energy meters to be installed to release the new connection. Some of the connections can be released from the existing network and some may require augmentation/addition/extension before release of new connection.

The following tables represent the data for consumer, consumption for previous year, first half of the current year and project figures for 2021-22.

PREVIOUS YEAR (2019-20)			**FIRST SIX MONTHS OF CURRENT YR (2020-21)**		
No of consumers as on 1st April of the Previous Year	Connected Load/Contract Demand (KW)	Consumption (MU)	No of consumers as on 1st April of the Current Year	Connected Load/Contract Demand (KW)	Consumption (MU)
2068557	2368412.4	2619.974	2279223	2646636.81	1393.836

CURRENT YEAR (PROJECTED) 2020-21			ENSUING YEAR (PROPOSED) (2021-22)			
Contract Demand (KW)	Consumption (MU)	Annual Percentage Rise (%)	No of consumers as on 1st April of the Ensuing Year	Connected Load/Contract Demand (KW)	Consumption (MU)	Annual Percentage Rise (%)
2796946.24	2804.814	7.06%	2569254	2978380.93	3042.844	8%

Below table shows the details of upgradation/new installation of assets done in previous as well as current year.

Sl.No	Subject	Unit	Previous Yr.	Current Yr.(H1)
			19-20	20-21
A. LT Less Transformers(HVDS)				
I	Installation of LT less transformers	Nos	415	26
B. Re-conductoring				
I	33 kV	Ckt.Kms	38.81	22.75
Ii	11 kV	Ckt.Kms	72.12	117.23
Iii	LT	Ckt.Kms	89.2	35.96
C. Up gradation of transformers				
I	33/11 kV	Nos	21	13
Ii	33/0.4 kV	Nos	0	0
Iii	11/0.4 kV	Nos	120	16
D. Installation of new transformers				
I	33/11 kV	Nos	0	1
Ii	33/0.4 kV	Nos	0	0
Iii	11/0.4 kV	Nos	254	302

Failure of Transformer (Nos.)					
Transformer Type	FY16-17	FY17-18	FY18-19	FY19-20	H1,FY20-21
Power Transformers (HT)	18	-	7	5	4
Distribution Transformers	1654	1550	1656	1425	814

Hence for carrying out network extension/ augmentation/addition, we propose expenditure under this head to consider load growth, network extension / augmentation / addition is expected to be carried out to cater the new demand.

Benefit to customer: Better the availability of materials, faster will be process of providing new connection hence more will be the customer satisfaction.

7.4.1. Addition/ Augmentation of 33kV& 11Kv line, Power Transformers & DT

Addition/ Augmentation of 11kV new line, link line:

During site survey it is observed that most of 33/11kV Primary Sub-Stations are having single incoming 33kV source. With failure of single existing 33kV source entire 33/11kV PSS gets shutdown thereby causing shutdown to all the downstream 11kV & LT network consumers.

It is also observed that HT consumers on 33kV and 11kV are being fed through tapping point instead of a dedicated feeders. There are multiple HT consumers source also mixed with incoming source of 33/11kV PSS. In case of technical fault at one of the HT consumer leads to tripping of incoming source and other connected HT consumer.

To overcome this issue it is proposed to study to establish link line from alternative available source.

At present 11kV feeders are radial and do not have ring connectivity with another 11kV feeder as per N-1 philosophy. It is proposed to study ring connectivity between nearest 11kV feeder in the vicinity and adjacent PSS 11kV feeders like Hospitals, town, commercial and key government establishments.

Addition/ Augmentation of Power Transformers

To cater the increasing load demand, PTR augmentation is required to avoid any overloading and N-1 fail situations. Also to ensure reliable power supply to our consumers, PTRs has to be kept at optimum loading so as to avoid any mechanical stress on the transformers due to overloading.

To avoid any overloading issues especially in urban areas where the load growth is high, it is required to augment some of the power transformers in city area which may get overloaded considering load growth for the next two years. It will give benefit to consumers as follows:

1. Reliable power supply by ensuring N-1 reliability at PTR level.

2. Reduce over-burdening of existing PTRs thereby reducing power cuts.

7.4.2. Addition/ Augmentation of Distribution Transformer

To cater the increasing load demand, DT augmentation is required to avoid overloading of transformer leading to transformer failure and power interruptions. Also to ensure reliable power supply to our consumers, Distribution Transformers need to be kept at optimum loading so as to avoid any mechanical stress on the transformers due to overloading.

When a distribution transformer loading exceeds 80% of the rated capacity of the transformer, then it is considered to be “overloaded”.

To avoid these overloading issues especially in urban areas where the load growth is high, it is required to augment the capacity of the Distribution transformers so as to mitigate the overloading issue. It will provide benefit to consumers as follows:

1. Reliable power supply by reducing chances of fault in network, thereby reducing power interruptions
2. Reduce over-burdening of existing Distribution transformers thereby reducing power cuts.

In case of overloading of the Distribution Transformer, it not only hampers the power supply to the consumers but also may cause pre-mature failure of DT due to operating for long hours on overload condition. Thus to abide by the safe loading limits, augmentation of distribution transformers are proposed for locations, where loading is exceeding the rated value.

In this proposal, TPSODL intends to carry out Distribution Transformer’s augmentation for those DTs which are identified as overloaded at various locations. Total 100 nos. of Transformers are proposed for Augmentation to 315 KVA DTs are at different locations.

In this proposal, TPSODL intends to carry out PTR augmentation for those PTRs which are identified as overloaded at various locations. Total 04 nos PTR are proposed for Augmentation from 5 MVA to 8 MVA at different locations. Detailed Cost estimate is attached in annexure No. 12

S.No.	Description	UOM	Qty	Amount (in Crores)
1	Augmentation to 8 MVA Power Transformer	EA	4	4.41
2	Augmentation to 315 KVA Distribution Transformer	EA	100	9.92
3	Addition/Augmentation of 11 kV Overhead Line	CKT.KM	43	8.06
4	Addition/Augmentation LT ABC Line	CKT.KM	38	4.13
Total				**26.52**

7.4.3. Meter Installation for all new connection

Following table enumerates the requirement of the new energy meters and accessories which are envisaged against new connection in different load segments:

Meter Category	City Circle	Berhampur	Bhanjnagar	Aska Circle	Jeypore	Rayagada	TPSODL
Single Phase	7,453	2,727	3,682	2,041	4,082	4,656	24,641
Poly Phase	289	641	797	601	1,575	559	4,462
LTCT	34	23	24	26	31	17	155
HTCT - 11kV/110V	49	41	30	22	44	44	230
HTCT - 33kV/110V	5	5	5	5	5	5	30
Net Meter- Single Phase	4	4	3	3	3	3	20
Net Meter- Poly Phase	2	2	1	1	2	2	10
Net Meter – LTCT							-
Net Meter- HTCT							-
Grand total	**7,837**	**3,437**	**4,538**	**2,695**	**5,737**	**5,286**	**29,530**

For installation of Energy Meters suitable size of the service cable to extend the supply to the consumer premises has also been considered. Six different rating of service cable are considered in the plan according to the load demand and connection category.

Further, accessories like Modems & seals are required to extend the supply and to take energy readings from remote.

Detailed Cost estimate is attached in annexure No. 13.

7.4.4. CAPEX Summary for Network Load Growth

S. No.	Major Category	Activity	DPR Cost (In Crores.)	Annexure
4	Load Growth	Network augmentation / addition to meet load growth/11 KV line, PTR,DTR,LT line	26.52	*Annexure 12*
		Meter Installation for all new connection	12.71	*Annexure 13*
		Total (4)	**39.23**	

7.5 Technology & Civil Infrastructure

7.5.1. Existing Technology Legacy Landscape:

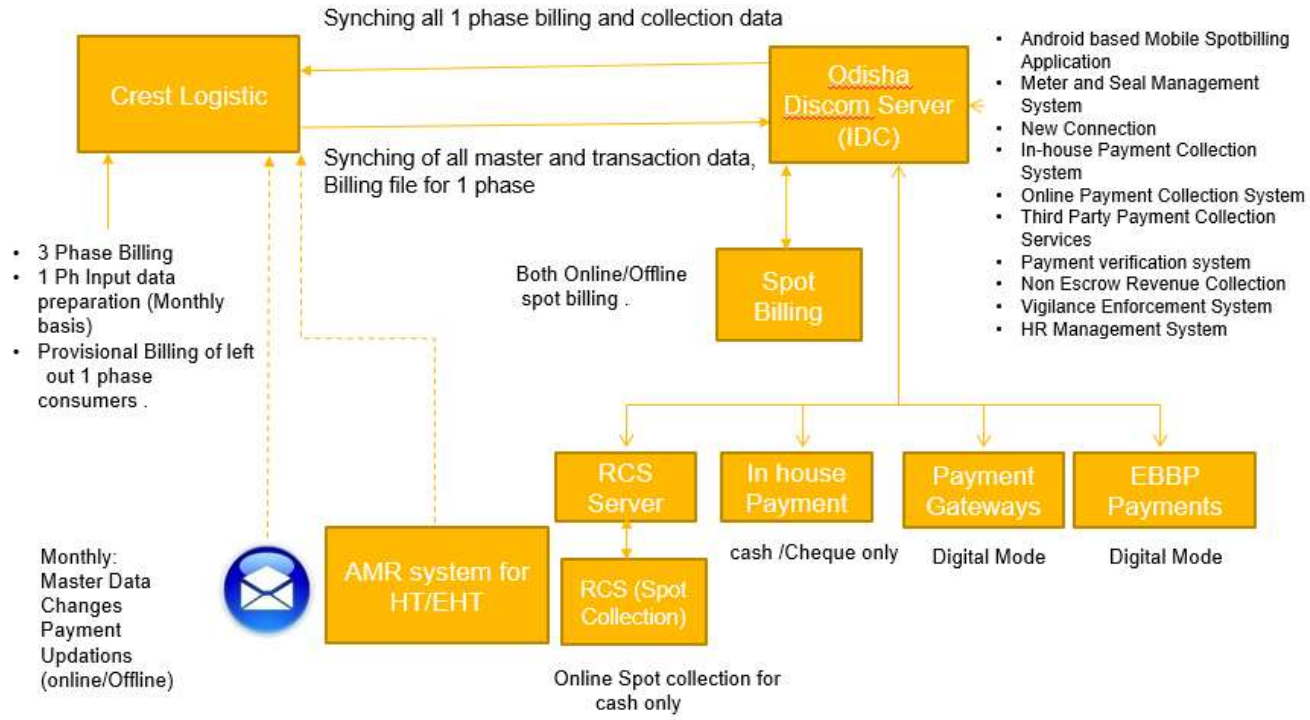
Operational efficiencies when matched with Technological applications, results into great face change for a utility. As far as technology is concerned erstwhile SOUTHCO had done no major investment in Technology till start of MBC and ERP implementation under IPDS scheme which is planned to be rolled out in near future. Existing landscape is briefed at below

IT Landscape:

Current IT landscape is using multiple Decentralized Legacy Billing system for single phase and three phase and Decentralized TALLY system for Accounts payable, Receivable, Asset Accounting. This software is very basic and most of processes and its activities are managed manually outside the system. Also system is not upgradable due to outdated technology. There are only one Oracle database using Oracle 8 version, which is not supported by OEM any more. Many of the mission critical application like call center applications, Cash Collection application, SBM Applications are managed by multiple agencies which has lot of integration issues resulting in data inconsistencies across various systems. Legacy AMR system currently installed is currently non communicating.

Issues with Legacy IT landscape:

We carried out a detailed study of IT applications of SOUTHCO to evaluate the as - Is condition and found following major issues



i. **Bespoke Applications Managed by Gridco IT Team** – These mainly include Legacy Oracle based billing system developed by Reliance Energy along with Java and .Net based applications developed/managed by Gridco for Spot Billing, Online Payments New connection. and complaints management. Along with this a mobile based cash collection application is developed by Tech Mahindra. These systems work for around 23 Lakh consumers. Mobile apps and In-house Application already used are not integrated and data is fed manually or though bulk upload process, lacking security best practices hence data sanctity and vulnerability is at risk. These customized solutions are not designed as Enterprise Level Solutions to fully cater the needs of Discom and are interoperable and ready for integration with upcoming Other Standard IT/OT Solutions. These application are not integrated with each other in real time and data is updated

ii. **Common Transaction and MIS platform** – SOUTHCO has a single Oracle based system for organization's common MIS platform and also various transaction based application are hosted on the same system.

iii. **Billing System and Process related Issues:**

- Current billing being done with existing reliance system has serious loopholes, like billing with old tariff in several mobile devices, huge amount of direct data corrections without tracking, and need to be immediately replaced.
- Standalone, disintegrated, decentralized and diverse Solution Landscape
  - Non Standard Processes
  - Weak Billing Process
    - Less or no Billing Quality Measures available
    - Billing data resides on individual PC level in Divisions
    - Absence of a Standard process of Assessment
  - Challenging Data Reconciliation mechanism
  - Absence of a strong ERP solution for efficient and effective enterprise processes
  - Online payment is being routed to third party gateways and no SSL in place, hence security is at stake here.
  - Tally – Accounting software used but runs in standalone basis
  - Customer complaint recording system is in place however the complete management of root cause analysis, its corrective /preventive action and information dissemination is lacking
  - AMR system is in place however huge dependency on Analogy proprietary software and Data Analysis (Theft etc.) is missing which is the key requirement of the solution
  - Android based Billing and collection app which needs seamless integration with billing system

    Applications need to be designed with secured coding guidelines to make them cyber safe which is a major threat today

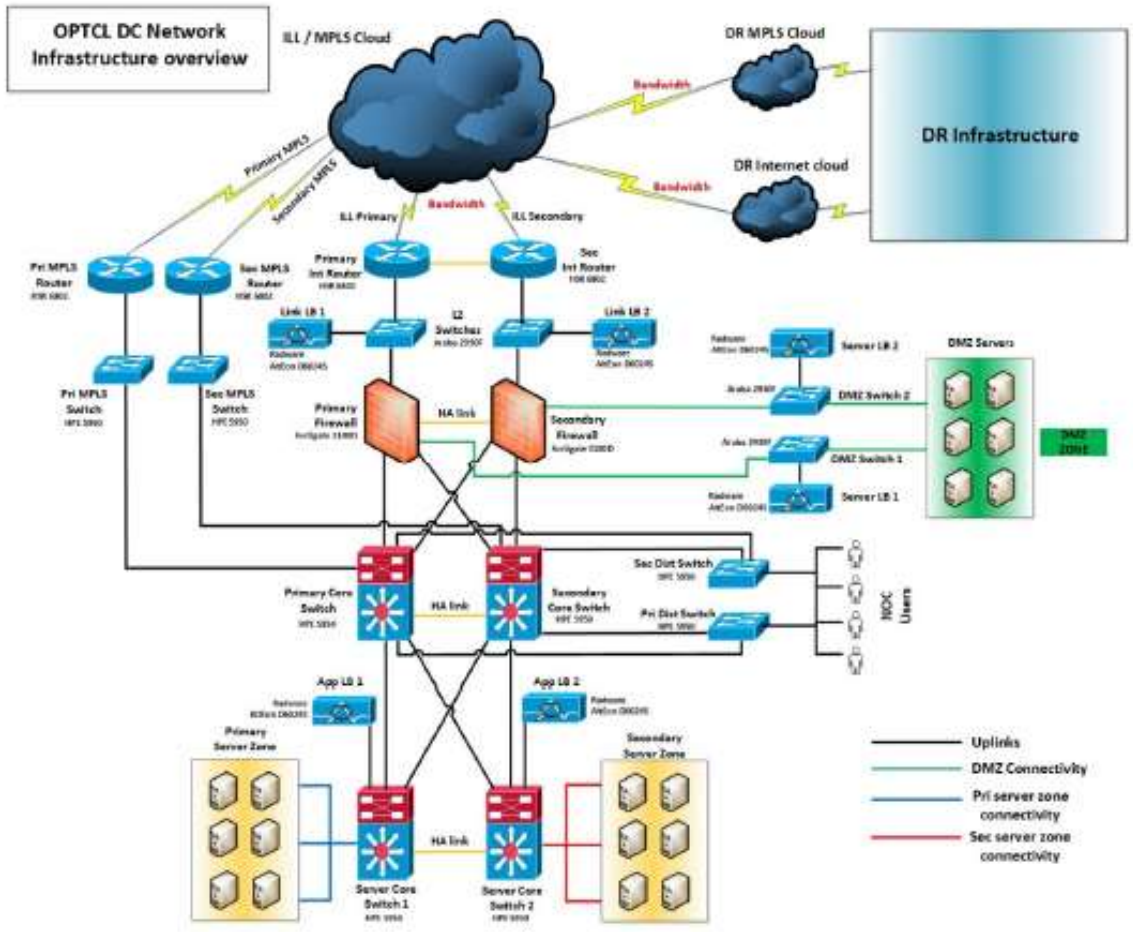
iv. SCADA

Currently there are total 224 Nos. of 33/11 substations in TPSODL areas out of which 99 no. of substations are developed/being developed under ODSSP scheme. Any old or ODSSP PSS is not integrated to SCADA Control Center.

7.5.2. Proposed Technology Transformation

Information Technology (IT) landscape

IPDS scheme Fluent Grid is implementing Customer Care Solution, Meter, Billing & Collection, New Connection and other Commercial Process, Energy Audit, MIS, Various ERP Modules. Apart from this TPSODL is planning to rollout Smart Metering MDM and HES system for all consumers above 5 KW.



Key considerations for IT Landscape Transformation

1. Installation of Smart Meters along with back end IT Infrastructure

TPSODL has around 23 lakh consumers and out of these consumer base, around 8 to 9 lakh are BPL category.

Smart Meters and metering system is the technology that is currently available in the market and is a preferred solution to adopt for consumer metering. GoI has also given mandate to replace all 25 Crores meters by smart meters in next 3 years.

In line with the national mission and as a pilot project, TPSODL intends to roll out Smart Meter (SM) project under Advance Metering Infrastructure (AMI) which would cover around 0.80 lakh consumers to start with.

Currently TPSODL sales are around 230Mus per month. The sale dispersion is

Type of Consumer category	No. of Consumer	Category Average per month sales based on 2019-20	Target Category Average per month sales based on 2019-20
LT Single Phase Target - All consumers with average consumption of more than 400 Unit pm	22,74,070	129.15	26
LT Three Phase Target - All consumers except Lift Irrigation	46,404	26.49	18.64
LT Three Phase Target >20 KW Except Lift Irrigation	2,108	8.5	8.43
HT/EHT Target – 100%	2,061	63.19	63.19
TOTAL	**23,24,643**	**227.33**	**116.26**

As can be seen from the table above, more than 50% power is consumed by less than 1 lakh consumers. The Proposed SM project will cover all EHT and HT consumers. All 3 phase consumers except lift irrigation and all 3 phase with more than 20KW demand except lift irrigation. There are significant number of consumers whose annual average consumption is more than 400 units and are connected on single phase. TPSODL intends to cover 100% of these consumers to start with since the risk of non payment is found to be very high. As we progress and we establish the efficacy of the SM project, the threshold

of more than 400 units can be lowered and more consumers can be brought into the ambit of SM system.

As far as EHT and HT consumers are concerned there are serious observations on which TPSODL has prepared action plan. Some of these are as listed below:

1. The existing AMR system of these category of consumers is virtually nonexistent. The reliability of the AMR is questionable and would remain so in future

2. The EHT and HT metering system itself has multiple flaws e.g. 3 phase 3 wire systems still in place, HT meters and metering units are old 3p3w system and need to be urgently changed, the systems have not been tested for many years etc

3. The communication link fails every now and then and people need to physically go and take the meter readings and other data which delays the billing and also increases the burden on quality check process

The proposed SM AMI will offer multiple benefits to the DISCOM as well as consumers and hence it is recommended to approve this project.

The benefits are as follows:

1. TPSODL will be able to control the entire billing and collection of more than 50% of its current billing very effectively

2. Less billing disputes as 100% correct bills issued on actual meter readings

3. Highly accurate meters

4. 100% Billing efficiency for 50% of the total billing which would free up the resources

5. The revenue cycle can be managed much better by spreading the meter reading dates

Sub Category	Activity	DPR Cost (In Crores.)
Smart Metering(AMI)	Installation of Smart Meters along with back end IT Infrastructure	28.28

2. Augmentation of IPDS Software licenses pan TPSODL

Fluent Grid is a COTS solution with suitable for enterprise wide operation. As per existing scenario, 13 Lakh consumer licenses and 366 ERP User licenses are already available under IPDS. Additional consumer (12 lakh) and initially SAP ERP 1000 user licenses would be procured to enable PAN area implementation of Fluent Grid CIS/MBC and SAP ERP.

An integrated contact centre for entire TPSODL area shall be dealt through the Aspect Contact Centre Solution (under IPDS implementation). This solution shall be scaled up to 50 seater call centre against current provisioning of 5 seater call center. The Core IT applications would include the following business critical modules / functionalities:

i.MBC and CIS

- New Connection
- Connection Management
- Disconnection & Reconnection
- Customer Move Out
- Metering and Material Process – Issue, Installation, Replacement, Removal and Reconciliation
- Billing – Scheduled, Unscheduled, Assessment, complaint handling
- Collection
- SMRD – Smart Meter Reading Devices - Mobile App for Meter Reading, Bill Distribution & follow up. This application is part of IPDS project and would be implemented by Fluent Grid.
- Customer Relationship Management
- Centralized Call Centre
- Energy Audit
- Customer Web Self Service

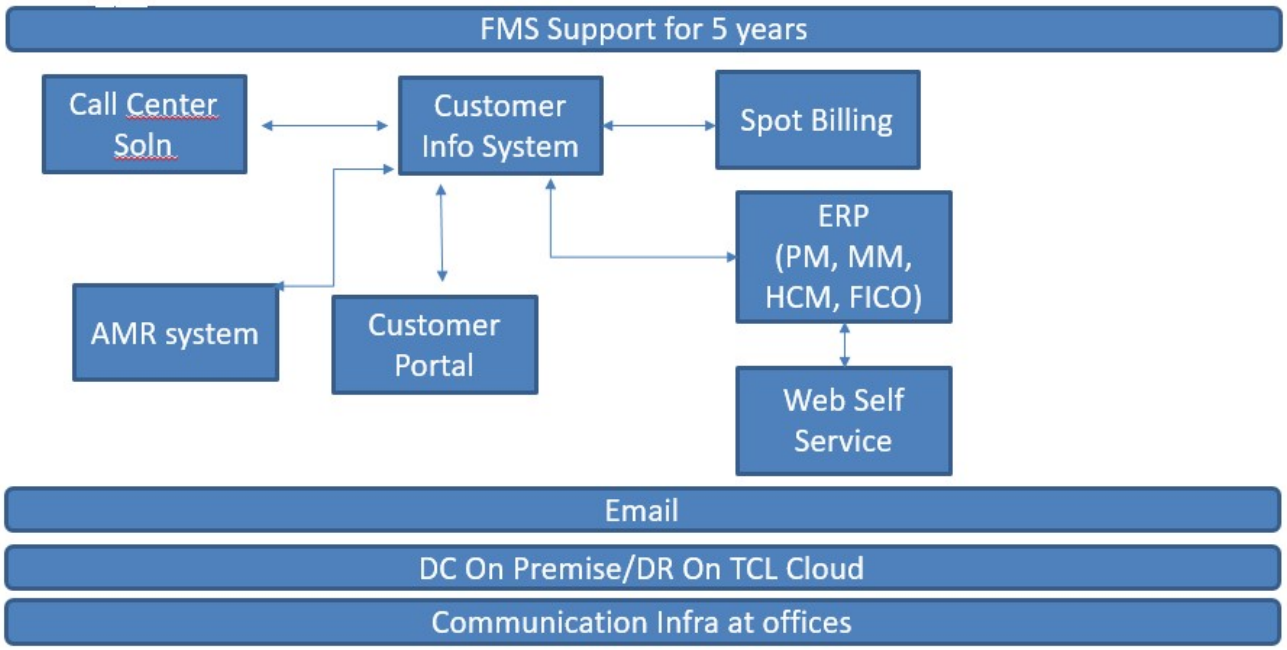
ii. SAP ERP

- Material Management
- Finance and Controlling
- Plant Maintenance

- Human Capital Management
- Web Self Service
- Project Systems (This module is not part of IPDS but TPSODL put its own resource for its implementation. Module is very important for Management of executing works and Project cost control and budgeting)

iii.Business Intelligence – SAP BW & BO

- Data Warehousing
- Management Information System
- Dashboards



IPDS Software Landscape

As current IPDS system is only planned for IPDS towns, following matrix lists the additional requirement of licenses for rolling it out across TPSODL

Sl. No.	Application	Total Licenses for TPSODL, TPSODL, NESCO	TPSODL	
			Allotment for TPSODL	Delta Requirement
1	CIS (MBC) Application (Consumers)	4000000	1300000	1200000
2	SAP Full use ERP Application users	1072	366	600
3	SAP Self-service users (employees)	868	294	1200
4	SAP – Payroll users	8500	2200	1000
5	MS Exchange Email	1145	312	1200
6	MS Active Directory	1145	312	1200

Capital expenditure of INR 18.24 Crores is proposed for implementing IPDS licensing `in terms of buying additional licenses and procuring additional hardware to cater to entire TPSODL area consumers and load growth is as below

S. No.	Description	FY22
1	Call Centre	0.9
2	Customer Care Centre	1.31
3	DC software & Licenses (ERP, MBC,DB, OS etc.)	16.03
	Total	**18.24**

3. IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)

Proposed IT/OT Infrastructure

Current Data Center developed under IPDS scheme by OPTCL is combined data center for NESCO, TPSODL and TPWODL and only includes IPDS town's consumers which are approximately 60% of total consumer coverage. Also many other Smart Grid applications like SCADA, GIS, Meter Data Management/Head End System for Smart Metering are yet to be implemented along with many niche applications like mobile app for consumers,

collection agencies and other web portal for safety management, Permit to Work, Outage Management etc. Current Data Center developed by OPTCL is requires scaling up to include non IPDS consumers and implementation of other Smart Grid Applications. Hence, we have proposed our new/extension of Data Center Setup in FY 22 for hosting additional Smart Grid applications like SCADA, GIS, Smart Metering. As Technology transformation would also require huge focus on reliability of IT systems, own disaster recovery centers for TPSODL is also planned in Year FY23 & FY24.

Along with this, TPSODL is also focused on digitization till section level accordingly new laptops and additional desktops are planned to be made available to each person in TPSODL except people only engaged in field work.

Description	FY22
	Amt. (INR Crores.)
Data Center	4.55
Frontend devices (Laptops, desktops, printers/scanners)	14.7
DC Hardware	10.02
Total	**29.27**

4.Communication Network Infra

While existing TPSODL connectivity is serving through internet bandwidth that too till division level. There are lot of inconcitencies at subdivision and especially at sections level where employees are connecting through mobile hot spots. While connectivity is provisioned till section level under IPDS, we have found that bandwidth asked in IPDS is far less than requirement and also there needs to be a different approach for sustainable connectivity solution at subdivision and section level. Accordingly TPSODL is planning to have IP-MPLS connectivity at major locations i.e. Data Center, DR Center, Head Office, Central Store, Circle Offices and Division offices. Also Co-locations offices like circle, division, subdivision, section, customer care, cash collection on same/nearby locations will be connected to single link to optimise bandwidth cost. Also, TPSODL has planned to connect nearby and major locations with optical fiber to increase reliability of network and optimise bandwidth cost. For bandwidth at Subdivision and Section Level, TPSODL will

currently provide good local internet connectivity till we try other sustainable solution like microwave RF etc.

Bandwidth provisioned for different locations is as follows:

Category	Link Type	Bandwidth ~ upgradable (MBPS)
Data Centre	MPLS	100 ~ 150 ~ 200
Disaster Recovery Centre	MPLS	100 ~ 150 ~ 200
Data Centre	Internet	100 ~ 150 ~ 200
Disaster Recovery Centre	Internet	100 ~ 150 ~ 200
DC - DR Replication	MPLS	100 ~ 150 ~ 200
DISCOM's Head Office	MPLS	50 ~ 100
Customer call Centre	MPLS	20 ~ 40
DISCOM's Circle Office	MPLS	10 ~ 20
DISCOM's Division Office	MPLS	10 ~ 20
DISCOM's Other Offices	MPLS	10 ~ 20
DISCOM's Collocated Sub Division Offices	MPLS	6 ~ 10
DISCOM's Collocated Section Offices	MPLS	6 ~ 10
Subdivisions & Sections	Internet	Good Internet bandwidth till permanent sustainable solution is explored.
Substations (except colocations/optical fibre connected locations)	MPLS	MPLS data Sims bandwidth till permanent sustainable solution is explored

Expenditure in Network Infrastructure: While in IPDS scheme, there is a provision to connect most of the office through Network Infrastructure, additional expenditure is planned to ensure network reliability till last mile.

Description	FY22
Network Infra	5.38

5.Operational Technology Landscape-SCADA Implementation

Currently there are total 224 numbers of 33/11 kV substations in TPSODL areas out of which 99 no. of substations are developed/being developed under ODSSP scheme and at present 69 ODSSP are taken into service.

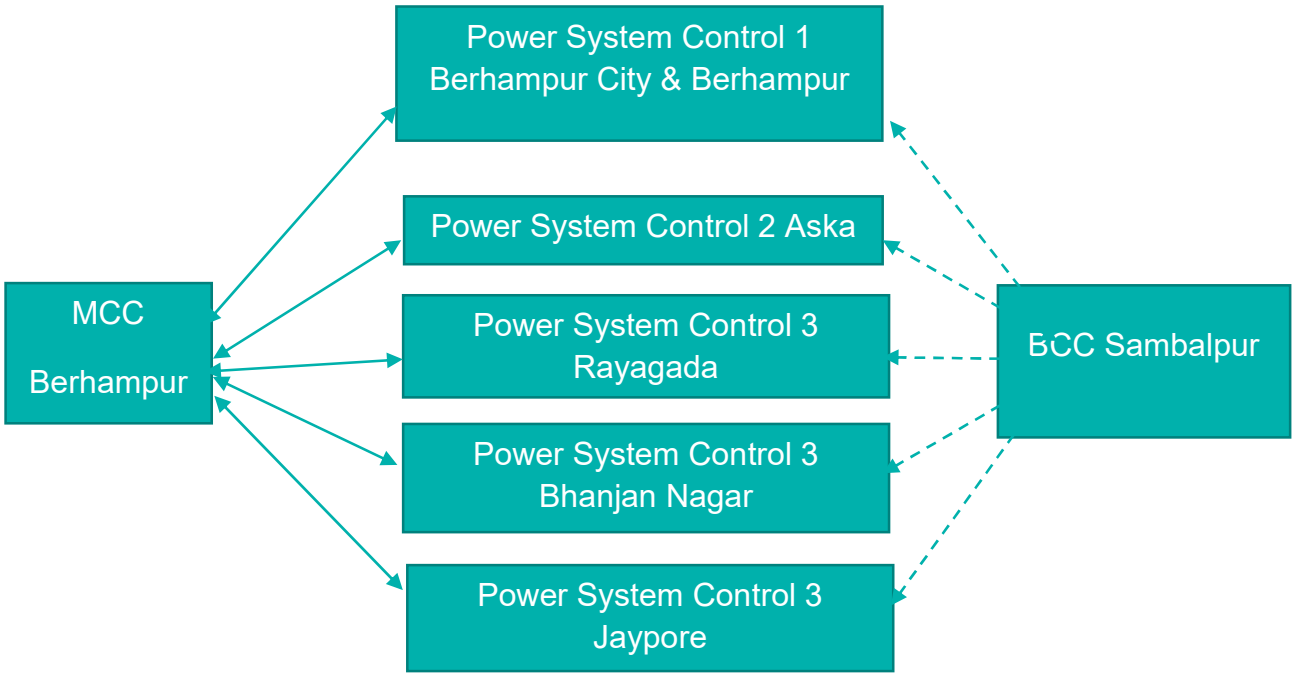
Name of PSS	Berhampur City & Berhampur (MCC)	Aska	Rayagada	BhanjaNagar	Jeypore	Total
Total Substations	42	20	51	42	68	224
ODSSP S/Stns (69 taken in service out of 99)	13	10	25	20	31	99

While Non ODSSP/Old Substations would take some time for modernization/revamping for making it SCADA ready, substations under ODSSP (being SCADA ready) can be very quickly integrated to Centralised Control Center. These substations are equipped with capabilities of being remotely managed with help of communicable devices viz. relays, IED, RTUs, etc. These new substations shall bring in higher levels of operational efficiency and system performance. TPSODL area is prone to frequent disaster situations such as cyclone, etc. and these substations shall not only help in managing the load efficiently but also reduce system downtime. Further, to harness the remote management capabilities of these substations it is must that these substations are integrated to Supervisory Control and Data Acquisition (SCADA) System. Through this system, all these substations shall be connected to a centralized control centre for the purpose remote monitoring, control & operations.

As a Phase wise approach it is considered that in FY22 70 nos. ODSSP substations would be connected to SCADA. In FY23 rest of ODSSP substations and 50 new Non ODSSP substations would be connected to control center.

Further considering TPSODL being disaster prone area, we plan to set up both Master Control Center (MCC) and Backup Control Center (BCC) in Berhampur and Sambalpur respectively. While MCC will be set up along with proposed Data Center in Berhampur in FY22, BCC will be setup in Sambalpur in FY22. Also all Circle Offices will have dedicated Power System Control Rooms which will get feed from MCC and automatically switch to BCC in case of any disaster.

Total SCADA capex in INR 16.71 Crores



6.GIS Implementation:

TPSODL is also planning to implement GIS system to have better asset management. System once implemented will strengthen various other business processes viz. energy audit process, technical feasibility, dues verification, network planning. Infact GIS will be backbone for implementation of outage management system in coming years. Being a large geography, GIS will be implemented in three phase as below

FY 22--Phase I	FY 23--Phase II	FY 24--Phase III
(City & Berhampur Circle)	(Aska & Bhanja Nagar Circle)	(Rayagada & Jeypore Circle)

CAPEX proposed for implementation of GIS in 1st Phase of amount INR 10.46 Crores.:

Benefits of Proposed IT Landscape

Following are the benefits perceived in proposed IT Landscape:

- Adoption of very strong integrated application landscape for enterprise wide implementation
- Ensure secured services to customers to safe guard the confidentiality, integrity and availability of IT systems
- Integrated processes with strong access control
- Drive the culture of safety and ethics among the workforce and all stakeholders
- Ensure customer delight and effective solutions for addressing needs
- Stringent data integrity to avoid any revenue leakage
- Increased Billing and collection efficiency
- Enhanced user experience with extensive standard features & functionalities
- Standardized process workflow across organization
- Centralized data base for synchronized data.
- Enhanced integration and automation capabilities with Non SAP applications
- Using SAP standard capabilities combined with customer presentment platforms for a delightful customer experience

7.5.3. Civil Infrastructure

TPSODL currently have offices in all the six circles, divisions, subdivisions & section office. Some of them are owned and others are on rented property. Currently the Offices in Berhampur City circle Berhampur rural section are accommodating office and associated services staff.

The challenges exists in TPSODL using current buildings and infrastructure is to accommodate more employees and providing a hygienic, well ventilated and spacious

working environment with minimum expenditure. It may also be noted that no annual repairs or refurbishment in all office buildings have been made in recent years, hence, immediate rehabilitation of the said buildings is required.

Existing Infrastructure

TPSODL currently have offices in all the six circles, divisions, subdivisions & section office. Some of them are owned and others are on rented property. Currently the Offices in Berhampur City circle Berhampur rural section are accommodating office and associated services staff.

Corporate Office at Courtpeta, Berhampur

The office space is currently crowded and haphazardly planned for seating arrangements, moreover, most of the circulation area has been occupied with files, documents etc. In view of more people joining the office it will be difficult to accommodate the extra manpower in the same arrangement.

Training Center at Ambagada Berhampur

The existing building is a single story shed (3000 sqft) constructed in 1970 and is in bad condition. Currently building accommodates to Meter testing laboratory & Training Center for safety training and most of the space is utilized for record keeping / storage of meters. The roof of building is damaged at many places and needs rehabilitation. Water leakage & seepage is observed from roof, walls and floors. The existing building requires urgent replacement of rehabilitation of existing structure to enhance its structural strength and internal modification to accommodate seating space for 25 employees.

Old Store Shed at Ambagada Berhampur

The existing old shed is a single story double height shed (3800 sq. ft) constructed in 1970, located at Ambadada - Berhampur. This shed was earlier used as Store but has been abandoned since the Central Store has become operational at Khajuria. Currently, the shed is in poor condition as same remained underutilized since long and require urgent rehabilitation of roofing, Structural & civil repairs. This shed can be used after rehabilitation and renovation.

Central Stores at Khajuria Berhampur

Currently the stores is located centrally at Khajuria, Berhampur. All the materials required by 6 circles, Divisions

and sub-divisions are provided from this location. Currently, the shed are in poor condition especially in the aftermath of Cyclone. These sheds remain underutilized since long and require urgent roofing & civil repairs. There are no sheds to store for storage of Consumable materials and indoor items after repairs. Also there is no storage yards, sheds for storage of costly identified scrap materials. Construction of Roads, drains, paving of area for storage of materials is essential.

Recommendation:

Civil Work for Meter Test Bench

In order to create updated Meter Testing Bay new building is to be constructed admeasuring about 160 sq.m. at convenient location at Berhampur along with refurbishment of area with all basic amenities required for setting up the Meter testing laboratory. This will have all modern testing benches and equipment's along with storage facility in covered storage shed.

Training Center & Old Store Shed at Ambagada Berhampur

The existing buildings shall be re-conditioned by carrying out rehabilitation, plastering, anti-termite treatment, Insulated roof sheeting, flooring, canteen facility, wash rooms and renovating of offices to accommodate Call Center, IT hub and PSCC facilities accommodating around 100 employees. Also it is planned to provide face lifting of the building along with parking space.

The Store at Khajuria

Roofs of existing sheds at Khajuria store are badly damaged and beyond repairs due to cyclone effect. Also, due to zero maintenance of the sheds, these sheds needs rehabilitation including replacement of doors and windows. To increase the utility of badly damaged roofs of sheds and make them serviceable. Currently, they are lying abandoned & can be used for indoor material and the height of compound wall shall be increased by providing two layers of concertina coil to prevent entry of miscreants.

Security System of Stores:

High Mast lighting System

High mast lighting are commonly used to illuminate large areas from a very high mounting height for storage, It is an efficient lighting solution & most preferred way of illumination because it can achieve a high space to height ratio. As stores & scrap stores are vulnerable to theft it is important to have optimum illumination to safeguard the materials kept in the premise. Berhampur Store has got a very big area of 8.5 acres, Jeypore Store has got an area of 6 acres, Reyagada Store has area 10 of acres, Bhanjanagar Store has an area of 2 acres and Phulbani Store has an area of 2.5 acres. Also, from operational point of view appropriate & efficient lighting arrangement is required to support loading, unloading & movement of materials inside the premises. Accordingly, the requirement of High Mast Lighting System is given below.

i. Berhampur Central Store - 07 Nos.
ii. Jeypore Store- 03 Nos.
iii. Rayagada Store – 05 Nos.
iv. Bhanjanagar Store – 01 Nos.
v. Phulbani Store – 01 Nos.

Fire Extinguishers

Fire extinguishers are extremely important as they are the most commonly used fire Protection. In many cases, they are first line of defense and often contain or extinguish fire without any damage to assets or materials. In addition to other fixed form of water suppression system a suitable numbers of appropriate portable fire extinguishers are required to counter fire.

Boundary Wall

There is no boundary wall at four store locations. The boundary wall at the Berhampur Store has no Concertina wire thereby allowing easy access inside store.

Storage of E-waste and Hazardous Scrap Material

As per the guidelines of the NGT, the disposal of E-Waste and Hazardous Scrap like used Oil, Computer accessories etc has to be as per the OHSAS guidelines for occupational health and safety management system.

Civil Upgradation of DT workshop:

TPSODL has its own Distribution Transformer Workshop at Berhampur which is very old and ill maintained. Hence it is proposed to renovate the DT workshop for its better utilization and expenditure of an amount of 1 crore is proposed.

7.5.4. Administration

In TPSODL, The office space is currently crowded and haphazardly planned for seating arrangements, moreover, most of the circulation area has been occupied with files, documents etc.

Some of offices are owned and others are on rented property.

The challenges exists in TPSODL using current buildings and infrastructure is to accommodate more employees and providing a hygienic, well ventilated and spacious working environment to them.

In order to provide best in class services to consumers, earn consumer delight, and improve satisfaction among other stakeholders and maintaining a clean & safe working environment, following infrastructures are required at above stated work place.

- **Office air conditioning systems** are required to provide a comfortable working environment to bring and control Energy Efficiency, Humidity, Air Quality, and Reduction in Noise & Keeping Business Critical Equipment at the Right Temperature.
- **Water cooler & Purifiers** are required for proper hydration employees and to ensure good health and improve overall efficiency. An employee should drink at least eight glasses of water a day to be properly hydrated as Water increases the amount of blood flow and oxygen to the brain and other body parts which in turn increases brain activity and attentiveness

- **Ergonomic office chairs** for sitting long periods with ease. This naturally helps employees work more efficiently and productively. Another benefit is reduction in healthcare expenses related to poor posture from unsuitable office chairs.

- **Photocopier machines** to offer a fast and easy way of getting single or multiple copies of documents & Improves Functionality of businesses.

- **Vehicles** to provide car pool facility to the company staff as well as car facility to the sr. management team.

- **File cabinets** are basic requirements to keep office space organized and tip-top. It helps store important papers, documents, photographs, magazines and training materials in one single place for easy and immediate access besides offering secure storage, it offers instant access to files of thousands of customers and employees.

- **Canteen facilities** are the necessity of satisfying employees with a better range of foods and healthy options.

To ensure safe, hygienic, well ventilated and spacious working environment for employees as well as consumers, a capital expenditure is proposed, break up of which is mentioned in annexure 16.

7.5.5. CAPEX Summary for Technology and Civil Infrastructure

S. No.	Major Category	Activity	DPR Cost (In Crores.)	Annexure
5	Technology & Civil Infrastructure	Installation of Smart Meters along with back end IT Infrastructure	28.28	*Annexure 14*
		Augmentation of IPDS Software licenses pan TPSODL	18.24	*Annexure 15*
		IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)	29.26	*Annexure 15*

		Communication Network Infra	5.38	*Annexure 15*
		SCADA Implementation	16.71	*Annexure 15*
		GIS Implementation	10.46	*Annexure 15*
		Civil Infrastructure	20.00	*Annexure 16*
		Civil Work for Meter Test Bench	2.00	*Annexure 16*
		Civil work for Call centre&PSCC	4.00	*Annexure 16*
		Upgradation of DT workshop	1.00	*Annexure 16*
		Security system in Central Store	4.25	*Annexure 16*
		Ready to Use assets for Offices	4.95	*Annexure 16*
		Total (5)	**144.53**	

Benefits of Proposal:

S.No	CAPEX Description	Objective
1	Civil Infrastructure	To rehabilitate & renovation of office premises, customer care center, cash collection centers etc. to create additional seating space with modular furniture for employees.
2	Civil Work for Meter Test Bench	To construct the space for meter testing bay along with refurbishment of area with all basic amenities required for setting up the Meter testing laboratory including storage shed.
3	Call Center, PSCC & Data Center Infrastructure	To rehabilitate the space for accommodating three bays for Call Center, IT Hub and PSCC along with refurbishment of area with all basic amenities required for setting up the above three bays
4	Store Shed	To increase the utility of badly damaged roofs of sheds and make them serviceable, Currently, they are lying abandoned & can be used for indoor material. Increase the height of compound wall by providing two layers of concertina coil to prevent entry of miscreants.
5	Administration	It will provide comfortable working environment, healthy eating & refreshments for employees and stakeholders and
		Helps to store important papers, documents, photographs, magazines and training materials in one single place. Vehicles will provide car pool facility to the company staff And water cooler is required for proper hydration employees

Summary of Total CAPEX:

S. No.	Major Category	Activity	DPR Cost (In Crores.)	Annexure
1	Statutory & Safety	PPEs,Safety & Testing Equipment	19.98	*Annexure 3*
		Cradle guard at major road crossings	8.53	*Annexure 4*
		Fencing of Distribution substations (DSS)	15.00	*Annexure 4*
		Boundary wall for Primary substations(PSS)	15.40	*Annexure 4*
		Establishment of Meter Testing Lab	2.47	*Annexure 5*
		Total (1)	**61.37**	
	Loss Reduction	Input Energy Monitoring System (ABT/AMR) -IEMS	10.97	*Annexure 6*
		Replacement of burnt, Faulty and Electromechanical meters and meter installation at no Meter cases	62.98	*Annexure 6*
		LT Bare to ABC conversion	11.98	*Annexure 6*
		Demand Side Management	5.00	*Annexure 6*
		Total (2)	**90.93**	
	Reliability	33 KV Network refurbishment	10.08	*Annexure 7*
		Installation of 33 KV AB Switch	2.23	*Annexure 9*
		PSS Refurbishment	12.17	*Annexure 8*
		11 KV Network refurbishment	11.16	*Annexure 7*
		Installation of 11 KV AB Switch	5.00	*Annexure 9*
		DSS Refurbishment	10.00	*Annexure 8*
		Installation of LV protection at DSS	10.09	*Annexure 10*

		Installation of Auto reclosure / Sectionalizers, RMUs &,FPIs	8.72	*Annexure 9*
		Trolley Mounted Pad Substations	1.31	*Annexure 11*
		Package Distribution Substations	1.64	*Annexure 11*
		Total (3)	**72.41**	
4	Load Growth	Network augmentation / addition to meet load growth/11 KV line, PTR,DTR,LT line	26.52	*Annexure 12*
		Meter Installation for all new connection	12.71	*Annexure 13*
		Total (4)	**39.23**	
5	Technology & Civil Infrastructure	Installation of Smart Meters along with back end IT Infrastructure	28.28	*Annexure 14*
		Augmentation of IPDS Software licenses pan TPSODL	18.24	*Annexure 15*
		IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)	29.26	*Annexure 15*
		Communication Network Infra	5.38	*Annexure 15*
		SCADA Implementation	16.71	*Annexure 15*
		GIS Implementation	10.46	*Annexure 15*
		Civil Infrastructure	20.00	*Annexure 16*
		Civil Work for Meter Test Bench	2.00	*Annexure 16*
		Civil work for Call centre &PSCC	4.00	*Annexure 16*
		Upgradation of DT workshop	1.00	*Annexure 16*
		Security system in Central Store	4.25	*Annexure 16*
		Ready to Use assets for Offices	4.95	*Annexure 16*
		Total (5)	**144.53**	
Grand Total (1+2+3+4+5)			**408.47**	

8. Annexures

8.1 Annexure1 Sample Photographs






8.2 Annexure 2 CEA regulations

CEA regulations (Measures relating to Safety and Electric Supply – 2010)

41. Connection with earth-

The following conditions shall apply to the connection with earth of systems at voltage normally exceeding 125 V but not exceeding 650 V, namely:-

(i) neutral conductor of a 3-phase, 4-wire· system and the middle conductor of a 2- phase, 3-wire system shall be earthed by not less than two separate and distinct connections with a minimum of two different earth electrodes or such large number as may be necessary to bring the earth resistance to a satisfactory value both at the generating station and at the sub-station.

(iii} neutral conductor shall also be earthed at one or more points along the distribution system or service line in addition to any connection with earth which may be at the consumer's premises.

58 (1) No conductor of an overhead line, including service lines, erected across a street shall at any part thereof be at a height of less than—

- For lines of voltage not exceeding 650 volts—5.8 metres
- For lines of voltage exceeding 650 volts but not exceeding 33 kV-6.1 metres

58 (2) No conductor of an overhead line, including service lines, erected along any street shall at any part thereof be at a height less than—

- For lines of voltage not exceeding 650 volts—5.5 metres
- For lines of voltage exceeding 650 volts but not exceeding 33 kV—5.8 meters

58 (3) No conductor of an overhead line, including service lines, erected elsewhere than along or across any street shall be at a height less than—

- For lines of voltage up to and including 11000 volts, if bare----4.6 meters.
- For lines of voltage up to & including 11,000 volts, if insulated—4.0 meters.
- For lines of voltage exceeding 11,000 volts—but not exceeding 33 kV----5.2 meters.

60. Maximum interval between supports-

All conductors shall be attached to supports at intervals not exceeding the safe limits based on the ultimate tensile strength of the conductor and the factor of safety specified under regulations 57. Provided that in the case of overhead lines carrying conductors of voltage not exceeding 650 V when erected in, over, along or across any street, the interval shall not, without the consent in writing of the Electrical Inspector, exceed 65 meters.

69. Lines crossing or approaching each other and lines crossing- Street and road.

ii) Guarding shall be provided where lines of voltage not exceeding 33 kV cross a road or street.

(iii) Where an overhead line crosses or is in proximity to another overhead line, guarding arrangements shall be provided so to guard against the possibility of their coming into contact with each other.

69. Guarding-

(1) Where guarding is required under these regulations the following shall be observed namely:

a) Every guard-wire shall be connected with earth at each point at which its electrical continuity is broken.
b) Every guard-wire shall have an actual breaking strength of not less than 635 kg and if made of iron or steel, shall be galvanized.
c) Every guard-Wire or cross-connected systems of guard-wires shall have sufficient current-carrying capacity to ensure them rendering dead, without risk of fusing of the guard-wire or wires, till the contact of any live wire has been removed.

72. Earthing-

1. All metal supports and all reinforced and pre-stressed cement Concrete supports of overhead lines and metallic fittings attached thereto, shall be either permanently and efficiently earthed by providing a continuous earth wire and securely fastening to each pole and connecting with earth ordinarily at three points in every km with the spacing between the points being as neatly equidistant as possible or each support and the metallic fitting attached thereto shall be efficiently earthed.
2. Metallic bearer wire used for supporting insulated wire of overhead service lines of

voltage not exceeding 650 V shall be efficiently earthed or insulated.

3. Each stay-wire shall be similarly earthed unless insulator has been placed· in it at a height not less than 3.0 metres from the ground.

Statutory guidelines (CEA – Technical Standards for Construction of Electrical Plants and Electric Lines,2010) in respect of Lines and its associated Poles and Towers, Span Length, Erection of Poles, and Stay.

95. Supports (Poles and Towers)-

1. The supports shall be poles or narrow based lattice towers with fully galvanized structure as per site requirement.
2. Poles may be used for 33 kV, 22 kV, 11 kV and LT lines (lines below 500 V) as per requirement. The poles shall be pre-cast concrete (PCC) pole, pre-stressed cement concrete (PSCC) pole, steel joist, rail pole or steel tubular pole as required, provided PCC and PSCC poles shall not be used at cut-points and as end poles.
3. Poles shall conform to relevant IS as the case may be.
4. Concrete poles shall be preferred in plain areas.
5. In hilly areas appropriate snow or ice loading shall be considered for design of poles and towers.
6. For locations involving long spans or higher clearances on account of crossing of power or communication lines or a railway line, specially designed poles/lattice towers may be used.
7. For angles of deviation of more than 10 degree, double pole structure shall be used.
8. The height of the pole above the ground level, length of pole below ground and working load shall be decided taking into consideration wind zone, terrain, topography, and the statutory clearances required to be maintained and these shall conform to relevant IS.

96. Line Span-

1. Line span shall be decided taking into consideration topography, wind pressure, type of support, conductor configuration and ultimate tensile strength of conductor.
2. The span shall be within the range specified by IS.
3. Uniform span shall be maintained as far as possible between consecutive pole structures.
4. While constructing a line, if a road crossing occurs at mid span, then a pole shall be placed on one side of the road so as to avoid mid span at the road crossing.
5. While crossing another power line, the lower voltage line shall be underneath. The lower line shall normally not cross at mid span of the upper line.
6. While placing poles on high ground, shorter poles can be used while maintaining proper ground clearance at the middle of the span.
7. Poles shall normally not be placed along the edges, cuts, or embankments of creeks and streams.
8. At all the places where the new line crosses over roads or another existing line, adequately earthed guard wire mesh below the line shall be provided to avoid the conductor of the new line falling over the areas below, in case of any break. In cases where the line passes below an existing line, the guard wire mesh shall be provided above the new line under construction.

97. Erection of Poles-

Erection of poles shall be carried out in accordance with the provisions of relevant IS.

98. Factor of Safety-

The supports shall be suitable for the wind loads as per relevant IS. The minimum factor of safety for supports shall be as per Central Electricity Authority (Measures Relating to Safety and Electricity Supply), Regulations as and when these are notified by the Authority.

100. Stay Arrangements-

1. To prevent tilting of a pole from its normal position due to abnormal wind pressure and deviation of alignment, the pole shall be kept in position by stays. The stays shall

be provided at:

a. Angle locations;
b. Dead end locations;
c. Tee off points;
d. Steep gradient locations;
e. cut- point;
f. Along the straight run at minimum two locations in 1 km.

2. Galvanized iron stay wires and stay rods of adequate size shall be used. The individual wire used to form "stranded stay-wire" shall have a minimum tensile strength complying with relevant IS. For double pole structure, four stays along the line, two in each direction and two stays along the bisection of the angle of deviation or as required depending on the angle of deviation shall be provided.
3. When two or more stays are provided on the same pole, each stay shall be grouted entirely separate from the other.
4. The angle between the pole and stay wire shall be about 45 degrees and in no case it shall be less than 30 degrees. ·
5. Stays shall be anchored by either providing base plates, angle iron or rail.
6. Stay wires shall be connected to the pole with a Porcelain Guy Strain Insulator. The standard Guy Strain insulators shall be as per relevant IS. The Porcelain insulator shall be inserted in the stay wire at a height of minimum 3 m vertically above the ground level. The strain insulators shall be free from defects, thoroughly vitrified and smoothly glazed.
7. Wooden insulators shall not be used for stay/guy wire.

99.Earthing of Poles-

1. All metallic supports shall be permanently and effectively earthed. The Earthing arrangement shall conform to relevant IS.
2. Metal cross arms and insulator pins for PCC and PSCC poles shall be bonded together and normally earthed at every pole for 33 kV or 22 kV or 11 kV lines and at every 5th pole for lines below 500 volts.
3. The support on each side of a road crossing, railway crossing or river crossing shall

be earthed.

4. Normally coil Earthing shall be provided except for locations involving railways, telegraph line, power line crossings and special structures where pipe/rod type Earthing shall be provided. Whenever the electric lines pass close to a well or a permanently moist place, an earth should be provided in the well or the marshy place and connected to the electric line pole.

5. All steel poles on which switches, transformers, fuses etc. are mounted shall be earthed.

6. All poles above 650 volts, irrespective of inhabited areas, shall be earthed. For poles below 650 V guarding with continuous earth-wire shall be provided invariably, connected to earth at three equidistant points in one km.

101. Protective Guard-

Guard wire shall be used where an overhead line crosses or is in proximity to any telecommunication line or any other overhead line and in populated localities. Every guard wire shall be connected to earth wherever its electrical continuity is broken. The minimum factor of safety for stay wires, guard and bearer wires shall not be less than 2.5 based on ultimate strength of the wire.

71. Fencing and Approach Arrangement-

Fencing shall be provided around the sub- station. A metalled approach road to transport the equipment should be provided leading from the main road.

77. Transformer Mounting Structure-

1. The transformer shall be mounted on a single pole, H pole structure or on a plinth depending upon site requirements, size and weight of the transformer.
2. Direct single pole mounting shall be used for transformers up to 25 kVA only.
3. The transformers of more than 25 kVA and up to 250 kVA can be mounted on H pole structure or on plinth. Transformers above 250 kVA shall be mounted on plinth only.
4. The structures shall be provided with anti-climbing devices and danger board.

5. The plinth shall be higher than the surroundings. The plinth foundation shall be of concrete.
6. Plinth mounted distribution sub-stations shall be adequately protected by fencing so as to prevent access to the equipment by unauthorized persons, animals and shall be provided with standard danger boards. The enclosure shall permit free circulation of air on all sides.

8.3 Annexure 3 DPR of Personal Protective Equipment, Safety & Testing Equipment

Cost Estimate for Procurement of PPE, Safety & Testing Equipment:

S No.	Item Description	Unit	Quantity	Unit Rate In Rs.	Total Amount(INR)
1	FIRE EXTINGUISHER DCP 25KG CAP.	EA	300	14,318	4295436
2	FIRE EXTINGUISHER DCP 50KG CAP.	EA	300	12,500	3750000
3	FIRE EXTINGUISHER ABC TYPE 10 KG	EA	1,457	2,100	3059700
4	FIRE EXTINGUISHER ABC 4 KG CAPACITY.	EA	1,166	1,180	1375880
5	FIRE EXTINGUISHER ABC 6 KG CAPACITY.	EA	1,500	22,000	33000000
6	FIRE EXTINGUISHER CO2 CAP 4.5KG	EA	1,500	5,381	8071200
7	FIRE EXTINGUISHER MECH FOAM 9 LTR	EA	318	1,201	381981.6
8	FIRE EXTINGUISHER MECH FOAM 50 LTR	EA	15	6,046	90695.25
11	SAFETY Harness	EA	1,500	3,411	5117070
12	HELMET SAFETY W/VOLT INDUCTION TESTER	EA	3,000	976	2927220
13	HELMET SAFETY HDPE INDUSTRIAL	EA	1,000	135	135060
14	FIRST AID BOX (FS - 401)	EA	300	685	205425
15	SAFETY SHOE	EA	3,500	976	3415090
16	GLOVES SOFT ELECT SAFETY 500 VOLTS	PAA	500	1,333	666700
17	GLOVES RUBBER 16IN INSULATION GRADE 11KV	PAA	1,600	3,162	5059840

18	GLOVES RUBBER 16IN INSULATION GRADE 33KV	PAA	1,200	309	371256
19	GLOVES RUBBER FOR BATTERY MAINT.	EA	300	68	20460
20	REFLECTIVE JACKET FOR SAFETY	EA	2,000	125	250000
21	LADDER FIBRE GLASS 3 FOLD 9 MTR HEIGHT	EA	408	11,887	4849810.32
22	LADDER FIBRE GLASS FOLDING 12 MTR HEIGHT	EA	272	15,849	4310941.6
	LOTO	EA	136	177	24072
23	MAT RUBBER 33KV 3 MM THICK	EA	500	3,150	1575000
24	BATTERY OPERATED TELESCOPIC TREE PRUNER TWO NOS BATTERY AND ONE NO. CHARGER.MAKE-STIHL Model No: HTA 85	EA	51	56,000	2856000
25	EMERGENCY LIGHT	EA	300	1,815	544500
26	TRAFFIC CONE HDPE REFLECTIVE	EA	1,500	525	787650
27	CAUTION TAPE DANGER HDPE 100MM WIDTH	M	30,000	2	47700
28	CAUTION TAPE DANGER HDPE 150X0.3MM	M	20,000	52	1038400
29	INSULATION TESTER 2.5KV/5KV 50 OHMS	EA	51	34,229	1745679.51
30	INSULATION TESTER DIGITAL 0-5KV	EA	2	1,70,557	341114.4
31	INSULATION TESTER DIGITAL 500V-1000V	EA	10	4,350	43500
32	OIL TEST SET 100KV MOTORIZED	EA	12	52,746	632952
33	EARTH TESTER DIGITAL	EA	19	8,467	160863.5
34	CONTACT RESISTANCE METER (CRM 100B)	EA	12	3,50,000	4200000
35	DIGITAL LOW RESISTANCE OHMMETER TRM104	EA	6	1,39,700	838200
36	FULLY AUTO TAN DELTA & RESISTIVITY KIT	EA	6	11,65,000	6990000
37	TRANSFORMER RATIO METER TRM-200	EA	12	4,96,485	5957820
38	DIGITAL MULTIMETER AC/DC 40mA to 20A	EA	51	80,000	4080000
39	POWER QUALITY METER	EA	6	4,00,000	2400000
40	SECONDARY CURRENT INJECTION WITH TIMER	EA	12	2,00,000	2400000
41	TOOLS BATTERY MAINTENANCE	EA	6	1,37,280	823680
42	METER DIGITAL CAPACITANCE	EA	21	29,625	622129.2
43	DISCHARGE ROD FOR 11-33-66KV	EA	50	21,240	1062000

44	TOOL KIT HD COMPLETE WITH CANVAS BAG	EA	51	20,000	1020000
45	DRILL M/C/HAMMER BATTERY OPERATED CRH	EA	21	48,380	1015980
46	DRILLING MACHINE	EA	50	5,000	250000
47	CT ANALYZER MODEL CTERP-2000	EA	6	7,31,500	4389000
48	NEON TESTER 11KV - 33KV - 66KV	EA	136	20,355	2768280
49	CABLE CUTTER MECHANICAL	EA	20	48,461	969220
50	OIL MOISTURE TESTER	EA	1	3,50,000	350000
51	CLAMP ON EARTH RESISTANCE TESTER	EA	10	2,500	25000
52	TRANSF.WINDING RESISTANCE METER TRM 103	EA	6	3,83,500	2301000
53	CAPACITANCE & TAN DELTA SET CTS-500	EA	5	1,17,500	587500
54	PRIMARY INJECTION TEST SET 0-2000A	EA	6	7,37,500	4425000
55	CRIMPING TOOL HAND OPERATED 50-400 SQMM	EA	20	1,30,560	2611198.4
56	CHART SHOCK TREATMENT LAMINATED	EA	300	54	16284
57	Respiratior	EA	20	41	815.6
58	OIL PUMP HAND OPERATED	EA	10	1,699	16992
59	INFRARED THERMO - SCANNING CAMERA	EA	8	7,10,000	5680000
60	ULTRASONIC INSPECTION KIT	EA	3	12,00,000	3600000
61	PORTABLE TR OIL AND GAS DGA INSTRUMENT	EA	3	30,00,000	9000000
62	METER EARTH RESIS DIGITAL 0-10/1000 OHMS	EA	154	22,951	3534454
63	RATCHET SPANNER SET SIZE 6MM TO 32MM	EA	136	2,655	361080
64	CROCODILE CLAMP FOR O/H LINE L-10 MTR	ST	913	4,472	4083118.6
66	TORQUE WRENCH INSULATED 20 Nm	EA	136	1,735	235905.6
67	CABLE SPIKING TOOL HYDRAULIC	EA	2	2,77,300	554600
68	BOX SPANNER SET IN INCH	ST	136	1,416	192576
69	CRIMPING TOOL PLIER CAP 10-185 SQMM	EA	51	11,000	561000
71	TREE PRUNER TELESCOPIC	EA	51	1,045	53295
73	TORQUE WRENCH SIZE 14 - 68 NM	EA	51	5,753	293377.5
75	HI-POT TEST SET AC 0-40 KV AC 50 mA.	EA	51	57,200	2917200

77	COIL EARTH LEAKAGE 1300T 11KV ECE OCB	EA	6	1,272	7629.6
78	DIGITAL MULTIMETER METER	EA	184	5,000	920000
79	TOWER WAGON -(AREIAL TYPE)	EA	2	25,00,000	5000000
80	Oil filter machine	EA	2	6,00,000	1200000
81	GROUNDING SET FOR O/H LINE PORTABLE	EA	6	38,645	231870
82	Oil sample collection bottle for DGA	EA	51	5,000	255000
83	Power Tools - Battery Operated for tightening and loosing of the nut/bolts	EA	51	3,000	153000
84	Power Tools battery operated for Drilling purpose	EA	51	3,000	153000
85	LT meter- testing equipment(onsite testing)	EA	20	1,10,000	2200000
86	HT meter- testing equipment(onsite testing)	EA	6	6,00,000	3600000
87	HT-CTPT testing equipment	EA	6	10,00,000	6000000
88	TRMS Value Measuring Multimeter With high Accuracy and High Insulation Class	EA	20	14,000	280000
89	TRMS Value Measuring Clamp on Meter With high Accuracy and High Insulation Class	EA	20	3,840	76800
90	CMRI with Bluetooth, Memory 500 MB	EA	20	50,000	1000000
91	IR+PI Value Measurement in Step of 500V to 5KV (Megger)	EA	20	14,000	280000
92	Accucheck single phase	EA	30	40,000	1200000
93	Accucheck three phase	EA	30	1,00,000	3000000
94	HHD 500 GB	EA	30	2,000	60000
95	DMRI	EA	30	40,000	1200000
96	Digital Camera, Min 40 MP	EA	30	6,000	180000
97	External DVD Writer	EA	30	1,625	48750
98	Night Vision Camera	EA	6	10,990	65940
99	Phantom heating load 2 kw	EA	30	1,000	30000
100	Pendrive 16GB	EA	30	1,230	36900
101	Clamp-on meter/ Tong Tester	EA	30	1,000	30000
102	Magnifying Glass	EA	30	300	9000
103	Pen Spy Camera	EA	30	1,390	41700
104	Spy/Specks Camera with min 16 GB memory card	EA	30	1,000	30000
105	Digital Milliamp Meter	EA	30	1,500	45000

106	Non Contact Electric Voltage Power Detector/Sensor	EA	30	2,549	76470
107	lens Convex	EA	30	200	6000
108	Mirror 4"x6"	EA	30	100	3000
Total (with GST)					199757962.7
Total In Crores					19.98

8.4 Annexure 4 DPR for Cradle guard at major road crossings & Construction of Plinth fencing of DSS and Boundary wall for PSS

Cradle guard at major road crossings

Guarding is an arrangement provided in overhead MV/HV/LV feeders, by which a live conductor, when accidentally gets broken, is prevented to come in contact with public or animals and vehicles moving beneath the road. By having cradle guards in place, immediately after a live conductor breaks, it first touches the cradle guard thus completing the electrical circuits necessary for the operation of the protection relays installed at substations. This in-turn trips the circuit breaker and danger to any living object is averted.

Sl No	Description of Materials	Unit	Quantity	Unit Rate in Rs.	Amount in Rs.
1	2	3	4	5	6
1	Guarding cross arm of 100x50x6mm MS Channel 2.21mtr long 2Nos @9.2Kg/mtr	Kg	56,930	65	37,00,424
2	Back clamp for guarding cross arm	No	2,800	80	2,24,000
3	HT Stay set Complete	Set	2,800	1050	29,40,000
4	7/10 SWG GI Stay Wire (0.455Kg/mtr)	Kg	19,600	75	14,70,000
5	HT Stay clamp	pair	2,800	125	3,50,000
6	HT Stay Insulator	No	2,800	50	1,40,000
13	Cement concreting for stay anchor plate with C.C. 1:3:6 by using 4cm size hard granite metal= 0.45Mtrx0.45Mtrx1.5Mtr= 0.3Cum	No	2,800	1270	35,56,000
7	MS Nuts, Bolts & washers	Kg	2,800	71	1,98,800

8	40mm dia GI pipe earthing device 3.0mtr long	No	2,800	1050	29,40,000
9	Materials for Massionary work for Earth Pit, Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	LS	2,800	1600	44,80,000
	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	Kg	4,71,240	65	3,06,30,600
10	Eye hook	No	11,200	60	6,72,000
11	No. 6 GI wire ((2x72.1mtr) Guard wire+ (2x10mtr long earth wire)) (0.146Kg/mtr)	Kg	33,562	75	25,17,186
12	No. 8 GI wire (37x2.55mtr long) cross lacing (0.103Kg/mtr)	Kg	13,605	75	10,20,395
	Total A				5,48,39,405
	Stock, storage and Insurance @ 3% of A				16,45,182
	Sub Total B				5,64,84,587
	T &P @ 2% of B				11,29,692
	Contingency @ 3% of B				16,94,538
	Transportation @ 7.5% of B				42,36,344
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				40,70,983
	Sub total C				6,76,16,144
	6% supervision charge/over head charge				40,56,969
	Gross Total				7,16,73,112
	OR Say				7,16,73,112
	GST @				1,29,01,160
	CESS 1%				7,16,731
	Gross (Inc. GST)-				8,52,91,003
	Total(In Crores)				8.53
	Unit Rate as per TPSODL /CDB Rate 2019-20				

Installation / Construction of Plinth fencing of DSS and Boundary wall for PSS:

Cost Estimate of Unit cost for Fencing for DSS:

S.NO.	Brief Item Description	Quantity	Unit	Rate	Amount
1	Excavation in all types of ordinary soils / hard murrum including all necessary permissions, depositing / stacking of all materials, removal of vegetation, backfilling with excavated earth in layers, well watered, compacted, transporting of surplus excavated material for backfilling or stacking or spreading or removal of surplus excavated earth within a basic lead of 100 mtrs as directed for a depth from 0.0 to 1.5 mtrs	408	M3	250	102000
2	Providing and laying 225 or 300 mm thick dry rubble soling with approved quality stones including filling gaps with small chips ramming with hand rammer etc. complete.	157	M3	2000	314000
3	Supplying, Providing and laying in position plain cement concrete of grade M15 machine mixed, vibrated and placed to correct line and level in levelling course/fill under or around foundations pits, slabs on grade, sumps, soak pits, etc. at any depth with 30 mm down graded coarse aggregates including curing, compacting, de-watering wherever necessary, providing marine plywood shuttering, form work, steel scaffolding wherever required etc. complete. (Min cement content 300 Kg/m3)	51	M3	6000	306000

S.NO.	Brief Item Description	Quantity	Unit	Rate	Amount
4	Supplying, Providing and laying in position plain cement concrete of grade M15 machine mixed, vibrated and placed to correct line and level in bedblocks/ concrete blocks, coping, etc. at any depth with 30 mm down graded coarse aggregates including curing, compacting, de-watering wherever necessary, providing marine plywood shuttering, form work, steel scaffolding wherever required etc. complete. (Min cement content 300 Kg/m3)	82	M3	6500	533000
5	Providing all material and constructing brick masonry 230 mm. thick and above in cement mortar (1:5) using approved quality class 50 conforming to IS:3102 table moulded bricks, including leaving inserts / pockets, steel scaffolding, curing, raking joints, etc.	196		6000	1176000
6	Providing and plastering external surfaces of concrete and brick work such as walls, columns, beams, coping etc. with cement mortar 1:4 mix finish smooth with 1:1 proportion cement & slaked lime neeru / instant neeru, including providing and erecting steel scaffolding, hacking concrete surface, providing bands, grooves drip moulds, curing, etc - 12 mm thk	1326	M2	350	464100

S.NO.	Brief Item Description	Quantity	Unit	Rate	Amount
7	Providing steel and supplying all material, fabricating and erecting structural steel work at all heights including steel scaffolding for roof trusses, purlins, beams, columns, posts for gates, chequered plate flloring, treads, risers, stringers, bracings, runners etc. at all heights including welding and gas cutting, drilling of holes etc. complete as per the approved drawing or as directed. Contractor shall use his own welding set, gas cutting set, gas, electrodes, drill machine and other accessories, required for carrying out the entire work. The rate shall include supply and fixing of MS bolts, and nuts, and washers and applying one coat of Shalimar or any other approved make red oxide (primer) paint to all the exposed surfaces of steel including applying synthetic enamel paint of approved make over one coat of primer.. Structural steel section shall be of primary manufacturer and confirm to IS2062 requirements	24.65	MT	89890	2215788.5
8	Providing and fixing reinforced barbed wire tape (RBT) (2.6mm) thick single wire along the boudary wall / fencing on angle iron post with all necessary fitting such as welding of nuts, bolts, clips, split pins, steel scaffolding, TSP & labour etc.complete.	5100	M	30	153000
9	Providing all the materials including binding wires, cleaning, bending, cutting, hoisting, placing in position, lapping and binding with 16 SWG annealed soft iron wire or	2.785	MT	75000	208875

S.NO.	Brief Item Description	Quanti ty	Unit	Rate	Amount
	tack welding reinforcement steel for all types of RCC / Precast work irrespective of locations & levels all as per drawings including handling and transporting from site stores, steel scaffolding complete as directed by using High yield strength deformed bars conforming to IS 1786 - HYSD Bars				
10	Providing cartage service and transporting, excavated soil, debris, bricks, concrete, scrapwood including loading and unloading and disposing off to dumping sites approved by statutory bodies outside premises including submission of relevant documents, as applicable outside the station premises . (Note. Payable measurement shall be dismantelled qty. (Voids to be deducted as applicable whenever heap / truck mesurements are taken))	325	M3	450	146250
11	Providing , stretching and fixing Galvanised Iron chain link fencing 2" square and of gauge 10 (bare metal thickness) on angle posts with heavy duty GI split pins etc. in position complete as directed at all Heights including steel scaffolding.	4250	M2	400	1700000
12	Stretching and fixing chain link fencing 2" square and of gauge 10 (bare metal thickness) on angle posts with heavy duty GI split pins etc. in position complete as directed at all Heights including steel scaffolding. (Only Chain link shall be supplied by the Owner).	4250	M2	200	850000

S.NO.	Brief Item Description	Quantity	Unit	Rate	Amount
13	Providing, Fabricating and erecting MS gates consisting of MS hollow rectangular or square box sections with 6mm to 8mm thk. MS joining plates, including welding of sections as per design approved by the Owner. Fabricating the framework with necessary hinges, locking arrangement including applying synthetic enamel paint of approved make over one coat of primer. Contractor shall use his own welding set, gas cutting set, gas, electrodes and other accessories, steel scaffolding required to complete the entire job. All hollow box steel section shall be of primary manufacturer and confirm to IS 4923 requirements	6.8	MT	89890	611252
				Total	8780265.5
			Add GST		
			Add GST	18%	1580447.79
			Grand Total including taxes		10360713.29
	Cost for Total RM			1700	10360713.29
	Cost Per RM of fencing				6094.537229
	Cost for 1 unit of 4 x4				97512.59567
	Say for One Uint			Rs.	1.00 Lakh

Circle wise Requirement of Fencing of DSS:

Circle Name	No of Divisions	Total Fencing required on priority based (in Nos.)	1st year no of DSS Fencing to be considered in FY21-22(Nos.)	Unit Cost for each DSS Fencing(in Crore)	Total Cost for DSS Fencing(in Crore)
City	3	540	250	0.01	2.5
Berahmpur	3	1240	250		2.5

Aska	3	630	250		2.5
Bhanjanagar	3	805	250		2.5
Raygada	3	417	250		2.5
Jeypore	4	680	250		2.5
Total	**19**	**4312**	**1500**		**15.0**

Cost Estimate of Unit cost per meter for Boundary wall for PSS:

S no	Item Description	Unit	Qty	Rate in Rs	Amount in Rs
1	Excavation	Cum	110	250	27500
2	PCCM-10	Cum	6	6000	36000
3	RCC Raft M-20	Cum	20	8000	160000
4	Rcc Column M-20	Cum	4	9000	36000
5	RCC For Beam M-20	Cum	5	9000	45000
6	Brick Masonary 1:5	Cum	19	6000	114000
7	External Plaster in CM 1:4	Sqm	200	350	70000
8	Strl Steel	MT	0.2	89000	17800
9	Barb wire	Rm	270	30	8100
10	Concertina Coil	Rm	30	400	12000
11	Reinf Steel	MT	1.5	75000	112500
12	Painting with Cement based paint	Sqm	200	160	32000
	Total Amount for 30 M				670900
			Add GST	18%	120762
					791662
	Rate for 1 M in Rs.				**26388.73**
	Rate for 1 M in **Crores**				0.0026

Circle wise Requirement of Boundary wall for PSS:

Circle Name	No of Divisions	Total Boundary wall required (in mtrs)	Total quantity considered in FY21-22 (in meters)	Unit Cost for per meter Boundary wall for PSS (in Crore)	Total Cost for PSS Boundary wall(in Crore)
City	3	5880	1000	0.0026	2.64
Berahmpur	3	2370	1000		2.64
Aska	3	1550	900		2.37
Bhanjanagar	3	25000	1034		2.73
Raygada	3	6609	900		2.37
Jeypore	4	16460	1000		2.64
Total	**19**	**57869**	**5834**		**15.40**

8.5 Annexure 5 DPR for Establishment of Meter Testing Lab

Cost Estimate of Meter Testing Bench:

Material	Estimated unit cost (Rs.)	Estimated unit cost (Rs.) With GST 18%	Qty. (No.)	Cost (Rs.)
SINGLE PHASE 20 POSITION BENCH	1,01,48,000	1,19,74,640	1	1,19,74,640
THREE PHASE 20 POSITION BENCH	1,01,48,000	1,19,74,640	1	1,19,74,640
SINGLE PHASE/ THREE PHASE PHANTOM LOAD TEST BENCH	2,08,000	2,45,440	3	7,36,320
Total				**2,46,85,600**
Total in Rs. Crores				**2.47**

Testing equipment	Estimated unit cost (Rs.)	Estimated unit cost (Rs.) With GST 18%	Qty. (No.) Year-1	Total Cost
LT meter- testing equipment(onsite testing)	1,10,000	1,29,800	20	25,96,000
HT meter- testing equipment(onsite testing)	6,00,000	7,08,000	6	42,48,000
HT-CTPT testing equipment	10,00,000	11,80,000	6	70,80,000
TRMS Value Measuring Multimeter With high Accuracy and High Insulation Class	14,000	16,520	20	3,30,400
TRMS Value Measuring Clamp on Meter With high Accuracy and High Insulation Class	3,840	4,531	20	90,624
CMRI with Bluetooth, Memory 500 MB	50,000	59,000	20	11,80,000
IR+PI Value Measurement in Step of 500V to 5KV (Megger)	14,000	16,520	20	3,30,400
Total				**1,58,55,424**
Total in Crores				**1.59**

The above cost is included in Safety PPE & Testing equipment mentioned in Annexure No.3

8.6. Annexure 6 DPR for Loss reduction initiative

Cost Estimate for Input Energy Monitoring System (ABT/AMR):

Reason for replacement	Qty.	Unit Supply Cost	Unit Supply Cost With GST 18%	Total Supply Cost	Unit Installation Cost	Unit Installation Cost With GST 18%	Total Installation Cost	Total Supply + Installation Cost
	No.	Rs.	Rs.	Rs.	Rs.		Rs.	Rs.
Exchange Point Metering System including MDAS	120	516041	608928.38	73071405.60	137470	162215	19465752	92537157.60
Grand Total								**92537157.60**
Total In Crores								**9.25**

REQUIREMENT OF Control Cables 21-22										
Cable Size (Sq mm)	Required Qty.	Cost per Meter	Cost per Meter With GST 18%	Cost of Cable	Unit Installation cost connection	Unit Installation cost connection With GST 18%	Total Supply Cost	Total Inst cost	AMOUNT 21-22	
	Mtr	Rs.		Rs.	Rs.		Rs.	Rs.	Rs.	Rs. (Crores.)
Armoured Control Cable	33,000	400	472	1,55,76,000	40	47	1,55,76,000	15,57,600	1,71,33,600	1.71
Grand Total	33,000			1,55,76,000			1,55,76,000	15,57,600	1,71,33,600	1.71

Meter Requirement for Loss reduction:

Type of meter	Reason for replacement	Qty. - (No.)	Total Cost (In Crores) Supply + Installation
Single Phase meters	No Meters	2,129	43.27
	Old Defective Meters***	3,00,000	
	New Defective Expected	77,589	
	Electromechanical Meter	0	

Three Phase Whole Current meters	No Meters	0	1.62
	Defective Meters	4,808	
	New Defective Expected	230	
	Electromechanical Meter	0	
Three Phase LT CT meters	No Meters	0	0.08
	Defective Meters	66	
	New Defective Expected	5	
	Electromechanical Meter	0	
Three Phase HT CT meters(11kV/110V)	No Meters	0	8.89
	Defective Meters	1,422	
	New Defective Expected	15	
	Electromechanical Meter	0	
Three Phase HT CT meters(33kV/110V)	No Meters	0	0.44
	Defective Meters	35	
	New Defective Expected	2	
	Electromechanical Meter	0	
Grand Total		3,86,301	54.29

Cable Requirement:

In “no meter” and “defective meter” cases, it is expected that in majority of cases will be there in which cable replacement will be required on account of defective or poor condition of cable:

It is pertinent to mention here that armoured service cable will be used as they are more robust and their failure rate is less as compared to unarmoured cable.

Cable Size	Required Qty.	Cost per Meter With 18%	Cost of Cable	Unit Installation cost connection with GST 18%	Total Supply Cosr	Total Inst cost	AMOUNT Supply + Installation (21-22)	
(Sq mm)	Mtr	Rs.	Rs.	Rs	Rs.	Rs.	Rs.	Rs. (Crores)
2*4	7,11,356	43	3,06,21,320	22	3,06,21,320	1,53,32,820	4,59,54,141	4.6
2*10	1,77,839	64	1,14,36,828	21	1,14,36,828	38,00,804	1,52,37,632	1.52
4*10	52,899	82	43,23,890	23	43,23,890	12,03,744	55,27,634	0.55
4*25	746	150	1,11,721	37	1,11,721	27,460	1,39,180	0.01
4*95	15,089	402	60,62,408	63	60,62,408	9,50,608	70,13,017	0.7

Cable Size	Required Qty.	Cost per Meter With 18%	Cost of Cable	Unit Installation cost connection with GST 18%	Total Supply Cosr	Total Inst cost	AMOUNT Supply + Installation (21-22)	
(Sq mm)	Mtr	Rs.	Rs.	Rs	Rs.	Rs.	Rs.	Rs. (Crores)
4*150	389	617	2,39,805	63	2,39,805	24,476	2,64,281	0.03
Grand Total	9,58,317		5,27,95,972		5,27,95,972	2,13,39,913	7,41,35,885	7.41

Metering Accessories requirements:

Below mentioned accessories are mandatory for installation of meters and to ensure communication of right revenue meters.

Requirement of Modem:

Accessories	Qty.	Unit Supply Cost	Unit Supply Cost With GST 18%	Total Supply Cost	Unit Installation Cost	Unit Installation Cost With GST 18%	Total Installation Cost	Total Supply + Installation Cost (21 - 22)
	No.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Modem	1,000	4,012	4,734.20	47,34,160	232.2	274	2,74,024.3	50,08,184.3
Total	1,000			47,34,160			2,74,024.32	50,08,184.32
Total in Rs. Crores								0.5

Requirement of Polycarbonate seals:

Seal, Terminal, Polycarbonate Box

Accessories	Qty.	Unit Supply Cost	Unit Supply Cost With GST 18%	Total Supply Cost	Total Supply + Installation Cost (21 - 22)
	No.	Rs.		Rs.	Rs.
Poly carbonate seals	14,31,502.90	4.5	5.4	76,73,915.00	76,73,915.00
Total	14,31,502.93			76,73,915.03	76,73,915.03
Total In Crores					**0.77**

Cost Estimate for LT Bare to ABC conversion:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (in Rs)
1	3x50+1x25+1x16mm2 AB cable	171000	M	182	3,11,15,160.00
2	300Kg PSC pole 9Mtr long	1197	EA	4,121	49,32,837.00
3	Board Danger 440V size 8x10 inch	1197	EA	43	51,471.00
4	ANTICLIMBING DEVICE	1197	EA	150	1,79,550.00
5	Two Line X arm GI for 9Mtr PCC Pole	1197	EA	242	2,89,674.00
6	ANCHOR LT ABC CABLE 3X120 TO 150 SQMM	2736	EA	95	2,59,920.00
7	Suspension Clamp with EYE hook for ABC	4788	EA	340	16,27,920.00
8	Eye Hook for AB cable	7524	EA	60	4,51,440.00
9	Plate Base RCC Size 450x450x50mm	1197	EA	60	71,820.00
10	7/10 SWG G I stay wire (10Kg. / Set)	27360	KG	75	20,52,000.00
11	40mm dia GI pipe earthing device 3 mtr. Long	1710	EA	1,050	17,95,500.00
12	Pipe HDPE Size 25MM	5130	M	18	92,340.00
13	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	6840	EA	17	1,16,280.00
14	METAL DISTRIBUTION BOX	855	EA	1,009	8,62,968.60
15	Dist. Box for housing 5 No. 10Amps MCCB including accessories for fixing with pole suitable for AB XLPE Cable	855	EA	1,838	15,71,490.00
16	Cap cable end for ABC Cables	10944	EA	19	2,07,936.00

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (in Rs)
17	IPC KZ 4X150	13680	EA	59	8,07,120.00
18	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	10260	EA	40	4,06,226.44
19	WIRE GI 8 SWG	711.36	KG	52	36,990.72
20	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	41040	EA	64	26,26,560.00
21	STEEL STRAP SIZE 20 MMX50 M LONG	136.8	ROL	1,250	1,71,000.00
22	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	136.8	EA	580	79,291.83
23	CABLE 1.1KV AL 4CX25 SQMM ARM	5130	M	120	6,15,600.00
24	GLAND FOR CABLE 4X25 SQ.MM	17100	EA	48	8,18,191.53
25	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	6840	EA	3	23,824.07
26	FLAT GI SIZE 50X6 MM	41040	KG	52	21,34,080.00
27	FLAT GI Size 25x6 MM	26676	KG	67	17,87,292.00
28	FRP CROSS ARM 1070MM 415V	5130	EA	317	16,25,645.70
29	ISA-50*50*6 GI Angel (4.6KG/M)	35910	KG	114	41,01,652.37
30	ISMC-75*40 GI Channel (7.24KG/M)	35910	KG	114	41,01,652.37
31	BOLT & NUT GI 12MMX50MM HEX	2052	KG	114	2,34,380.14
32	BOLT & NUT GI 16MMX75M HEX	4104	KG	114	4,68,760.27
33	WASHER GI SIZE 12MM DIA	684	KG	114	78,126.71
34	4Cx16 mm2 LT PVC Cable	17100	Mtr	100	17,10,000.00
35	2Cx6 mm2 LT PVC Cable	34200	Mtr	30	10,26,000.00
36	4Cx10 mm2 LT PVC Cable	17100	Mtr	115	19,66,500.00
37	Dismantling of 55Sqmm conductor & Transport to Store	171	KM	1000	1,71,000.00
38	Dismantling of PSC pole with Transport to Store	513	EA	1000	5,13,000.00
39	MISC expenses for Dismantling	171	LS	1000	1,71,000.00
40	LT Stay set Complete	855	Set	520	4,44,600.00
41	7/12 SWG Stay Wire	8550	K.g.	75	6,41,250.00
42	LT Stay clamp (1.4 K.g./ Pair)	855	pair	110	94,050.00
43	LT Stay Insulator	855	No.	35	29,925.00
44	Fixing and concreting of stay set with 0.5Cum cement concrete foundation 1:3:6 size (900mmx600mmx900mm) using 40mm BHG metal with all labour and material except stay set, stay wire, stay insulator.	855	No.	2455.46	20,99,418.30
45	WASHER GI SIZE 16MM DIA	1026	KG	114	1,17,190.07

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs)	Amount (in Rs)
46	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	6840	EA	3	21,888.00
47	TIE PLASTIC BLACK SIZE 7.6 MM X 150MM	3420	EA	2	7,660.80
48	Tie Plastic size 9mmx265mm	18468	EA	4	73,872.00
Subtotal Material(A)					**7,48,82,055**
Stock, Storage and Insurance@3% of A					2,246,461.65
Sub- Total-B					**77,128,516.57**
T & P Charges @ 2% of B					1,542,570.33
Contingency @ 3% of B					2,313,855.50
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					8,220,933.87
Transportation Charges@7.5% of B					5,784,638.74
Sub-Total C					**94,990,515.00**
Over Head Charges (Including Supervision charges) @6% of C					5,699,430.90
Total D					**100,689,945.90**
Gross Cost					100,689,945.90
OR Say					100,689,946.00
GST @18%					18,124,190.28
CESS 1%					1,006,899.46
Gross Cost (Inc. GST+ Cess)					**119,821,035.74**
Total(In Crores)					**11.98**
Unit Rate as per TPSODL /CDB Rate 2019-20					

Cost Estimate of Demand side Management Initiatives

Sr No.	Particulars	Unit	Quantity	Unit Cost (Rs) IN CR.	Total Cost (Rs.) IN CR.
1	Siper Energy Efficient Fans	Nos	15235	1800	27423000
2	Suer Efficient Air Conditioners	Nos	500	39990	19995000
3	Premium Efficiency Electric Motor	Nos	550	4702.5	2586375
Total					**5.00**

8.7. Annexure 7 DPR for Network reliability:

33 kV Network refurbishment

List of Locations as per GRIDCO Distribution Planning Report

Sl. No.	Circle / Division	33kV feeder name	From substation	To substation	Distance (in Ckt. km)	Line loss Reduced(MW)	Priority level
1	Aska	Budhamba	Aska GSS	Budhamba	20	2.186	2
2	Jeypore	Boriguma	Jayanagr GSS	Randapalli PSS	11	1.971	2
3	Phulbani	Kalinga	Dahapadar Tapping	Phirngia	8	1.872	2

Distribution Planning Report.pdf

S. No.	Description	UOM	Qty	Amount in Crores.
1	33kV Line Refurbishment-232 sq.mm AAAC	Ckt Km	35	4.6
2	33kV Line Refurbishment-148 sq.mm AAAC	Ckt Km	57	5.48

Cost Estimate:

Estimate for 33kV Overhead Line Refurbishment with 232 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
1	232 sqmm All Alloy Aluminum Conductor AAAC	108150	M	156.5	1,69,25,475
2	150X 150mm RS joist (13 Mtr long)(34.6 ky Per meter)(Each 415.2kg)	101724	KG	65	66,12,060
3	BOLT & NUT GI 16MMX75M HEX	525	KG	114	59,966
4	BOLT & NUT GI 16MMX200MM HEX	105	KG	114	11,993
5	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	5250	KG	65	3,41,250
6	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	2030	KG	65	1,31,950
7	100x50x6 mm MS Channel (9.2Kg. / Mtr)	5040	KG	65	3,27,600
8	50x6 mm G I flat	3780	KG	75	2,83,500
9	25x6 mm G I flat	1120	KG	75	84,000
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	140	EA	1,050	1,47,000
11	PIPE HDPE SIZE 25 MM	420	M	31	13,020
12	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	560	EA	17	9,520
13	WASHER MS SIZE 16MM DIA	105	KG	95	9,949
14	BOARD DANGER 33KV SIZE 8X10 INCH	560	EA	86	48,160
15	ANTICLIMBING DEVICE FOR TOWER (BRACKET)	560	EA	430	2,40,800
16	INSULATOR STAY (GUY/EGG) 11KV	560	EA	50	28,000
17	PLATE BASE RCC SIZE 450X450X50MM	805	EA	110	88,550
18	ANCHOR ROD SIZE 20MMX2100MM	560	EA	77	43,120
19	TENSION SCREW GI SIZE 750X20MM	560	EA	342	1,91,520
20	Disc insulator (B&S) 120KN Polymer	420	EA	1,440	6,04,800
21	33KV H W fitting(B&S)90KN, 3Bolt	420	EA	351	1,47,420
22	V-CROSS ARM STEEL FOR 11KV	420	EA	507	2,12,940
23	7/10 SWG G I stay wire (10Kg. / Set)	7000	KG	75	5,25,000
24	Back Clamp for V cross arm(33KV) 1.7 kg each 950*8 Flat)	420	EA	150	63,000
25	WIRE GI 4 SWG	17500	KG	52	9,10,000
26	COVER MVLC - 38 FOR GOAT COND	210	M	550	1,15,500

S No.	Item Description	Quantity	Unit	Unit Rate in Rs.	Amount (INR)
27	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	140	LS	1600	2,24,000
28	33KV pin insulator polymer	1470	EA	480	7,05,600
Subtotal Material(A)					**2,91,05,693**
Stock, Storage and Insurance@3% of A					873170.79
Sub- Total-B					**29978863.8**
T & P Charges @ 2% of B					599577.28
Contingency @ 3% of B					899365.91
Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					2747301.88
Transportation Charges@7.5% of B					2248414.78
Sub-Total C					**36473523.65**
Over Head Charges (Including Supervision charges) @6% of C					2188411.42
Total D					**38661935.07**
Gross Cost					**38661935.07**
OR Say					**38661935**
GST @18%					6959148.3
CESS 1%					386619.35
Gross Cost (Inc. GST)					**46007702.65**
Total(In Crores)					**4.6**
Unit Rate as per TPSODL /CDB Rate 2019-20					

Estimate for 33kV Overhead Line Refurbishment with 148 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	148mm2 All Aluminium Aloy Conductor. AAAC	176130	M	82	1,44,42,660
2	150X 150mm RS joist (13 Mtr long)(34.6 ky Per meter)(Each 415.2kg)	165665	KG	65	1,07,68,212
3	BOLT & NUT GI 16MMX75M HEX	855	KG	114	97,658
4	BOLT & NUT GI 16MMX200MM HEX	171	KG	114	19,532
5	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	11400	KG	65	7,41,000

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
6	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	5700	KG	65	3,70,500
7	100x50x6 mm MS Channel (9.2Kg. / Mtr)	7980	KG	65	5,18,700
8	50x6 mm G I flat	6156	KG	75	4,61,700
9	25x6 mm G I flat	1824	KG	75	1,36,800
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	228	EA	1,050	2,39,400
11	PIPE HDPE SIZE 25 MM	684	M	31	21,204
12	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	912	EA	17	15,504
13	WASHER MS SIZE 16MM DIA	114	KG	95	10,802
14	BOARD DANGER 33KV SIZE 8X10 INCH	912	EA	86	78,795
15	ANTICLIMBING DEVICE FOR TOWER (BRACKET)	912	EA	430	3,92,230
16	INSULATOR STAY (GUY/EGG) 11KV	912	EA	50	45,600
17	PLATE BASE RCC SIZE 450X450X50MM	1311	EA	110	1,44,210
18	ANCHOR ROD SIZE 20MMX2100MM	912	EA	77	70,224
19	TENSION SCREW GI SIZE 750X20MM	912	EA	342	3,11,904
20	Disc insulator (B&S) 120KN Polymer	684	EA	1,440	9,84,960
21	33KV H W fitting(B&S)90KN, 3Bolt	351	EA	351	1,23,201
22	V-CROSS ARM STEEL FOR 11KV	684	EA	507	3,46,788
23	7/10 SWG G I stay wire (10Kg. / Set)	11400	KG	75	8,55,000
24	Back Clamp for V cross arm(33KV) 1.7 kg each 950*8 Flat)	684	EA	150	1,02,600
25	WIRE GI 4 SWG	34200	KG	52	17,78,400
26	COVER MVLC - 38 FOR GOAT COND	342	M	550	1,88,100
27	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing	228	LS	1600	3,64,800

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
	chamber (Size: 2"x2") and RCC slab cover				
28	33KV pin insulator polymer	2394	EA	480	11,49,120
Subtotal Material(A)					**3,47,79,604**
	Stock, Storage and Insurance@3% of A				1043388.12
	Sub- Total-B				**35822991.98**
	T & P Charges @ 2% of B				716459.84
	Contingency @ 3% of B				1074689.76
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				3135205.26
	Transportation Charges@7.5% of B				2686724.4
	Sub-Total C				**43436071.24**
	Over Head Charges (Including Supervision charges) @6% of C				2606164.27
	Total D				**46042235.51**
	Gross Cost				**46042235.51**
	OR Say				**46042236**
	GST @18%				8287602.48
	CESS 1%			-	460422.36
	Gross Cost (Inc. GST)33 kV OH Line-148 sqmm				**54790260.84**
	Total(In Crores)				**5.48**
Unit Rate as per TPSODL /CDB Rate 2019-20					

8.8. Annexure 8 DPR for Primary Substations (PSS) & 11kV Distribution Substations (DSS) refurbishment

I. Cost estimate for Sick Equipment replacement (VCB, CT/PT, CRP, Isolator, AB switches, Battery bank & Charger):

S No.	Item Description	Quantity	Unit	Unit Rate (In Crores.)	Amount (INR)
1	33KV VCB -800A	20	EA	3,00,000.00	60,00,000.00
2	33KV CT- 800-400-200/1-1-1	60	EA	46,000.00	27,60,000.00
3	33KV PT	5	EA	40,000.00	2,00,000.00
4	33KV Control Relay Panel For Transformer	10	EA	4,50,000.00	45,00,000.00
5	33KV Control Relay Panel For IC/OG	10	EA	3,00,000.00	30,00,000.00
6	11KV VCB - 1200A	24	EA	2,50,000.00	60,00,000.00

7	11KV CT- 300-600/1-1, 400-800-1200/1-1-1	75	EA	30,000.00	22,50,000.00
8	11KV PT	8	EA	30,000.00	2,40,000.00
9	11KV Control relay panel	13	EA	2,50,000.00	32,50,000.00
10	33kv Isolator (800A)	50	EA	1,20,000.00	60,00,000.00
11	AB Switch(33KV,400A,3Pole,50Hz)	50	ST	19070	9,53,500.00
12	AB Switch(11KV, 400A,3Pole,50Hz)	50	ST	11,850.00	5,92,500.00
13	16 C 2.5 mm sq Cu Control Cable, un armoured	1000	mtr.	403.00	4,03,000.00
14	10 C 2.5 mm sq Cu Control Cable, un armoured	1000	mtr.	258.00	2,58,000.00
15	2C 2.5mm sq Cu Control Cable, un armoured	1000	mtr.	68.00	68,000.00
16	**11 KV 800** Amp Isolator without earth switch with PI (polymer)	50	Set	43,240.00	21,62,000.00
17	24 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	40	EA	28,820.00	11,52,800.00
18	24V, 100A Float cum Boost Charger (Float/Boost current as per above VRLA Battery)	40	EA	3,29,220	1,31,68,800.00
19	48 V, 100 AH, maintenance free VRLA Battery (Set. 4 Nos of 12V Battery)	25	EA	57,650.00	14,41,250.00
20	48V, 100A Float cum Boost Charger (Float/Boost current as per above VRLA Battery)	25	EA	1,44,120.00	36,03,000.00
21	Control Cable 2Cx 50 Sq mm	1000	mtr.	684	6,84,000.00
22	40mm Nominal bore GI pipe (medium gauge) earthing device with 3mtr long	200	No	1050.00	2,10,000.00
23	25X6mm GI Flat (@1.2Kg/mtr)	2640	Kg	75.00	1,98,000.00
24	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	176	No	1600.00	2,81,600.00
25	Design, Engineering, Supply of all materials and labour for construction of RCC foundation (1:2:4)as per approved drawing for 33KV VCB with CT as per applicable TS and drawing.	1	LS	15000	15000.00
26	Sundries (Clamp, connector, danger board, Insulation tape etc)	44	LS	2000.00	88,000.00

	Subtotal Material(A)	**5,94,79,450.00**
	Stock, Storage and Insurance@3% of A	1784383.50
	Sub- Total-B	**61263833.50**
	T & P Charges @ 2% of B	1225276.67
	Contigency @ 3% of B	1837915.01
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)	6310174.85
	Transportation Charges@7.5% of B	4594787.51
	Sub-Total C	**75231987.54**
	Over Head Charges (Including Supervision charges) @6% of C	4513919.25
	Total D	79745906.79
	Gross Cost	**79745906.79**
	OR Say	**79745907.00**
	GST @18%	14354263.26
	CESS 1%	7,97,459.07
	Gross Cost (Inc. GST)	94897629.33
	Total(In Crores)	9.49
	Unit Rate as per TPSODL /CDB Rate 2019-20	

II.Cost estimate for replacement of Sick PTR:

Sl. No.	Item-Description	Unit	Qty.	Unit Rate(In Rs)	Total Price (In Rs)
1	2	3	4	5	6
	Part-A				
2	Earthing and Grounding as per applicable TS				
b	GI flat 90X6 mm size under ground for mat	MT	3	75000	2,25,000.00
c	GI flat 50X6 mm size for riser	MT	0.9	75000	67,500.00
d	GI flat 25X6 mm size for riser	MT	0.9	75000	67,500.00
e	8 swg GI wire	MT	0.15	75000	11,250.00
3	Busbar, droppers, jumpers and interconnections with all outdoor equipment using 232 sq.mm AAA Conductor , all associated conductor, insulator, hardwares,clamps, 8 SWG wire etc as per applicable TS				
a	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	km	0.6	186231	1,11,738.50
b	Equipment jumpering with 232 sq.mm AAA Conductor	km	0.6	186231	1,11,738.50
c	3 Bolted(3 pair M-16 U bolts to be used) 33 Kv H/W fitting with 4 nos Insulator (70KN) String Suitable for 232 sq.mm AAA Conductor	Set	27	2952	79704
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	No	9	1000	9,000.00
e	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	No	36	384	13824.00
5	33Kv Isolator without earth switch	Set	3	67500	202500.00

7	33Kv O/D VCB with CT & In-Door Control Relay Panel (Excluding Foundation)				
A	For Transformer	Set	3	590000	17,70,000.00
9	33/11 KV,5 MVA 33/11 KV Power Transformer (Excluding Foundation)	No	3	4315500	1,29,46,500.00
10	33Kv Post Insulator	No	9	1050	9,450.00
16	TOTAL OF SUPPLY				1,56,25,705.00
17	Dismantling of existing transformer	EA	3	200000	6,00,000.00
18	Testing	LS	3	200000	6,00,000.00
A	GRAND TOTAL(29+30+31)				1,68,25,705.00
B	Stock & Storage @ 3% of A				5,04,771.15
C	Sub - Total (A+B)				1,73,30,476.15
D	Contingency @ 3 %+T&P Charges @2%+Transportation 7.5% +Errection 10%=22.5 % of C				3899357
E	Sub - Total (C+D)				2,12,29,833.28
F	Other Overheads including supervision charges @ 6% of E				1273790.00
G	Total estimated Capital Cost (E+F)				22503623.28
H	GST 18% of G				40,50,652.19
I	CESS 1% of G				2,25,036.23
J	Total Cost				2,67,79,311.70
	Total(In Crores)				2.68
K	Inspection fee				Extra as per Govt notification
	Unit Rate as per TPSODL /CDB Rate 2019-20				

Cost Estimate for DSS refurbishment:

S.No.	Description	UOM	Qty	Amount in Crores.
1	DSS Refurbishment of 500 kVA	EA	40	2.39
2	DSS Refurbishment of 250 kVA	EA	80	2.56
3	DSS Refurbishment of 100 kVA	EA	157	5.06
Total			**277**	**10.01**

III.Estimate for 500 kVA Distribution Substations Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
1	500 KVA,11/0.4KV(Cu) Transformer	0	EA	5,80,000.00	-
2	ACB LT 400A	80	EA	39,919	31,93,520
3	BOARD DANGER 11KV SIZE 8X10 INCH	80	EA	131	10,480

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
4	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	280	EA	1,050	2,94,000
5	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	960	EA	8	7,485
6	FUSE ELEMENT FOR 11KV DD FUSE 30AMP PINK	120	EA	52	6,240
7	7/10 SWG G I stay wire (10Kg. / Set)	3000	KG	75	2,25,000
8	CABLE 1.1KV AL 1X630 SQMM UNAR XLPE	2560	M	395	10,11,504
9	LUG AL CRIMPING 630 SQMM XLPE ONE HOLE	640	EA	115	73,600
10	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	6800	KG	65	4,42,000
11	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	2800	KG	65	1,82,000
12	50x6 mm G I flat	1200	KG	75	90,000
13	BOLT & NUT GI 16MMX75M HEX	400	KG	114	45,688
14	BOLT & NUT GI 12MMX75MM HEX	200	KG	114	22,844
15	BOLT & NUT GI 16MMX200MM HEX	200	KG	114	22,844
16	WASHER GI SIZE 12MM DIA	20	KG	114	2,284
17	WASHER GI SIZE 16MM DIA	20	KG	114	2,284
18	TEMPLETE FOR TRANSFORMER MAINT.RECORD	40	EA	68	2,700
19	CONNECTOR PALM LT BRASS 1000A 630KVA TRF	160	EA	1,144	1,83,051
20	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	26928	KG	65	17,50,320
21	FRP CROSS ARM 1150MM 11KV	80	EA	423	33,858
22	Back Clamp for V cross arm(11KV)	80	EA	80	6,400
23	11KV pin insulator polymer	240	EA	200	48,000
24	AB Switch(11KV,200A,2Pole,50Hz)	40	EA	5,300.00	2,12,000
25	Lightening Arrester(9KV,5KA)	120	EA	980	1,17,600
26	ANTICLIMBING DEVICE FOR 11 M PCC POLE	80	EA	219	17,520
27	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	120	EA	1,356	1,62,703
28	CONDUCTOR ACSR RABBIT PVC 61.70 SQMM	920	M	67	61,640
29	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	120	EA	237	28,440
30	TAPE HT SCOTCH 23 25MMX9.1M 66KV	36	ROL	214.2	7,797
31	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	14	EA	1,550.75	22,331
32	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	160	EA	213.23	34,117
33	ALNOX 3M (HOT SPOT REDUCING PASTE)	3	EA	3,779.96	10,584
34	3M SCOTCH 1625 SPRAY	16	EA	338.98	5,424
35	3M SCOTCH FILL PUTTY	40	EA	593.22	23,729
36	RODENT CAPACITIVE SCREEN GUARD FOR- DT	120	EA	94.5	11,340
37	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	80	EA	38	3,040
38	SLEEV BLACK POLYOLEFIN	80	M	38.94	3,115
39	PLATE BASE RCC SIZE 450X450X75MM	80	EA	110	8,800
40	CONNECTOR MINI WEDGE 25 SQMM TO DOG	120	EA	183	21,978

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
41	BUS BAR COPPER HDT SIZE 75X10MM	40	M	1,857	74,278
42	PIPE HDPE SIZE 25 MM	480	M	31	14,880
43	CABLE 1.1KV AL 4CX300 SQMM XLPE ARM	1200	M	1,015	12,18,305
44	JT. KIT O/D 1.1KV XLPE 4X300 SQ.MM HS	160	EA	1,247.78	1,99,645
45	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	240	M	773	1,85,431
46	25x6 mm G I flat	400	KG	75	30,000
47	BOLT & NUT GI 12MMX50MM HEX	40	KG	78	3,120
48	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	280	LS	1600	4,48,000
49	FRP Fencing	1680	Sq.M	2,615	43,93,627
Subtotal Material					**14975545**
	Stock, Storage and Insurance@3% of A				449266.34
	Sub- Total-B				**15424810.91**
	T & P Charges @ 2% of B				308496.22
	Contingency @ 3% of B				462744.33
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1588755.52
	Transportation Charges@7.5% of B				1156860.82
	Sub-Total C				**18941667.81**
	Over Head Charges (Including Supervision charges) @6% of C				1136500.07
	Total D				**20078167.88**
	Gross Cost				**20078167.88**
	OR Say				**20078168**
	GST @18%				3614070.24
	CESS 1%			-	200781.68
	Gross Cost (Inc. GST)-				**23893019.92**
	Total (In Crores)				**2.39**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

iv.Estimate for 250 kVA Distribution Substations Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
1	315 KVA,11/0.4KV (Cu) Transformer	-	EA	4,44,910.00	-
2	LT Distribution Box for 250 KVA S/S.	80	EA	48,000.00	38,40,000
3	FRP CROSS ARM 1150MM 11KV	160	EA	423	67,715
4	Back Clamp for V cross arm(11KV)	160	EA	80	12,800
5	11KV pin insulator polymer	480	EA	200	96,000
6	AB Switch(11KV,200A,2Pole,50Hz)	80	EA	5,300	4,24,000

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
7	Lightening Arrester(9KV,5KA)	240	EA	980	2,35,200
8	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	240	EA	1,356	3,25,405
9	FUSE ELEMENT FOR 11KV DD FUSE 20A WHITE	240	EA	49	11,760
10	CONDUCTOR ACSR RABBIT PVC 61.70 SQMM	1,840	M	67	1,23,280
11	CABLE 1.1KV AL 4CX150 SQMM ARM	640	M	539	3,45,052
12	GLAND FOR ARM CABLE 4X150 SQ.MM	160	EA	280	44,800
13	ISMC-125*65 GI Channel (13.3KG/M)	7,055	KG	114	8,05,847
14	ISMC-100*50 GI Channel (9.76KG/M)	4,766	KG	114	5,44,420
15	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	7,975	KG	65	5,18,388
16	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	6,043	KG	65	3,92,808
17	50x6 mm G I flat	4,074	KG	75	3,05,520
18	25x6 mm G I flat	1,347	KG	75	1,01,040
19	BOLT & NUT GI 12MMX50MM HEX	484	KG	114	55,283
20	WASHER GI SIZE 16MM DIA	364	KG	114	41,576
21	WASHER GI SIZE 12MM DIA	155	KG	114	17,727
22	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	800	EA	8	6,400
23	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	4,320	EA	17	73,440
24	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	640	EA	13	8,244
25	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	240	EA	237	56,880
26	TEMPLETE FOR TRANSFORMER MAINT.RECORD	80	EA	68	5,400
27	TAPE HT SCOTCH 23 25MMX9.1M 66KV	73	ROL	214.2	15,594
28	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	29	EA	1,550.75	44,662
29	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	320	EA	213.23	68,233
30	ALNOX 3M (HOT SPOT REDUCING PASTE)	6	EA	3,779.96	21,168
31	3M SCOTCH 1625 SPRAY	32	EA	338.98	10,847
32	3M SCOTCH FILL PUTTY	80	EA	593.22	47,458
33	RODENT CAPACITIVE SCREEN GUARD FOR- DT	240	EA	94.5	22,680
34	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	160	EA	38	6,080
35	SLEEV BLACK POLYOLEFIN	160	M	38.94	6,231
36	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	400	EA	1050	4,20,000
37	PIPE HDPE SIZE 25 MM	1,840	M	31	57,040
38	7/10 SWG G I stay wire (10Kg. / Set)	5,816	KG	75	4,36,200
39	CONNECTOR MINI WEDGE 25 SQMM TO DOG	240	EA	183	43,957
40	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	400	LS	1600	6,40,000

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
41	FRP Fencing	2,240	Sq.M	2,615	58,58,169
Subtotal Material(A)					**1,61,57,304**
	Stock, Storage and Insurance@3% of A				484719.13
	Sub- Total-B				**16642023.49**
	T & P Charges @ 2% of B				332840.47
	Contigency @ 3% of B				499260.7
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1714128.42
	Transportation Charges@7.5% of B				1248151.76
	Sub-Total C				**20436404.84**
	Over Head Charges (Including Supervision charges) @6% of C				1226184.29
	Total D				**21662589.13**
	Gross Sectionaliser Cost				**21662589.13**
	OR Say				**21662589**
	GST @18%				3899266.02
	CESS 1%			-	216625.89
	Gross Cost (Inc. GST)-Refurbishment-250kVA				**25561912.02**
	Total(In Crores)				**2.56**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

v.Estimate for 100 kVA Distribution Substations Refurbishment:

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
1	100 KVA,33/0.4KV(Cu) Transformer	-	EA	2,72,000	-
2	LT Distribution Box for 250 KVA S/S.	157	EA	48,000	75,36,000
3	FRP CROSS ARM 1150MM 11KV	314	EA	423	1,32,891
4	Back Clamp for V cross arm(11KV)	314	EA	80	25,120
5	11KV pin insulator polymer	942	EA	200	1,88,400
6	AB Switch(11KV,200A,2Pole,50Hz)	157	EA	5,300	8,32,100
7	Lightening Arrester(9KV,5KA)	471	EA	980	4,61,580
8	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	471	EA	1,356	6,38,608
9	FUSE ELEMENT FOR 11KV DD FUSE 20A WHITE	471	EA	49	23,079
10	CONDUCTOR ACSR RABBIT PVC 61.70 SQMM	3,611	M	67	2,41,937

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
11	CABLE 1.1KV AL 4CX150 SQMM ARM	1,256	M	539	6,77,165
12	GLAND FOR ARM CABLE 4X150 SQ.MM	314	EA	280	87,920
13	ISMC-125*65 GI Channel (13.3KG/M)	13,846	KG	114	15,81,475
14	ISMC-100*50 GI Channel (9.76KG/M)	9,354	KG	114	10,68,424
15	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	15,651	KG	65	10,17,336
16	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	11,860	KG	65	7,70,886
17	50x6 mm G I flat	7,994	KG	75	5,99,583
18	25x6 mm G I flat	2,644	KG	75	1,98,291
19	BOLT & NUT GI 12MMX50MM HEX	950	KG	114	1,08,492
20	WASHER GI SIZE 16MM DIA	714	KG	114	81,593
21	WASHER GI SIZE 12MM DIA	305	KG	114	34,789
22	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	1,570	EA	8	12,560
23	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	8,478	EA	17	1,44,126
24	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	1,256	EA	13	16,179
25	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	471	EA	237	1,11,627
26	TEMPLETE FOR TRANSFORMER MAINT.RECORD	157	EA	68	10,598
27	TAPE HT SCOTCH 23 25MMX9.1M 66KV	143	ROL	214.2	30,603
28	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	57	EA	1,550.75	87,649
29	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	628	EA	213.23	1,33,908
30	ALNOX 3M (HOT SPOT REDUCING PASTE)	11	EA	3,779.96	41,542
31	3M SCOTCH 1625 SPRAY	63	EA	338.98	21,288
32	3M SCOTCH FILL PUTTY	157	EA	593.22	93,136
33	RODENT CAPACITIVE SCREEN GUARD FOR- DT	471	EA	94.5	44,510
34	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	314	EA	38	11,932
35	SLEEV BLACK POLYOLEFIN	314	M	38.94	12,227
36	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	785	EA	1050	8,24,250
37	PIPE HDPE SIZE 25 MM	3,611	M	31	1,11,941
38	7/10 SWG G I stay wire (10Kg. / Set)	11,414	KG	75	8,56,043
39	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	785	LS	1600	12,56,000
40	CONNECTOR MINI WEDGE 25 SQMM TO DOG	471	EA	183	86,265
41	FRP Fencing	4,396	Sq.M	2,615	1,14,96,658
Subtotal Material(A)					**3,17,08,710**
	Stock, Storage and Insurance@3% of A				951261.29
	Sub- Total-B				**32659971.1**
	T & P Charges @ 2% of B				653199.42
	Contigency @ 3% of B				979799.13

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				3363977.02
	Transportation Charges@7.5% of B				2449497.83
	Sub-Total C				**40106444.5**
	Over Head Charges (Including Supervision charges) @6% of C				2406386.67
	Total D				**42512831.17**
	Gross Cost				42512831.17
	OR Say				**42512831**
	GST @18%				7652309.58
	CESS 1%			-	425128.31
	Gross Cost (Inc. GST)				**50590268.89**
	Total(In Crores)				**5.06**
Unit Rate as per TPSODL /CDB Rate 2019-20					

8.9. Annexure 9 DPR for Auto-Recloser, Sectionaliser, FPI, RMU and AB switches at 33kV & 11kV Feeders

i.Estimate for Supply and Installation of 11kV Auto-Recloser

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Ammount (INR)
1	Auto reclosure	12	ST	10,00,000.00	1,20,00,000
2	Lightening Arrester(9KV,5KA)	72	EA	980	70,560
3	BOLT & NUT GI 12MMX50MM HEX	12	KG	78	936
4	BOLT & NUT GI 16MMX75M HEX	36	KG	78	2,808
5	50x6 mm G I flat	120	KG	75	9,000
6	25x6 mm G I flat	180	KG	75	13,500
7	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	8,078	EA	65	5,25,096
8	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	300	KG	65	19,500
9	100x50x6 mm MS Channel (9.2Kg. / Mtr)	180	KG	65	11,700

10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	24	EA	1,050	25,200
11	7/10 SWG G I stay wire (10Kg. / Set)	720	KG	75	54,000
12	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	96	EA	8	732
13	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	72	EA	237	17,085
14	125 sqmm All Alloy Aluminum Conductor AAAC	180	M	-	-
15	ANTICLIMBING DEVICE FOR 11 M PCC POLE	24	EA	219	5,256
16	BOARD DANGER 11KV SIZE 8X10 INCH	24	EA	131	3,144
17	PLATE BASE RCC SIZE 450X450X75MM	72	EA	110	7,920
18	INSULATOR STAY (GUY/EGG) 11KV	48	EA	50	2,400
19	ANCHOR ROD SIZE 20MMX2100MM	48	EA	77	3,696
20	TENSION SCREW GI SIZE 750X20MM	48	EA	342	16,416
21	BRACKET/STAY COLLAR FOR 11 M PCC POLES	48	EA	195	9,382
22	PIPE HDPE SIZE 25 MM	72	M	31	2,232
23	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	24	LS	1600.00	38,400
24	11KV pin insulator polymer	72	EA	200	14,400
Subtotal Material(A)					**1,28,53,363**
	Stock, Storage and Insurance@3% of A				385600.90
	Sub- Total-B				**13238964.22**
	T & P Charges @ 2% of B				264779.28
	Contigency @ 3% of B				397168.93
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1296853.98
	Transportation Charges@7.5% of B				992922.32

	Sub-Total C		**16190688.73**
	Over Head Charges (Including Supervision charges) @6% of C		971441.32
	Total D		17162130.05
	Gross Cost		**17162130.05**
	OR Say		**17162130.00**
	GST @		3089183.4
	CESS 1%	-	171621.3
	Gross Auto Reclosure Cost (Inc. GST)		20422934.70
	Total(In Crores)		2.04
	Unit Rate as per TPSODL /CDB Rate 2019-20		

ii.Estimate for Supply and Installation of 11kV Sectionalizer

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	SECTIONALISER 11KV 3PH POLE MOUNTED	36	EA	4,93,602	1,77,69,672
2	Lightening Arrester(9KV,5KA)	216	EA	980	2,11,680
3	BOLT & NUT GI 12MMX50MM HEX	36	KG	78	2,808
4	BOLT & NUT GI 16MMX75M HEX	108	KG	78	8,424
5	50x6 mm G I flat	360	KG	75	27,000
6	25x6 mm G I flat	540	KG	75	40,500
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	900	KG	65	58,500
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	540	KG	65	35,100
9	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	72	EA	1,050	75,600
10	7/10 SWG G I stay wire (10Kg. / Set)	2160	KG	75	1,62,000
11	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	288	EA	8	2,197
12	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	216	EA	237	51,254
13	125 sqmm All Alloy Aluminum Conductor AAAC	540	M	-	-
14	ANTICLIMBING DEVICE FOR 11 M PCC POLE	72	EA	219	15,768
15	BOARD DANGER 11KV SIZE 8X10 INCH	72	EA	131	9,432
16	PIPE HDPE SIZE 25 MM	216	M	31	6,590
17	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	12118	KG	65	7,87,644
18	PLATE BASE RCC SIZE 450X450X75MM	36	EA	110	3,960
19	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	72	LS	1600	1,15,200
20	11KV pin insulator polymer	216	EA	200	43,200

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
	Subtotal Material(A)				**1,94,26,529**
	Stock, Storage and Insurance@3% of A				582,796
	Sub- Total-B				**20,009,325**
	T & P Charges @ 2% of B				400,186
	Contingency @ 3% of B				600,280
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1,960,369
	Transportation Charges@7.5% of B				1,500,699
	Sub-Total C				**24470858.9**
	Over Head Charges (Including Supervision charges) @6% of C				1468251.53
	Total D				**25939110.43**
	Gross Cost				**25939110.43**
	OR Say				**25939110**
	GST @				4669039.8
	CESS 1%			-	259391.1
	Gross Cost (Inc. GST)-Sectionaliser				**30867540.9**
	Total(In Crores)				**3.09**

iii.Estimate for Supply and Installation of Overhead Communicable FPI:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	Non-communicable FPI	600	EA	9,328	55,96,800
2	cost to make in Communicable	600	EA	4,664	27,98,400
	Subtotal Material(A)				**83,95,200**
	Stock, Storage and Insurance@3% of A				251856
	Sub- Total-B				**8647056**
	T & P Charges @ 2% of B				172941.12
	Contingency @ 3% of B				259411.68
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				864705.6
	Transportation Charges@7.5% of B				648529.2
	Sub-Total C				**10592643.6**
	Over Head Charges (Including Supervision charges) @6% of C				635558.62
	Total D				**11228202.22**
	Gross FPI Cost				**11228202.22**

OR Say		**11228202**
GST @		2021076.36
CESS 1%		112282.02
Gross (Inc. GST)-FPI Cost		**13361560.38**
Total(In Crores)		**1.34**
Unit Rate as per TPSODL /CDB Rate 2019-20		

iv.Estimate for Supply and Installation of 3 Way RMU

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	RMU 11KV 3 WAY 630A BKR O/D	21	EA	3,75,000.00	78,75,000
2	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	1050	KG	75	78,750
3	50x6 mm G I flat	1260	KG	75	94,500
4	25x6 mm G I flat	210	KG	75	15,750
5	BOARD DANGER 11KV SIZE 8X10 INCH	105	EA	131	13,755
6	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	84	EA	1,050	88,200
7	BOLT & NUT GI 16MMX75M HEX	42	KG	78	3,276
8	BOLT & NUT GI 12MMX50MM HEX	42	KG	78	3,276
9	WASHER GI SIZE 16MM DIA	11	KG	114	1,199
10	WASHER GI SIZE 12MM DIA	11	KG	114	1,199
11	CABLE 11KV AL 3CX400 SQMM XLPE ARM	840	M	1,468	12,33,120
12	Heat shrinkable jointing kit for 3C x 400 mm2 33 KV XLPE Cable(outdoor type)	63	EA	33,255.00	20,95,065
13	Heat shrinkable jointing kit for 3C x 400mm2 33 KV XLPE Cable(indoor type)	63	EA	20,503.00	12,91,689
14	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	126	M	773	97,351
15	PIPE HDPE SIZE 25 MM	126	M	31	3,849
16	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	84	EA	8	655
17	7/10 SWG G I stay wire (10Kg. / Set)	420	KG	75	31,500
18	125 sqmm All Alloy Aluminum Conductor AAAC	126	M	76.87	9,686
19	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	84	LS	1600.00	1,34,400
20	FRP Fencing (3x2.4x2.0)	420	Sq. M	2,615	10,98,407
21	RMU Plinth	21	EA	15,917	3,34,250
	Subtotal Material(A)				1,45,04,877
	Stock, Storage and Insurance@3% of A				435146.32

	Sub- Total-B		**14940023.69**
	T & P Charges @ 2% of B		298800.47
	Contigency @ 3% of B		448200.71
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)		1088439.87
	Transportation Charges@7.5% of B		1120501.78
	Sub-Total C		**17895966.51**
	Over Head Charges (Including Supervision charges) @6% of C		1073757.99
	Total D		18969724.50
	Gross 3 Way RMU Cost		**18969724.50**
	OR Say		**18969725.00**
	GST @		3414550.5
	CESS 1%	-	189697.25
	Gross Cost (Inc. GST)-3W RMU 11 KV		22573972.75
	Total(In Crores)		2.26

v.Estimate for AB Switches at 33kV Feeder:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Ammount (INR)
1	232 sqmm All Alloy Aluminum Conductor AAAC	2100	M	156.5	328650
2	150x150mm RS joist (12Mtr long) (34.6 Kg per meter) (Each 367.2Kg)	51408	KG	65	3341520
3	AB Switch(33KV,400A,3Pole,50Hz)	70	ST	19070	1334900
4	40mm dia GI pipe earthing device 3 mtr. Long	70	EA	1050	73500
5	PIPE HDPE SIZE 25 MM	210	M	32	6668
6	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	280	EA	17	4760
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	4900	KG	65	318500
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	4900	KG	65	318500
9	7/10 SWG G I stay wire (10Kg. / Set)	1400	KG	75	105000
10	25x6 mm G I flat	630	KG	75	47250
11	50x6 mm G I flat	1548	KG	75	116103
12	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	3500	KG	75	262500
13	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	3850	KG	75	288750
14	Disc insulator (B&S) 120KN Polymer	840	EA	1440	1209600
15	33KV post insulator(2X24KV Post insulator Stack)	420	EA	1580	663600
16	33KV H W fitting(B&S)90KN, 4Bolt	420	EA	500	210000
17	P.G. CLAMP FOR 232 MM2 AAC CONDUCTOR	420	EA	1150	483000
18	BOARD DANGER 33KV SIZE 8X10 INCH	140	EA	80	11200
19	PLATE BASE RCC SIZE 450X450X75MM	140	EA	219	30729
20	ANTICLIMBING DEVICE FOR TOWER (BRACKET)	140	EA	430	60211
21	BOLT & NUT GI 12MMX50MM HEX	140	KG	78	10920
22	BOLT & NUT GI 16MMX100MM HEX	140	KG	78	10920
23	BOLT & NUT GI 16MMX150MM HEX	140	KG	78	10920

24	BOLT & NUT GI 16MMX50MM HEX	359	KG	78	28015
25	WASHER MS SIZE 16MM DIA	263	KG	95	24873
26	WASHER MS SIZE 12MM DIA	35	KG	95	3316
27	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	70	LS	1600	1,12,000
28	Civil works for Pole Foundation	70	L/S	12712	889831
29	FRP Fencing	216020	M2	18	3844424
Subtotal Material(A)					**1,41,50,159**
	Stock, Storage and Insurance@3% of A				424504.77
	Sub- Total-B				**14574663.65**
	T & P Charges @ 2% of B				291493.27
	Contingency @ 3% of B				437239.91
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1285378.08
	Transportation Charges@7.5% of B				1093099.77
	Sub-Total C				**17681874.69**
	Over Head Charges (Including Supervision charges) @6% of C				1060912.48
	Total D				**18742787.17**
	Gross Cost				**18742787.17**
	OR Say				**18742787**
	GST @				3373701.66
	CESS 1%			-	187427.87
	Gross Cost (Inc. GST)-ABS 33 kV				**22303916.53**
	Total(In Crores)				**2.23**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

vi.Estimate for AB Switches at 11kV Feeder:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Ammount (INR)
1	125 sqmm All Alloy Aluminum Conductor AAAC	5400	M	156.5	845100
2	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	121176	EA	65	7876440
3	AB Switch(11KV, 400A,3Pole,50Hz)	180	ST	11,850.00	2133000
4	40mm dia GI pipe earthing device 3 mtr. Long	180	EA	1050	189000
5	PIPE HDPE SIZE 25 MM	540	M	32	17145
6	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	720	EA	17	12240
7	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	10921	KG	65	709853
8	100x50x6 mm MS Channel (9.2Kg. / Mtr)	11244	KG	65	730829

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Ammount (INR)
9	7/10 SWG G I stay wire (10Kg. / Set)	3600	KG	75	270000
10	25x6 mm G I flat	1620	KG	75	121500
11	50x6 mm G I flat	3981	KG	75	298550
12	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	7359	KG	75	551945
13	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	8617	KG	75	646272
14	Disc insulator (B&S) 120KN Polymer	2160	EA	1,440.00	3110400
15	33KV H W fitting(B&S)90KN, 4Bolt	1080	EA	500	540000
16	P.G. CLAMP FOR 100 MM2 AAC CONDUCTOR	1080	EA	580	626400
17	BOARD DANGER 11KV SIZE 8X10 INCH	360	EA	131	47160
18	PLATE BASE RCC SIZE 450X450X75MM	360	EA	219	79016
19	ANTICLIMBING DEVICE FOR 11 M PCC POLE	360	EA	205	73800
20	BOLT & NUT GI 12MMX50MM HEX	250	KG	78	19532
21	BOLT & NUT GI 16MMX100MM HEX	235	KG	78	18322
22	BOLT & NUT GI 16MMX150MM HEX	1210	KG	78	94391
23	BOLT & NUT GI 16MMX50MM HEX	924	KG	78	72039
24	WASHER MS SIZE 16MM DIA	675	KG	95	63959
25	WASHER MS SIZE 12MM DIA	90	KG	95	8528
26	Civil Foundation	180	L/S	12712	2288136
27	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	180	LS	1600	2,88,000
28	FRP Fencing	555480	M2	18	9998640
Subtotal Material(A)					**3,17,30,197**
	Stock, Storage and Insurance@3% of A				951905.92
	Sub- Total-B				32682103.15
	T & P Charges @ 2% of B				653642.06
	Contingency @ 3% of B				980463.09
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				2862573.65
	Transportation Charges@7.5% of B				2451157.74
	Sub-Total C				**39629939.7**
	Over Head Charges (Including Supervision charges) @6% of C				2377796.38
	Total D				42007736.08
	Gross Cost				42007736.08
	OR Say				**42007736**
	GST @				7561392.48
	CESS 1%			-	420077.36
	Gross Cost (Inc. GST)-ABS 11 kV				49989205.84
	Total(In Crores)				5
	Unit Rate as per TPSODL /CDB Rate 2019-20				

8.10. Annexure 10 DPR for LT protection at DSS

Cost Estimate for LT protection at DSS

S.No.	Description	UOM	Qty	Amount in Rs. Crores
1	Supply and Installation of MCCB-100 KVA	EA	500	3.33
2	Supply and Installation of MCCB-250 KVA	EA	400	4.17
3	Supply and Installation of ACB-500 KVA	EA	140	2.59
Total			**040**	**10.09**

i.Estimate for Supply and Installation of MCCB for 100 kVA DT

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
1	LT Distribution Box for 100 KVA S/S.	500	EA	24,419	1,22,09,500
2	CABLE 1.1KV AL 4CX150 SQMM ARM	7,500	M	539	40,43,581
3	GLAND FOR ARM CABLE 4X150 SQ.MM	2,000	EA	280	5,60,000
4	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	24,500	KG	65	15,92,500
5	50x6 mm G I flat	5,000	KG	75	3,75,000
6	25x6 mm G I flat	2,500	KG	75	1,87,500
7	BOLT & NUT GI 12MMX50MM HEX	500	KG	78	39,000
8	BOLT & NUT GI 16MMX75M HEX	500	KG	78	39,000
9	WASHER GI SIZE 16MM DIA	125	KG	114	14,278
10	WASHER GI SIZE 12MM DIA	125	KG	114	14,278
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1,000	EA	17	17,000
12	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	8,000	EA	13	1,03,051
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	500	EA	1,050	5,25,000
14	PIPE HDPE SIZE 25 MM	1,500	M	31	46,500
15	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	500	LS	1600	8,00,000
16	7/10 SWG G I stay wire (10Kg. / Set)	5,000	KG	75	3,75,000
Subtotal Material					**2,09,41,186**
	Stock, Storage and Insurance@3% of A				628235.59

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
	Sub- Total-B				**21569422.03**
	T & P Charges @ 2% of B				431388.44
	Contigency @ 3% of B				647082.66
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				2156942.2
	Transportation Charges@7.5% of B				1617706.65
	Sub-Total C				**26422541.98**
	Over Head Charges (Including Supervision charges) @6% of C				1585352.52
	Total D				**28007894.5**
	Gross Cost				**28007894.5**
	OR Say				**28007895**
	GST @				5041421.1
	CESS 1%			-	280078.95
	Gross Cost (Inc. GST)-MCCB 250 KVA				**33329395.05**
	Total(In Crores)				**3.33**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

ii.Estimate for Supply and Installation of MCCB for 250 kVA DT

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	LT Distribution Box for 250 KVA S/S.	400	EA	48,000	1,92,00,000
2	CABLE 1.1KV AL 4CX150 SQMM ARM	6,000	M	539	32,34,864.41
3	GLAND FOR ARM CABLE 4X150 SQ.MM	1,600	EA	280	4,48,000.00
4	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	19,600	KG	5	12,74,000.00
5	50x6 mm G I flat	4,000	KG	5	3,00,000.00
6	25x6 mm G I flat	2,000	KG	5	1,50,000.00
7	BOLT & NUT GI 12MMX50MM HEX	400	KG	8	31,200.00
8	BOLT & NUT GI 16MMX75M HEX	400	KG	8	31,200.00
9	WASHER GI SIZE 16MM DIA	100	KG	114	11,422.03
10	WASHER GI SIZE 12MM DIA	100	KG	114	11,422.03

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	800	EA	7	13,600.00
12	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	6,400	EA	3	82,440.68
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	400	EA	,050	4,20,000.00
14	PIPE HDPE SIZE 25 MM	1,200	M	1	37,200.00
15	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	400	LS	1600	6,40,000
16	7/10 SWG G I stay wire (10Kg. / Set)	4,000	KG	5	3,00,000.00
Subtotal Material(A)					**2,61,85,349**
	Stock, Storage and Insurance@3% of A				785560.47
	Sub- Total-B				**26970909.62**
	T & P Charges @ 2% of B				539418.19
	Contigency @ 3% of B				809127.29
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				2697090.96
	Transportation Charges@7.5% of B				2022818.22
	Sub-Total C				**33039364.29**
	Over Head Charges (Including Supervision charges) @6% of C				1982361.86
	Total D				**35021726.15**
	Gross Cost				**35021726.15**
	OR Say				**35021726**
	GST @				6303910.68
	CESS 1%			-	350217.26
	Gross (Inc. GST)-MCCB 250 KVA				**41675853.94**
	Total(In Crores)				**4.17**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

iii.Estimate for Supply and Installation of ACB for 500 kVA DT:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	ACB LT 400A	140	EA	39,919	55,88,660.00
2	CABLE 1.1KV AL 4CX150 SQMM ARM	2,100	M	539	11,32,202.54
3	GLAND FOR ARM CABLE 4X150 SQ.MM	560	EA	280	1,56,800.00
4	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	6,860	KG	65	4,45,900.00
5	50x6 mm G I flat	1,400	KG	75	1,05,000.00
6	25x6 mm G I flat	700	KG	75	52,500.00
7	BOLT & NUT GI 12MMX50MM HEX	140	KG	78	10,920.00
8	BOLT & NUT GI 16MMX75M HEX	140	KG	78	10,920.00
9	WASHER GI SIZE 16MM DIA	35	KG	114	3,997.71
10	WASHER GI SIZE 12MM DIA	35	KG	114	3,997.71
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	280	EA	17	4,760.00
12	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	2,240	EA	13	28,854.24
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	140	EA	1,050	1,47,000.00
14	11 Mtr long 330 kg PSC Pole(including transportation cost upto store)	280	EA	7,000.00	19,60,000.00
15	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	840	M	772.63	6,49,006.78
16	CABLE 1.1KV AL 4CX300 SQMM XLPE ARM	5,600	M	1,011.00	56,61,600.00
17	PIPE HDPE SIZE 25 MM	420	M	31	13,020.00
18	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	140	LS	1600	2,24,000
19	7/10 SWG G I stay wire (10Kg. / Set)	1,400	KG	75	1,05,000.00
Subtotal Material(A)					**1,63,04,139**
	Stock, Storage and Insurance@3% of A				489124.17
	Sub- Total-B				**16793263.15**
	T & P Charges @ 2% of B				335865.26
	Contingency @ 3% of B				503797.89
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				1628766.1
	Transportation Charges@7.5% of B				1259494.74
	Sub-Total C				**20521187.15**
	Over Head Charges (Including Supervision charges) @6% of C				1231271.23

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
	Total D				**21752458.38**
	Gross Cost				**21752458.38**
	OR Say				**21752458**
	GST @				3915442.44
	CESS 1%			-	217524.58
	Gross (Inc. GST)-				**25885425.02**
	Total(In Crores)				**2.59**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

8.11. Annexure 11 DPR for Trolley Mounted Pad substations & Package Distribution Substation

i.Cost Estimate for 6 Nos. Trolley Mounted Pad substations:

Item Description	Unit Cost	Quantity	Total Cost (In Crores)
PAD MOUNTED SUBSTATION 630 KVA DT , 3 WAY RMU AND LT BOX WITH 4 NUMBER MCCB	2185000	6	1.31

ii.Cost Estimate for installation of 5 Nos. 630 KVA package Substation:

Sl No	Description of Materials	Per Unit	Total quantity for 5 unit	UOM	Unit Rate in Rs.	Total Cost of 5 NOS. 630 KVA Package TRF
1	PACKAGED S/S 630KVA WITH LT METERING	1	5	ST	18,01,528.00	9007640
2	CABLE 11KV AL 3CX400 SQMM XLPE ARM	80	400	M	1468	587200
3	JT. KIT I/D 11KV XLPE 3CX400 HS	4	20	EA	2349	46980
4	JT. KIT O/D 11KV XLPE 3CX400 HS	3	15	EA	2349	35235
5	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	8	40	EA	39	1560
6	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	6	30	EA	1050	31500
7	PIPE HDPE SIZE 25 MM	6	30	M	18	540
8	PIPE G.I. 100MM DIA 'B' CLASS	6	30	M	607	18210
9	WIRE STAY GI 7/10 SWG	30	150	KG	63	9450
10	POLE PCC 11 M LONG	2	10	EA	5852	58520
11	CHANNEL MS SIZE 75X40MM	40	200	KG	48	9600

12	ANGLE MS SIZE 50X50X6MM	50	250	KG	34.06	8515.25
13	FLAT GI SIZE 50X6MM	10	50	KG	52	2600
14	FLAT GI SIZE 25X6 MM	8	40	KG	67	2680
15	BOLT & NUT GI 16MMX75M HEX	2	10	KG	114.22	1142.20
16	BOLT & NUT GI 12MMX50MM HEX	1	5	KG	114.22	571.10
17	BOLT & NUT GI 16MMX200MM HEX	1	5	KG	114.22	571.10
18	WASHER GI SIZE 16MM DIA	0.5	2.5	KG	114.22	285.55
19	WASHER GI SIZE 12MM DIA	0.5	2.5	KG	114.22	285.55
20	BOARD DANGER 11KV SIZE 8X10 INCH	4	20	EA	131	2620
21	ANTICLIMBING DEVICE FOR 11 M PCC POLE	2	10	EA	219	2190
22	Plinth for 630 KVA Transformer	1	5	LS	100000	500000
23	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	6	30	LS	1600	48000
	Subtotal Material(A)					**1,03,75,896**
	Stock, Storage and Insurance@3% of A					311276.87
	Sub- Total-B					**10687172.63**
	T & P Charges @ 2% of B					213743.45
	Contigency @ 3% of B					320615.18
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)					1065703.483
	Transportation Charges@7.5% of B					801537.95
	Sub-Total C					**13088772.69**
	Over Head Charges (Including Supervision charges) @6% of C					785326.36
	Total D					13874099.05
	Gross Cost					**13874099.05**
	OR Say					**13874099.00**
	GST @18%					2497337.82
	CESS 1%					138740.99
	Gross Cost (Inc. GST & CESS)-					16371436.82
	Total(In Crores)					1.64
	Unit Rate as per TPSODL /CDB Rate 2019-20					

8.12. Annexure 12 DPR for Network augmentation / addition of 11 KV line, PTR,DTR, LT line to meet load growth

Total Cost Estimate:

S.No.	Description	UOM	Qty	Amount in Crores
1	Augmentation to 8 MVA Power Transformer	EA	4	4.41
2	Augmentation to 315 KVA Distribution Transformer	EA	100	9.92
3	New 11 kV Overhead bare Line	CKT.KM	43	8.06
4	New 11 kV Overhead LT ABC Line	CKT.KM	38	4.13
Total				**26.52**

i. Cost Estimate for Augmentation of PTR to 8 MVA:

Sl. No.	Item-Description	Unit	Qty.	Unit Rate in Rs.	Total Price
1	Earthing and Grounding as per applicable TS				
a	GI flat 90X6 mm size under ground for mat	MT	4	75000	300000
b	GI flat 50X6 mm size for riser	MT	1.2	75000	90000
c	GI flat 25X6 mm size for riser	MT	1.2	75000	90000
d	8 swg GI wire	MT	0.2	75000	15000
2	Busbar, droppers, jumpers and interconnections with all outdoor equipment using 232 sq.mm AAA Conductor , all associated conductor, insulator, hardwares,clamps, 8 SWG wire etc as per applicable TS				
a	33 KV & 11 KV Bus bar with 232 sq.mm AAA Conductor	km	0.8	186230.83	148985
b	Equipment jumpering with 232 sq.mm AAA Conductor	km	0.8	186230.83	148985
c	3 Bolted(3 pair M-16 U bolts to be used) 33 Kv H/W fitting with 4 nos Insulator (70KN) String Suitable for 232 sq.mm AAA Conductor	Set	36	2952	106272
d	12 bolted (M-12)"T" clamp, 232 sq.mm AAAC run & 230 mm drop	No	12	1000	12000
e	3 Bolted (M- 16) PG Clamp suitable for 232 sq.mm AAA Conductor	No	48	384	18432
3	33Kv Isolator without earth switch	Set	4	67500	270000
4	33Kv O/D VCB with CT & In-Door Control Relay Panel (Excluding Foundation)				
a	For Transformer	Set	4	590000	2360000

Sl. No.	Item-Description	Unit	Qty.	Unit Rate in Rs.	Total Price
5	33/11 KV, 8 MVA 33/11 KV (Cu) Power Transformers with OLTC (Excluding Foundation)	No	4	5700000	22800000
6	33Kv Post Insulator	No	12	1050	12600
8	Dismantling of existing transformer	EA	4	200000	800000
9	Testing	LS	4	200000	800000
A	**GRAND TOTAL**				**27972273**
B	Stock & Storage @ 3% of A				839168
C	**Sub - Total (A+B)**				**28811442**
D	Contingency @ 3 %+T&P Charges @2%+Transportation 7.5% +Errection 10%=22.5 % of C				6482574
E	**Sub - Total (C+D)**				**35294016**
F	Other Overheads including supervision charges @ 6% of E				2117641
G	**Total estimated Capital Cost (E+F)**				**37411657**
H	GST 18% of G				6734098
I	**Total Cost**				**44145755**
	Total(In Crores)				**4.41**
	Inspection fee			Extra as per Govt notification	
Unit Rate as per TPSODL /CDB Rate 2019-20					

iii. Cost Estimate for Augmentation of Distribution Transformer to 315 KVA:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
1	315 KVA,11/0.4KV (Cu) Transformer	100	EA	4,44,910.00	4,44,91,000
2	LT Distribution Box for 250 KVA S/S.	100	EA	48,000.00	48,00,000
3	FRP CROSS ARM 1150MM 11KV	200	EA	423	84,644
4	Back Clamp for V cross arm(11KV)	200	EA	80	16,000
5	11KV pin insulator polymer	600	EA	200	1,20,000
6	AB Switch(11KV,200A,2Pole,50Hz)	100	EA	5,300	5,30,000
7	Lightening Arrester(9KV,5KA)	300	EA	980	2,94,000
8	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	300	EA	1,356	4,06,757
9	FUSE ELEMENT FOR 11KV DD FUSE 20A WHITE	300	EA	49	14,700
10	CONDUCTOR ACSR RABBIT PVC 61.70 SQMM	2,300	M	67	1,54,100
11	CABLE 1.1KV AL 4CX150 SQMM ARM	800	M	539	4,31,315
12	GLAND FOR ARM CABLE 4X150 SQ.MM	200	EA	280	56,000

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
13	ISMC-125*65 GI Channel (13.3KG/M)	8,819	KG	114	10,07,309
14	ISMC-100*50 GI Channel (9.76KG/M)	5,958	KG	114	6,80,525
15	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	9,969	KG	65	6,47,985
16	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	7,554	KG	65	4,91,010
17	50x6 mm G I flat	5,092	KG	75	3,81,900
18	25x6 mm G I flat	1,684	KG	75	1,26,300
19	BOLT & NUT GI 12MMX50MM HEX	605	KG	114	69,103
20	WASHER GI SIZE 16MM DIA	455	KG	114	51,970
21	WASHER GI SIZE 12MM DIA	194	KG	114	22,159
22	LUG AL CRIMPING 95 SQMM XLPE SINGLE HOLE	1,000	EA	8	8,000
23	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	5,400	EA	17	91,800
24	LUG AL CRIMPING 150 SQMM XLPE ONE HOLE	800	EA	13	10,305
25	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	300	EA	237	71,100
26	TEMPLETE FOR TRANSFORMER MAINT.RECORD	100	EA	68	6,750
27	TAPE HT SCOTCH 23 25MMX9.1M 66KV	91	ROL	214.2	19,493
28	ANTI TRACKING SILICON TAPE SCOTCH 70 3M	36	EA	1,550.75	55,827
29	VINYL TAPE SCOTCH 35 YELLOW-BLUE-RED	400	EA	213.23	85,292
30	ALNOX 3M (HOT SPOT REDUCING PASTE)	7	EA	3,779.96	26,460
31	3M SCOTCH 1625 SPRAY	40	EA	338.98	13,559
32	3M SCOTCH FILL PUTTY	100	EA	593.22	59,322
33	RODENT CAPACITIVE SCREEN GUARD FOR- DT	300	EA	94.5	28,350
34	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	200	EA	38	7,600
35	SLEEV BLACK POLYOLEFIN	200	M	38.94	7,788
36	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	500	EA	1050	5,25,000
37	PIPE HDPE SIZE 25 MM	2,300	M	31	71,300
38	7/10 SWG G I stay wire (10Kg. / Set)	7,270	KG	75	5,45,250
39	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	500	LS	1600	8,00,000
40	CONNECTOR MINI WEDGE 25 SQMM TO DOG	300	EA	183	54,946

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Amount (INR)
41	FRP Fencing	2,800	Sq. M	2,615	73,22,712
Subtotal Material(A)					**6,46,87,630**
	Stock, Storage and Insurance@3% of A				1940628.91
	Sub- Total-B				**66628259.36**
	T & P Charges @ 2% of B				1332565.19
	Contingency @ 3% of B				1998847.78
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				4371539.436
	Transportation Charges@7.5% of B				4997119.45
	Sub-Total C				**79328331.22**
	Over Head Charges (Including Supervision charges) @6% of C				4759699.87
	Total D				**84088031.09**
	Gross Sectionaliser Cost				**84088031.09**
	OR Say				**84088031**
	GST @18%				15135845.58
	CESS 1%			-	840880.31
	Gross Cost (Inc. GST)-				**99223876.58**
	Total(In Crores)				**9.92**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

iii.Cost Estimate for New 11 kV Overhead bare Line with 80 sq.mm AAAC

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
1	80 sqmm All Alloy Aluminum Conductor AAAC	120600	M	43	5185800
2	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	538560	KG	65	35006400
3	BOLT & NUT GI 16MMX75M HEX	3564	KG	114	407081
4	BOLT & NUT GI 16MMX200MM HEX	752	KG	114	85894
5	50x50x6 mm M.S Angle (4.50Kg. / Mtr)	31625	KG	65	2055625

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
6	75x40x6 mm M.S Channel (6.80Kg. / Mtr)	14500	KG	65	942500
7	100x50x6 mm MS Channel (9.2Kg. / Mtr)	36000	KG	65	2340000
8	50x6 mm G I flat	24000	KG	75	1800000
9	25x6 mm G I flat	7400	KG	75	555000
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	500	EA	1050	525000
11	PIPE HDPE SIZE 25 MM	1500	M	31	46500
12	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	2000	EA	17	34000
13	WASHER MS SIZE 16MM DIA	582	KG	95	55147
14	BOARD DANGER 11KV SIZE 8X10 INCH	3000	EA	131	393000
15	ANTICLIMBING DEVICE FOR 11 M PCC POLE	3000	EA	219	657000
16	INSULATOR STAY (GUY/EGG) 11KV	4000	EA	50	200000
17	PLATE BASE RCC SIZE 450X450X75MM	7000	EA	104	728000
18	ANCHOR ROD SIZE 20MMX2100MM	4000	EA	77	308000
19	TENSION SCREW GI SIZE 750X20MM	4000	EA	342	1368000
20	Disc Insulator(B&S) 70KN Polymer	3000	EA	1150	3450000
21	HW FITTING(B&S) 70KN 3 BOLT	3000	EA	1,055	3165000
22	FRP CROSS ARM 1150MM 11KV	2000	EA	423	846441
23	7/10 SWG G I stay wire (10Kg. / Set)	39000	KG	75	2925000
24	Back Clamp for V cross arm(11KV)	2000	EA	80	160000
25	WIRE GI 4 SWG	53500	KG	52	2782000
26	SLEEV BLACK POLYOLEFIN -16MM	9000	M	10	91525
27	MONKEY SCARE- ONE LAYER	1500	EA	64	95339
28	BIRD GUARD SPIKE (FLEXIBLE POLYCORBONAT)	3000	EA	38	114000
29	SILICON RUBBER SPACER 11 KV	4000	EA	395	1580000
30	GUARD POLIPRO FOR OVERHEAD COND.	3000	M	295	886475
31	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	500	LS	1600	8,00,000

S No.	Item Description	Quantity	Unit	Unit Rate (in Rs)	Amount (INR)
32	11KV pin insulator polymer	9000	EA	200	1800000
	Subtotal Material(A)				**7,13,88,727**
	Stock, Storage and Insurance@3% of A				2141661.8
	Sub- Total-B				**73530388.41**
	T & P Charges @ 2% of B				1470607.77
	Contingency @ 3% of B				2205911.65
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				5770800.41
	Transportation Charges@7.5% of B				5514779.13
	Sub-Total C				**88492487.37**
	Over Head Charges (Including Supervision charges) @6% of C				5309549.24
	Total D				**93802036.61**
	Gross Cost				**93802036.61**
	OR Say				**93802037**
	GST @18%				16884366.66
	CESS 1%			-	938020.37
	Gross Cost (Inc. GST)-11 kV OH Line-80 sqmm				**111624424**
	Total(In Crores)				**11.16**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

iv. Cost Estimate for New LT ABC Line with 3x50+1x25+1x16mm2 AB cable:

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Total Amount (Rs)
1	3x50+1x25+1x16mm2 AB cable	38000	M	181.96	69,14,480.00
2	300Kg PSC pole 9Mtr long (including Transportation cost)	760	EA	4121	31,31,960.00
3	Board Danger 440V size 8x10 inch	760	EA	43	32680
4	ANTICLIMBING DEVICE 9MR 200KG PCC POLE	760	EA	150	1,14,000.00
5	Two Line X arm GI for 9Mtr PCC Pole	760	EA	242	1,83,920.00
6	ANCHOR LT ABC CABLE 3X120 TO 150 SQMM	608	EA	95	57760
7	Suspension Clamp with EYE hook for ABC	1064	EA	340	3,61,760.00
8	Eye Hook for AB cable	1672	EA	60	1,00,320.00
9	Plate Base RCC Size 450x450x50mm	760	EA	60	45600
10	7/10 SWG G I stay wire (10Kg. / Set)	6080	KG	75	4,56,000.00
11	40mm dia GI pipe earthing device 3 mtr. Long	760	EA	1050	7,98,000.00

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Total Amount (Rs)
12	Pipe HDPE Size 25MM	2280	M	18	41040
13	Lug AL 70 SQMM for 7/8 SWG WIRE/EARTHING	1520	EA	17	25840
14	METAL DISTRIBUTION BOX	380	EA	1009.32	3,83,541.60
15	Dist. Box for housing 5 No. 10Amps MCCB including accessories for fixing with pole suitable for AB XLPE Cable	380	EA	1838	6,98,440.00
16	Cap cable end for ABC Cables	2432	EA	19	46208
17	IPC KZ 4X150	3040	EA	59	1,79,360.00
18	CABLE 1.1KV AL 1X4 SQMM UNAR PVC	2660	M	8.9491525	23804.75
19	CABLE 1.1KV AL 2X2.5 SQMM UNAR PVC	3800	M	20.152542	76579.66
20	IPC EP 95 LT ABC 16-95 & 5-10 SQMM ST.LT	2280	EA	39.59322	90272.54
21	WIRE GI 8 SWG	158.08	KG	52	8220.16
22	IPC KZ 2x150 LTABC 50-150 & 6-35(50) sqmm	9120	EA	64	5,83,680.00
23	STEEL STRAP SIZE 20 MMX50 M LONG	30.4	ROL	1250	38000
24	BUCKLES FOR STEEL STRAP (1 EA = 100 NOS)	30.4	EA	579.61864	17620.41
25	CABLE 1.1KV AL 4CX25 SQMM ARM	1900	M	120	2,28,000.00
26	GLAND FOR CABLE 4X25 SQ.MM	3800	EA	47.847458	1,81,820.34
27	LUG AL CRIMPING 25 SQMM XLPE SINGLE HOLE	1520	EA	3.4830508	5294.24
28	FLAT GI SIZE 50X6 MM	9120	KG	52	4,74,240.00
29	FLAT GI Size 25x6 MM	5928	KG	67	3,97,176.00
30	FRP CROSS ARM 1070MM 415V	1520	EA	316.89	4,81,672.80
31	ISA-50*50*6 GI Angel (4.6KG/M)	36100	KG	114.22034	41,23,354.24
32	ISMC-75*40 GI Channel (7.24KG/M)	19570	KG	114.22034	22,35,292.03
33	BOLT & NUT GI 12MMX50MM HEX	456	KG	114.22034	52084.47
34	BOLT & NUT GI 16MMX75M HEX	912	KG	114.22034	1,04,168.95
35	WASHER GI SIZE 12MM DIA	152	KG	114.22034	17361.49
36	WASHER GI SIZE 16MM DIA	228	KG	114.22034	26042.24
37	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	228	M	772.63	1,76,159.64
38	CABLE 1.1KV AL 4CX300 SQMM XLPE ARM	1520	M	1011	15,36,720.00
39	TIE PLASTIC BLACK SIZE 7.6 MM X 380 MM	1520	EA	3.2	4864
40	TIE PLASTIC BLACK SIZE 7.6 MM X 150MM	760	EA	2.24	1702.4

S No.	Item Description	Quantity	Unit	Unit Rate (In Rs.)	Total Amount (Rs)
41	Materials for Massionary work for Earth Pit,Charcoal, Salt etc including construction of earthing chamber (Size: 2"x2") and RCC slab cover	760	LS	1600	12,16,000
42	Tie Plastic size 9mmx265mm	4104	EA	4	16416
	Subtotal Material(A)				**2,56,87,456**
	Stock, Storage and Insurance@3% of A				770623.68
	Sub- Total-B				**26458079.64**
	T & P Charges @ 2% of B				529161.59
	Contingency @ 3% of B				793742.39
	Erection Charges@ 20% over PSC pole cost, @ 5% over T/F & @10% over other materials (B)				2968399.84
	Transportation Charges@7.5% of B				1984355.97
	Sub-Total C				**32733739.43**
	Over Head Charges (Including Supervision charges) @6% of C				1964024.37
	Total D				**34697763.8**
	Gross Cost				**34697763.8**
	OR Say				**34697764**
	GST @				6245597.52
	CESS 1%			-	346977.64
	Gross Cost (Inc. GST)-				**41290339.16**
	Total(In Crores)				**4.13**
	Unit Rate as per TPSODL /CDB Rate 2019-20				

8.13. Annexure: 13 DPR for Release of New Connection

Type of meter	Qty. - (No.)	Meter Unit Supply Cost (Rs.)	Meter Unit Supply Cost (Rs.) With GST 18%	Unit Installation Cost (Rs.)	Unit Installation Cost (Rs.) With GST 18%	Total Supply Cost (Rs.)	Total Installation Cost (Rs.)	Total Cost (Rs.) Supply + Installation
1	3	4	5	6	7	8=3x5	9=3X7	10=8+9
Single Phase meters	24,641	701	827	165	195	2,03,89,230	47,97,603	2,51,86,833
Three Phase Whole Current meters	4,462	1,967	2,321	483	570	1,03,57,149	25,44,915	1,29,02,064
Three Phase LT CT meters	80	7,928	9,354	1,343	1,585	7,48,356	1,26,770	8,75,126
Three Phase HT CT meters(11kV/110V)	115	46,100	54,398	6,302	7,436	62,55,770	8,55,181	71,10,951

Three Phase HT CT meters(33kV/110V)	15	95,300	1,12,454	6,302	7,436	16,86,810	1,11,545	17,98,355
Grand Total	29,313					3,94,37,315	84,36,014	4,78,73,329
Total in Crore								**4.79**

Cable Size (Sq mm)	Required Qty.	Cost per Meter	Cost per Meter With 18%	Cost of Cable	Unit Installation cost connection	Unit Installation cost connection with GST 18%	Total Supply Cosr	Total Inst cost	AMOUNT 21-22	
	Mtr	Rs.		Rs.	Rs.		Rs.	Rs.	Rs.	Rs. (Cr.)
2*4	6,89,948	36	43	2,96,99,778	18	22	2,96,99,778	1,48,71,382	4,45,71,160	4.46
2*10	1,72,487	55	64	1,10,92,639	18	21	1,10,92,639	36,86,420	1,47,79,059	1.48
4*10	1,56,170	69	82	1,27,65,117	19	23	1,27,65,117	35,53,729	1,63,18,846	1.63
4*25	2,800	127	150	4,19,608	31	37	4,19,608	1,03,134	5,22,742	0.05
4*95	4,025	341	402	16,17,205	53	63	16,17,205	2,53,584	18,70,788	0.19
4*150	525	523	617	3,24,060	53	63	3,24,060	33,076	3,57,137	0.04
Grand Total	10,25,955			5,59,18,407			5,59,18,407	2,25,01,325	7,84,19,731	7.84

Accessories	Qty.	Unit Supply Cost	Unit Supply Cost With GST 18%	Total Supply Cost	Unit Installation Cost	Total Installation Cost	Total Supply + Installation Cost (21 - 22)
	No.	**Rs.**	**Rs.**	**Rs.**	**Rs.**	**Rs.**	**Rs.**
Poly carbonate seals	1,46,565.00	4.5	5.4	7,85,696.90	-	-	7,85,696.90
Total	1,46,565.00			7,85,696.90			7,85,696.90
Total In Crore							**0.08**

8.14. Annexure 14 DPR for SMART Meter

Details Cost estimate of Smart meter installation:

Purpose	Voltage Level	Meter Type/Class	TOTAL	As Per MuMBAI Tender Unit rate(Supply)	Escalation	Unit rate(Supply)	Unit rate (Box)	As Per MuMBAI Tender Unit rate(Installation SM & Box)	Total Cost(unit)	Total Cost(unit) With GST 18%	Total Cost	FY21-22
												Y 1 cost
DT Meter Above 50KVA	LTCT	3 phase	15,742	6,627	8%	7,157	-	1,769	8,926	10,533	16,58,08,421	
Consumer Having > 400 Unit Consumption	LT	1 phase	27,163	5,398	8%	5,830	350	346	6,526	7,700	20,91,68,442	
Consumer Meter Consumption Except Lift Irrigation	LT	3 phase	16,206	8,737	8%	9,436	350	500	10,286	12,137	19,66,99,236	1,96,69,924
Consumer Meter Except Lift Irrigation	LTCT	3 phase	2,086	6,627	8%	7,157	-	2,230	9,387	11,077	2,31,06,307	2,31,06,307
Consumer Meter Except Lift Irrigation	HT/EHT	3 phase	2,061	8,000	8%	8,640	-	2,230	10,870	12,827	2,64,35,623	2,64,35,623
Consumer Meter (only govt consumers)	LT	1 phase	127	5,398	8%	5,830	350	346	6,526	7,700	9,77,962	9,77,962
Consumer Meter (only govt consumers) Except Irrigation	LT	3 phase	5,912	8,737	8%	9,436	350	500	10,286	12,137	7,17,56,503	7,17,56,503
Consumer Having > 400 Unit Consumption, New Connection	LT	1 phase	2,710	5,398	8%	5,830	350	308	6,488	7,656	2,07,42,987	
Consumer Meter, New Connection	LT	3 phase	2,882	8,737	8%	9,436	350	423	10,209	12,047	3,47,17,018	
Consumer Meter, New Connection	LTCT	3 phase	2,172	6,627	8%	7,157	-	1,769	8,926	10,533	2,28,81,604	
Consumer Meter, New Connection	HT/EHT	3 phase	439	8,000	8%	8,640	-	1,769	10,409	12,283	53,92,684	
HES/MDAS system - License for 1 Lac Meters			1	1,67,89,071					1,67,89,071	1,98,11,104	1,98,11,104	1,98,11,104

Purpose	Voltage Level	Meter Type/Class	TOTAL	As Per MuMBAI Tender Unit rate(Supply)	Escalation	Unit rate(Supply)	Unit rate (Box)	As Per MuMBAI Tender Unit rate(Installation SM & Box)	Total Cost(unit)	Total Cost(unit) With GST 18%	Total Cost	FY21-22
												Y 1 cost
MDM system- Licenses for 1 Lac Meters			1	1,57,89,722					1,57,89,722	1,86,31,872	1,86,31,872	1,86,31,872
Integration Charges HES/MDAS			1	1,30,68,416					1,30,68,416	1,54,20,731	1,54,20,731	1,54,20,731
Integration Charges MDMS			1	1,30,68,416					1,30,68,416	1,54,20,731	1,54,20,731	1,54,20,731
Server Infrastructure and Networking for 1 Lac Meters (Bidder to provide detailed breakup)			1	6,06,91,559					6,06,91,559	7,16,16,040	7,16,16,040	7,16,16,040
Grand Total			77,500								91,85,87,264	28,28,46,795
Total In Crore												28.28

8.15. Annexure 15 DPR for IT

1. Augmentation of IPDS Software licenses pan TPSODL:

Call Center

Call Centre with 70 desks (voice + Front & Back office)						Additional Requirement	
			Qty in Hand (with FG Scope)			FY22	
S. No.	Description	Unit cost (INR inclusive of Tax)	Existing in Use (A)	FG Scope (B)	Total (A+B)	Qty	Amt.
1	PC with windows OS & UPS	60000		6	6	30	1800000
2	Printer(Laser Jet B/W)	27500		2	2	0	0
	EPABX with ACD	100000		0	0	0	0
3	Printer / Scanner / Copier (Laser Jet - Color)	150000		0	0	0	0
4	Touch Kiosk	27500		1	1	0	0
5	IDMS along with Token dispenser	141573		1	1	0	0
6	Anti Virus	1200		6	6	30	36000
7	Mail License	1000		6	6	30	30000
8	Active User License	1200		6	6	30	36000
9	MS Office	27141			0	30	814230
10	Automated Call Distribution software	617677		1	1	0	0
11	CTI integration	617677		1	1	0	0

12	Answering Service software	617677		1	1	0	0
13	IVRS	617677		1	1	0	0
14	soft IP Phone	617677		1	1	0	0
15	voice Broad casting software	617677		1	1	0	0
16	Server OS	170899		2	2	0	0
17	Database License	3928876		1	1	0	0
18	Application Server	955708		2	2	0	0
19	Head set	6289		5	5	0	0
20	Hand set	7389		5	5	0	0
21	Call switching Equipment	395834		1	1	0	0
22	IVRS Server	569603		1	1	0	0
23	CTI server	569603		1	1	0	0
24	Automated Call Distribution Hardware	395834		1	1	0	0
25	Dialer	395834		1	1	0	0
26	Voice Logger	395834		1	1	0	0
27	Soft telephone	17972		5	5	0	0
28	Server Rack IDF/MDF	52778		1	1	0	0
29	Switch -layer -II	165522		2	2	0	0
30	Router MPLS VPN	78052		1	1	0	0
31	LAN cabling	10000		1	1	30	300000
32	UPS 2/5 KVA	189000		1	1	0	0
33	UPS for 30 min back-up	189000	0	0	0	30	5670000
34	IP Phone	9079		5	5	30	272370
	Total						**89,58,600**

Customer Care center

			Qty in Hand (with FG Scope)				FY22
S. No.	**Description**	**Unit cost (INR inclusive of Tax)**	**Existing in Use (A)**	**Existing in Store (B)**	**FG Scope (C)**	**Total (A+B+C)**	**Amt.**
1	PC(UPS,Chair, Table)	60000	0	0	0	0	1800000
2	Printer(Laser Jet B/W)	27500	0	0	0	0	0
3	Printer / Scanner / Copier (Laser Jet - Color)	150000	0	0	0	0	4500000
4	IDMS along with Token dispenser	141573	0	0	0	0	4247190
5	Anti Virus	1200	0	0	0	0	36000
6	Mail License	1000	0	0	0	0	30000
7	Active User License	1200	0	0	0	0	36000
8	Hand set	7389	0	0	0	0	221670

9	Server Rack IDF/MDF	52778	0	0	0	0	475002
10	Switch -layer -II	165522	0	0	0	0	1489698
11	LAN cabling	10000	0	0	0	0	300000
12	UPS 2/5 KVA	189000	0	0	0	0	0
13	IP Phone	9079	0	0	0	0	0
	Total						**1,31,35,560**

DC software & Licenses (ERP, MBC,DB, OS etc.)

DC software & Licenses (ERP, MBC,DB, OS etc.)							
		Qty in Hand including FG Scope				**FY22**	
S. No.	**Description**	**Existing in Use (A)**	**FG Scope (B)**	**Total (A+B)**	**Unit cost (INR, inclusive of Tax)**	**Qty**	**Amt.**
1	MBC software including Energy audit, New connection / disconnection, MIS		130000	130000	27	1200000	32400000
2	DB License		2	2	8449584	0	0
3	Server OS		5	5	676459	5	3382293
4	ERP full user licensed		366	366	40710	500	20355000
5	Self service		294	294	20355	1000	20355000
6	Payroll users		200	200	11534.5	700	8074150
7	ERP Data base		2	2	1485915	1	1485915
8	Server OS		9	9	777927.39	10	7779273.9
9	Access Management software			0	17773944.61	0	0
10	System Security			0	1357000	0	0
11	EMS /NMSsolution			0	17914586	0	0
12	Mailing solution			0	178356	1	178356.4944
13	AD software			0	67850	1	67850
14	SPAM filter			0	67850	1	67850
15	IDS/IPS/Firewall			0	17520298	2	35040595.13
16	Development of Web portal		1	1	6106500	1	6106500
17	MBC Implementation		1	1	71704667	0	0
18	ERP Implementation		1	1	90652320	0	0
19	Share Point Portal		0	0	2500000	1	2500000
20	MS SQL			0	2500000	1	2500000
21	Other Technologies			0	20000000	1	20000000
					Total		**16,02,92,784**

2.IT Infrastructure (H/W & Field office infra for augmentation of IPDS application licenses)

Data Center

S. No.	Data Centre Enablers	Unit	Unit Cost	QTY	Total (Cr.)	Qty	Total (Cr.)
1	IT Server Racks	No's	86375	17	0.146	20	0.17
2	Precision AC's	No's	1230000	2	0.24	12	1.48
3	Water Leakage system	Sqft	214	1500	0.032	3000	0.06
4	Cold Containment in Data Centre	No's	495000	2	0.1	6	0.30
5	Fire safety system (FM 200)	Sqft	3200	1000	0.32	2000	0.64
6	Building Management System	Nos	5000000			1	0.50
7	Generator 100-200 KVA	nos	2500000			1	0.25
8	Fire Proof Storage	nos	200000			2	0.04
9	Data cabling and Eleictrical cabling	nos	5000000			1	0.50
10	***Data centre UPS with UPS panel	No's	6062500	2	1.21	1	0.61
			Total without civil construction		**2.048**		**4.55**

Front end devices

Front End Devices with Licenses excluding Call Centre & Curomer Care Centre (A)								
			Qty in Hand including FG Scope				Additional Requirement	
S.No	Description	Unit cost (INR , inclusive of tax)	Existing in Use (A)	Existing in Store (B)	FG Scope (C)	Total (A+B+C)	FY22	
			Qty	Qty	Qty	Qty	Qty	Amt.
1	Workstation PC with windows OS & UPS	60000	0	0	312	312	200	12000000
2	Printer(Laser Jet B/W)	20000			44	44	25	500000
3	Printer / Scanner / Copier (Laser Jet - Color)	150000	0	0	0	0	10	1500000
4	Dot Matrix Printer (Billing counter)	15000			360	360	80	1200000
5	Bar code reader	5000			360	360	80	400000
6	Anti Virus	1200			312	312	2000	2400000
7	Mail License	1000			312	312	2000	2000000

8	Active User License	1200			312	312	2000	2400000
9	Laptop with windows OS (Ref. TPDDL) & MS Office	92495			0	0	900	83245500
10	MS Office(Ref TPDDL)	33597	0	0	0	0	1100	36956700
11	LAN Cabling (Rate / Point)	10000	0	0	0	0	440	4400000
	Total							**14,70,02,200**

DC Hardware:

DC Hardware equipment								
S. No.	**Description**	**Unit cost (INR inclusive of Tax)**	**Proposed by FG Scope**	**Additional requirement**	**Total**	**Amount (INR) considering FG scope only**	**Total Amount (INR) with additional requirement**	**FY22 Amount (INR)**
1	MIS reporting Server	1448853	1	1	2	14,48,853	28,97,705	
2	MBC Application Server	1448853	2	1	3	28,97,705	43,46,558	
3	DB server MBC	1565087	2	1	3	31,30,174	46,95,261	
4	Work Station PC	76616	5	5	10	3,83,081	7,66,162	
5	Printer Line	214406	1	0	1	2,14,406	2,14,406	
6	ERP Server Production	5795410	4	2	6	2,31,81,641	3,47,72,461	
7	ERP DB Server	1565087	2	1	3	31,30,174	46,95,261	
8	Development System Server	1565087	1	0	1	15,65,087	15,65,087	
9	Test & QA	1086639	1	0	1	10,86,639	10,86,639	
10	Training Server	1448853	1	0	1	14,48,853	14,48,853	
11	Laser Jet Printer(BW)	18666	1	0	1	18,666	18,666	
12	Anti virus Server	1448853	1	2	3	14,48,853	43,46,558	
13	AD Server	1448853	1	2	3	14,48,853	43,46,558	
14	Web Server	1448853	1	1	2	14,48,853	28,97,705	
15	Mail server	1448853	1	2	3	14,48,853	43,46,558	
16	SAN Storage	9232214		1	1	-	92,32,214	92,32,214
17	SAN Disk	20000000		1	1	-	2,00,00,000	2,00,00,000
18	SAN Switch	3220975		2	2	-	64,41,950	64,41,950

19	SAN Cabling	135700		1	1	-	1,35,700	1,35,700
20	UTM HA	6299817		1	1	-	62,99,817	62,99,817
21	Switch - Layer-II	81144	2	2	4	1,62,288	3,24,576	
22	Testing, Development & QA Server	1448853	1	0	1	14,48,853	14,48,853	
23	Access Control Server	1448853		1	1	-	14,48,853	
24	LDAP Server	1448853		1	1	-	14,48,853	
25	Reverse Proxy Server	1448853		1	1	-	14,48,853	
26	EMS/NMS Server with Network Operation Console	1448853	1	0	1	14,48,853	14,48,853	
27	Backup Server	1448853		1	1	-	14,48,853	
28	Core Switch	2191538		2	2	-	43,83,076	
29	Access Switch	1623643		2	2	-	32,47,286	32,47,286
30	Distribution Switch	2238043		2	2	-	44,76,086	44,76,086
31	Application Load Balancer	5638335		2	2	-	1,12,76,670	
32	Media for DAT drive	4235333		2	2	-	84,70,665	84,70,665
33	Router Installation for Internet Gateway	2038532	1	0	1	20,38,532	20,38,532	20,38,532
34	Router Installation for MPLS/ VPN Connectivity [One for each DISCOM at DC and DR]	2038532	2	0	2	40,77,065	40,77,065	40,77,065
35	Cabling Connectors and required Hardware	271400		1	1	-	2,71,400	2,71,400
36	LAN including Accessories	327376		1	1	-	3,27,376	3,27,376
37	Fiber Optical Cable, Connectors, Patch Cord etc.	868242		1	1	-	8,68,242	8,68,242
37	Critical Load UPS	5428000	2	0	2	1,08,56,000	1,08,56,000	

37	Service Load UPS	1798025	2	0	2	35,96,050	35,96,050	
37	Hard ware Installation	21483635	1	1	2	2,14,83,635	4,29,67,269	42,96,726.93
37	Additional Hardware other Application	2000000		15	15	-	3,00,00,000	3,00,00,000
					Total	**8,94,11,963**	**25,04,27,527**	**10,01,83,061**

3.Communication Network Infra

Locational Network (E)							
			Qty in Hand (with FG Scope)				FY22
S. No.	Description	Unit cost (INR inclusive of Tax)	Existing in Use (A)	Existing in Store (B)	FG Scope (C)	Total (A+B+C)	Amt.
1	Layer -II Switch	50000	0	0	200	224	7500000
2	Layer- 3 Router (MPLS/VPN)	200000	0	0	200	224	15000000
3	LAN Cables One time	20000	0	0	200	224	2000000
4	2/5 kVA UPS	40000	0	0	200	224	3000000
5	Equipment cards(UPS cabling)	10000	0	0	200	224	750000
6	WIFI Access points	45000	0	0	0	0	4500000
7	Wifi Controller	300000	0	0	0	0	4500000
8	10 G Switch	1000000	0	0	0	0	2000000
		Total					**3,92,50,000**

OFC (F)							
			Qty in Hand including FG Scope			FY22	
S. No.	Description	Unit cost (INR including Tax)	Existing in Use (A)	FG Scope (B)	Total (A+B)	Qty	Amt.
1	Under Ground 24C OFC laying (ckt-km)	700000	0	0	0	10	7000000
2	Over head 12C unarmoured (ckt-km)	200000	0	0	0	25	5000000
3	24C OPGW	500000	0	0	0	0	0
4	MPLS Router	500000	0	0	0	5	2500000

		Total					1,45,00,000

4.SCADA Implementation

Project Area Detail

Name of PSS	Berhampur City & Berhampur (MCC)	Aska	Rayagada	BhanjaNagar	Jeypore	Total
Total Substations	42	20	51	42	68	224
ODSSP S/Stns (69 taken in service out of 99)	13	10	25	20	31	99

SCADA Phasewise implementation plan.

Project Plan	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
Payment out flow								1.67			3.34	5.01	3.34	3.34
Submission of Capex to OERC														
NIT for SCADA & MPLS communication														
Bid submission														
Technical evaluation														
Award of Contract														
Engineering & Design of SCADA & Communication														
FAT of SCADA & communication														
1st phase implementation of ODSSP grid @ 7 nos. of grid per month														
1st phase implementation of Old grid @ 5 nos. of grid per month														

Phase-1	
Common Charges	3.73
SCADA/ADMS CC	8.08

Integration Cost	4.90
Total in Cr.	16.71

Summary of Project Cost

Sr.No	Particular	Berhampur City & Berhampur (MCC)	Aska	Rayagada	Bhanjan Nagar	Jaypore	Sambalpur (BCC)	Total (exclu Taxes & duties) (In INR)	GST	Grand Total
1	Common charges excluding Civil Infra	15382548.05	7282412.506	7282412.51	7282412.506	7282412.506	8215320.88	52727518.95	9490953.411	62218472.36
2	SCADA/DMS Control centre	70052207.75	10051203.75	10051203.8	10051203.75	10051203.75	60854228.8	171111251.5	30800025.27	201911276.8
3	Integration Cost	169300000	169300000	169300000	169300000	169300000	0	846500000	152370000	998870000
	Grand Total (Sub total of 1+2+3))	254734755.8	186633616.3	186633616	186633616.3	186633616.3	69069549.6	1070338770	192660978.7	1262999749

Summary of Project Cost(Part-A)

Sl. No.	Particular	Berhampur City & Berhampur (MCC)	Aska	Rayagada	Bhanjan Nagar	Jaypore	Sambalpur (BCC)	Total exclu Taxes & duties (in INR)
1	**Common charges**							
1.2	Training for the Employees@2% Sub total (B+C@5 year)	2393522	1793512	1793512	1793512	1793512	608542	10176112.52
1.3	Contingency cost @2.5% ,Sub total (B+C@5 year)	5983805	4483780	4483780	4483780	4483780	1521356	25440281.29

1.4	Project Management and implementation Cost@10% ,Sub total (B+C@5 year)	7005221	1005120	1005120	1005120	1005120	6085423	17111125.15
	Sub-Total –A	**15382548.05**	**7282412.51**	**7282412.51**	**7282412.51**	**7282412.51**	**8215320.9**	**52727518.95**
2	**SCADA/DMS Control centre**							
2.1	Hardware	51383055	9572575	9572575	9572575	9572575	42623075	132296430
2.2	Software	16100000	0	0	0	0	16100000	32200000
2.3	Mandatory spares	2569152.75	478628.75	478628.75	478628.75	478628.75	2131153.75	6614821.5
	Sub-Total –B	**70052207.75**	**10051203.8**	**10051203.8**	**10051203.8**	**10051203.8**	**60854229**	**171111251.5**
3	**Integration Cost**							
3.1	**Integration Cost**	33860000	33860000	33860000	33860000	33860000		169300000
	Sub-Total –C	**33860000**	**33860000**	**33860000**	**33860000**	**33860000**	**0**	**169300000**
	Sub-Total -@ 5 year	**169300000**	**169300000**	**169300000**	**169300000**	**169300000**	**0**	**846500000**
	Grand Total(Sub total of 1+2+3)	**254734755.8**	**186633616**	**186633616**	**186633616**	**186633616**	**69069550**	**1070338770**

SCADA/DMS control centre Quantity

S. No.	Equipment		Berhampur City + Berhampur (MCC)	Aska	Rayagada	Bhanjanagar	Jaypore	Sambalpur (BCC)	total
B1	**Server/ workstation Hardware**	**Unit**							
	SCADA/ADMS server	No.	8	0	0	0		8	**16**

	FEP server with interface switches	No.	8	0	0	0		8	**16**
	ISR server	No.	8	0	0	0		8	**16**
	NMS server	No.	8	0	0	0		8	**16**
	DTS server	No.	3	0	0	0		3	**6**
	Developmental server	No.	3	0	0	0		3	**6**
	Interface Server (ICCP/GIS/Network Planning / ODBC / Web services)	No.	8	0	0	0		8	**16**
	Web/Directory server	No.	2	0	0	0		2	4
	Workstation with dual TFT Monitors	No.	10	5	5	5	5	0	**30**
	Remote VDUs with one TFT Monitors	No.	5	5	5	5	5	0	**25**
	Developmental console with dual TFT	No.	5	0	0	0	0	5	**10**
	DTS/Workstation Console with dual TFTs	No.	5	0	0	0	0	5	**10**
	DLP based Video Projection system with 2x3 Module configuration with each module at least 67" diagonal with common projector and 80 Inch TV at excluding MCC & BCC	No.	1	1	1	1	1	0	**5**
	Storage & Backup Devices							0	**0**
	External RAID Mass storage device (for year online backup)	No.	3	0	0	0		3	**6**
	Exteranl DAT drive	No.	3	0	0	0		3	**6**
	Switches							0	
	Layer II switch (SCADA/DMS LAN)-48 ports	No.	5	0	0	0		5	**10**
	Layer II switch (Development system LAN)-24ports	No.	3	1	1	1	1	3	**10**
	Routers							0	**0**
	Router for interfacing IT system & SCADA/ ADMS BCC centre	No.	1	0	0	0		1	**2**
	Router at remote VDU	No.	5	0	0	0		1	**6**
	Security system (DMZ)							0	
	Web server with load balancing	No.	3					5	**8**
	Patch Management / Mail / SMS server	No.	2	0	0	0		4	**6**
	Router	No.	2	0	0	0		2	**4**
	Firewall & network IDS/IPS	Set	2	0	0	0		2	**4**
	Layer II switch	No.	2	0	0	0		2	**4**
	Other Active Devices							0	**0**
	GPS Time synchronization system	Set	2	0	0	0		2	**4**

	Time, day & date digital displays	Set	1	0	0	0		1	**2**
	Printers								**0**
	B/W Laser printer	Set	1	1	1	1	1		**5**
	Color Laser printer	Set	1	1	1	1	1		**5**
	Cabling System								**0**
	Cable, Jacks etc.	Lot	1	1	1	1	1	1	**6**
	UPS along with battery of suitable rating running in parallel redundant mode*(40 KVA)	set	2	0	0	0	0	2	**4**
	Sub- Total (Hardware) B1								
B2	**Mandatory Spares for Control Centre**								
	5% of B1	No.							
	Sub-Total (Spares) B2								
B3	**Software for Control Centre**								
	SCADA software	Lot	1	0	0	0		1	**2**
	ISR Software	Lot	1	0	0	0		1	**2**
	DMS software	Lot	1	0	0	0		1	**2**
	OMS software	Lot	1	0	0	0		1	**2**
	DTS software	Lot	1	0	0	0		1	**2**
	Developmental software	Lot	1	0	0	0		1	**2**
	Network Management Software	Lot	1	0	0	0		1	**2**
	WEB /Network security software (incl in web server)	Lot	1	0	0	0		1	**2**
	RDBMS package (incl in ISR)	Lot							**0**
	GIS Adaptor/Engine for importing data from GIS system under IT system	Lot	1	0	0	0		1	**2**
	Sub-Total (SW) -B3								
B4	**Network Charges**								
	Sub -Total (SW) -B4								

SCADA/DMS control centre Cost

S.No.	Equipment		Berhampur City + Berhampur (MCC)	Aska	Rayagada	Bhanjanagar	Jaypore	Sambalpur (BCC)	total
B1	**Server / workstation Hardware**	**Unit cost (in INR)**							
	SCADA/DMS server	6,49,650	51,97,200	-	-	-	-	51,97,200	1,03,94,400

	FEP server with interface switches	6,49,650	51,97,200	-	-	-	-	51,97,200	1,03,94,400
	ISR server	6,49,650	51,97,200	-	-	-	-	51,97,200	1,03,94,400
	NMS server	6,49,650	51,97,200	-	-	-	-	51,97,200	1,03,94,400
	DTS server	6,49,650	19,48,950	-	-	-	-	19,48,950	38,97,900
	Developmental server	6,49,650	19,48,950	-	-	-	-	19,48,950	38,97,900
	Communicatio n Server (ICCP)	6,49,650	51,97,200	-	-	-	-	51,97,200	1,03,94,400
	Web/Director y server	**6,49,650**	**12,99,300**	-	-	-	-	**12,99,300**	**25,98,600**
	Workstation with dual TFT Monitors	1,51,940	15,19,400	7,59,700	7,59,700	7,59,700	7,59,700	-	45,58,200
	Remote VDUs with one TFT Monitors	1,01,175	5,05,875	5,05,875	5,05,875	5,05,875	5,05,875	-	25,29,375
	Developmental console with one TFT	1,52,295	7,61,475	-	-	-	-	7,61,475	15,22,950
	DTS/Workstati on Console with dual TFTs	1,52,295	7,61,475	-	-	-	-	7,61,475	15,22,950
	DLP based Video Projection system with 2x3 Module configuration with each module at least 67" diagonal with common projector	81,14,235	81,14,235	81,14,235	81,14,235	81,14,235	81,14,235	-	4,05,71,175
	Storage & Backup Devices			-	-	-	-		
	External RAID Mass storage device (for 2 months online backup)	3,04,235	9,12,705	-	-	-	-	9,12,705	18,25,410
	Exteranl DAT drive	76,325	2,28,975	-	-	-	-	2,28,975	4,57,950
	Switches			-	-	-	-		
	Layer II switch (SCADA/DMS LAN)-48 ports	1,52,295	7,61,475	-	-	-	-	7,61,475	15,22,950
	Layer II switch (Development system LAN)- 24ports	1,01,530	3,04,590	1,01,530	1,01,530	1,01,530	1,01,530	3,04,590	10,15,300
	Routers			-	-	-	-		
	Router for interfacing IT system & SCADA/DMS DR centre	2,02,705	2,02,705	-	-	-	-	2,02,705	4,05,410
	Router at remote VDU	50,765	2,53,825	-	-	-	-	50,765	3,04,590
	Security system (DMZ)			-	-	-	-		

	Web server with load balancing	4,05,765	12,17,295	-	-	-	-	20,28,825	32,46,120
	Mail server	4,05,765	8,11,530	-	-	-	-	16,23,060	24,34,590
	Router	2,02,705	4,05,410	-	-	-	-	4,05,410	8,10,820
	Firewall & network IDS/IPS	7,10,000	14,20,000	-	-	-	-	14,20,000	28,40,000
	Layer II switch	50,765	1,01,530	-	-	-	-	1,01,530	2,03,060
	Other Active Devices			-	-	-	-		
	GPS Time synchronizatio n system	3,04,235	6,08,470	-	-	-	-	6,08,470	12,16,940
	Time, day & date digital displays			-	-	-	-		
	Printers			-	-	-	-		
	B/W Laser printer	20,235	20,235	20,235	20,235	20,235	20,235	-	1,01,175
	Color Laser printer	20,235	20,235	20,235	20,235	20,235	20,235	-	1,01,175
	Cabling System			-	-	-	-		
	Cable, Jacks etc.	50,765	50,765	50,765	50,765	50,765	50,765	50,765	3,04,590
	UPS along with battery of suitable rating running in parallel redundant mode*(min 40 KVA)	6,08,825	12,17,650	-	-	-	-	12,17,650	24,35,300
	Sub- Total (Hardware) B1		**5,13,83,055**	**95,72,575**	**95,72,575**	**95,72,575**	**95,72,575**	**4,26,23,075**	**13,22,96,430**
B2	**Mandatory Spares for Control Centre**						-		
	5% of B1		25,69,153	4,78,629	4,78,629	4,78,629	-	21,31,154	61,36,193
	Sub-Total (Spares) B2		**25,69,153**	**4,78,629**	**4,78,629**	**4,78,629**	**-**	**21,31,154**	**61,36,193**
B3	**Software for Control Centre**			**-**			**-**		
	SCADA software	50,00,000	50,00,000	-	-	-	-	50,00,000	1,00,00,000
	ISR Software	2,50,000	2,50,000	-	-	-	-	2,50,000	5,00,000
	DMS/OMS software	50,00,000	50,00,000	-	-	-	-	50,00,000	1,00,00,000
	DTS software	2,50,000	2,50,000	-	-	-	-	2,50,000	5,00,000
	Developmental software	2,50,000	2,50,000	-	-	-	-	2,50,000	5,00,000
	Network Management Software	2,50,000	2,50,000	-	-	-	-	2,50,000	5,00,000
	WEB /Network security software (incl in web server)	50,00,000	50,00,000	-			-	50,00,000	1,00,00,000
	RDBMS package(incl in ISR)			-			-		

	GIS Adaptor/Engine for importing data from GIS system under IT system	1,00,000	1,00,000	-	-	-	-	1,00,000	2,00,000
	Sub-Total (SW) -B3		**1,61,00,000**	**-**	**-**	**-**	**-**	**1,61,00,000**	**3,22,00,000**
									17,06,32,623

5.GIS Implementation

GIS Project Details:

Circle	33 KV		33 KV		11 KV		LT (only for urban and semi urban divisions)		No. of 33 KV Pole	No. of HT Pole	No. of LT Pole only in Urban Areas
	Total S/Stns	Total PTRs	CKT Kms O/H	CKT Kms U/G	CKT Kms O/H	CKT Kms U/G	CKT Kms O/H	CKT Kms U/G			
City circle	18	41	139.23	3	1114.84	7.08	316.394		1392	13936	10546
BERHAMPUR CIRCLE	27	64	373.94		3370.57	11.1	868.8		3739	42132	28960
ASKA CIRCLE	20	53	227.9	0.9	2116.24	8.95	435.56		2279	26453	14519
BHANJANAGAR CIRCLE	40	81	819.88		9876.87	20.1	1675.7		8199	123461	55857
RAYAGADA CIRCLE	48	87	797.6		7972.12		1285.8		7976	99652	42860
JEYPORE CIRCLE	64	133	1273.51		15989.52		2744.8		12735	199869	91493

GIS Software

DC software & Licenses (ERP, MBC,DB, OS etc.)				
			FY22	
S. No.	**Description**	**Unit cost (INR, inclusive of Tax)**	**Qty**	**Amt.**
1	GIS S/W licenses (20 desktop licenses, 150 web licenses, 1 geo spatial analysis)		171	40000000
2	DB License	8449584	1	8449584
3	Server OS	676459	5	0
4	Development of Web portal	6106500	0	0
5	Implementation Cost	71704667	1	20000000
6	Mobile App with Implementation	20000000	0	
		Total		**6,84,49,584**

GIS Imagery Digitization Survey

Sr. No	Activities	Unit	Unit Price	Phase I (City & Berhampur Circle)	
				QTY	Cost
1	Procurement of Satellite Imagery having 0.5 m or less resolution (Extension to the existing 12 town as well as other smaller settlements	Sq. KM	500	47000	23500000
2	Creation of Base Map by using High Resolution Satellite Imagery..considering 40% valid area of base map creation	Sq. KM	3,500		
3	33/11 kV substations	Nos	5,000	45	225000
4	HT (33, 11 kV) overhead lines/underground cables along with associated line equipment such as RMUs, Distribution Transformers, Capacitors etc. & Asset Painting as per codification Logic	KM	2,000	516	1032000
5	HT (11 kV) overhead lines/underground cables along with associated line equipment such as RMUs, Distribution Transformers, Capacitors etc. & Asset Painting as per codification Logic	KM	2,000	4504	9008000
6	LT overhead lines and underground cables along with associated equipment such as poles, feeder pillar boxes etc. & Asset Painting as per codification Logic.	KM	2,000	1185	2370000
7	Collection/updation of consumer attribute database through door-to-door field survey and codification & indexing of the consumers with respective upstream source of supply (poles/feeder pillar boxes).	Nos	45		
8	Preparation of digitized electrical network on the base map in the pre-defined scale with features and attributes of assets and consumers collected through DGPS/door-to-door survey for GIS application.	Sq. KM	1,000		
Total					**36135000**

8.16. Annexure 16 DPR for Civil Works, Store & Administration

Security System of Stores:

The requirement of High Mast Lighting System:

Expected Cost for High Mast Light : 17 Nos = 85 lacs

i. Unit Material Cost = 04 Lakhs

ii. Unit Installation Cost =01 Lakh

Expected Cost & Quantity of required Fire Extinguishers: 15.22 Lakhs

FIRE EXTINGUISHER TYPE	UNIT	TPSODL/ CDB Rates INCL GST	BERHAMPUR CENTRAL STORE	RAYAGADA STORE	JEYPORE STORE	BHANJANA GAR STORE	PHULBANI STORE	Total Requirement (Nos.)	Total Cost (In Rs.)
DCP 50KG CAP.	EA	12,500	10	7	7	2	2	28	350000
ABC TYPE 10 KG	EA	2,100	6	5	5	3	3	22	46200
MECH FOAM 50 LTR	EA	6,046	4	3	3	1	1	12	72556.2
Water Mist Type	EA	263435	2	1	1			4	1053740
Total			22	16	16	6	6	66	1522496

Cost of Boundary Wall with Concertina coil:

Store Name	Requirement	Estimate Cost (in Cr.)
BERHAMPUR CENTRAL STORE	New Concertina wire	0.4
RAYAGADA STORE	Store boundary wall with concertina wire	0.75
JEYPORE STORE	Store boundary wall with concertina wire	0.7
PHULBANI STORE	New Concertina wire	0.3
BHANJANAGAR STORE	New Concertina wire	0.3
Total		**2.45**

Total Cost estimate for Store:

S.no	Item Description	Total Budget (In Crores)
1	High Mast arrangement	0.85
2	Fire Extinguishers	0.15
3	Store boundary wall with concertina wire	2.45

4	Storage of E-waste and Hazardous Scrap Material	0.8
Total		**4.25**

Administration:.

S. No.	Major Items Required	Quantity	Unit Price in Rs	Total Cost in Rs	Office Location where items will be used
1	Water Cooler	120	45,000	5,400,000	Sub Division,Section office, Circle, Division,training Center,store,Corporate office
2	Water Dispenser	4	10,000	40,000	Training Center, Customer Care, Corporate office
3	RO / Aqua guard	200	18,000	3,600,000	Sub Division,Section office, Circle, Division,training Center,store,Corporate office
4	Photocopy Machine	30	90,000	2,700,000	Corporate office & Training Center,Circle, & store
5	Projector	8	37,000	296,000	Corporate office & Training Center, Circle, & store
6	Sanitizer M/c	200	10,000	2,000,000	Circle,Corporate office ,Section office & Others support offices
7	Biometric M/c	250	10,000	2,500,000	All offices
8	Fan celling / Wall mounted / Pedestal Fan/ Exhaust Fan	250	2,000	500,000	Circle,Corporate office ,Section office & Others support offices
9	Refrigerator	25	22,000	550,000	Circle,Corporate office ,Section office & Others support offices
10	Induction Plate	50	3,000	150,000	Circle,Corporate office ,Section office & Others support offices
11	Electric Kettle	200	1,200	240,000	Circle,Corporate office ,Section office & Others support offices
12	White Board	100	6,000	600,000	Division,Circle,store,Corporate office, Customer Care center(CCC),Training Center
13	Notice / Pin up Board	100	3,000	300,000	Division,Circle,store,Corporate office,CCC,Training Center
14	Emergency Light	100	1,300	130,000	Division,Circle,store,Corporate office,CCC,Training Center
15	TV/monitor 32 inch	20	35,000	700,000	CCC,Training Center,Corporate office,Canteen

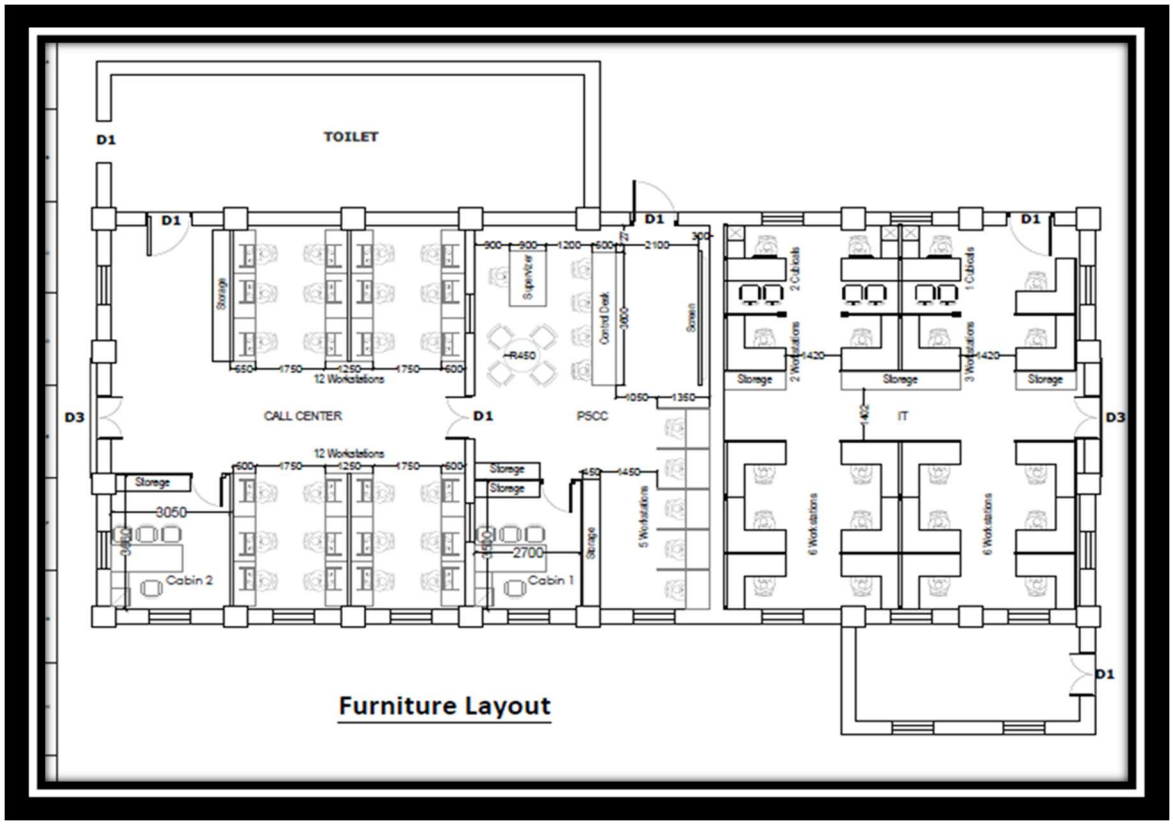
S. No.	Major Items Required	Quantity	Unit Price in Rs	Total Cost in Rs	Office Location where items will be used
16	Car-Innova	1	2,500,000	2,500,000	CEO's office
17	Bolero	6	1,400,000	8,400,000	Operations Dept.
18	Maruti Dzire	2	1,100,000	2,200,000	Civil & Administration
19	Paper Shredder	10	6,000	60,000	Division,Circle,store,Corporate,CCC,Training Center
20	Wall clock	2000	500	1,000,000	All the locations
21	Grass cutting Machine	6	17,000	102,000	Circle
22	Public announcement machine	6	25,000	150,000	Circle
23	Fogging machine	7	10,000	70,000	Circle
24	Almirah/file cabinet	50	15,000	750,000	Circle
25	EPBAX System	10	50,000	500,000	Circle Others office supoort office,Corporate office
26	AC	40	40,000	1,600,000	Circle, Div & Sub Div
27	New Office Furniture	500	25,000	12,500,000	new New Office Furniture & replacement of damage furniture
Total				**49,538,000**	
Total in Crores				**4.95**	

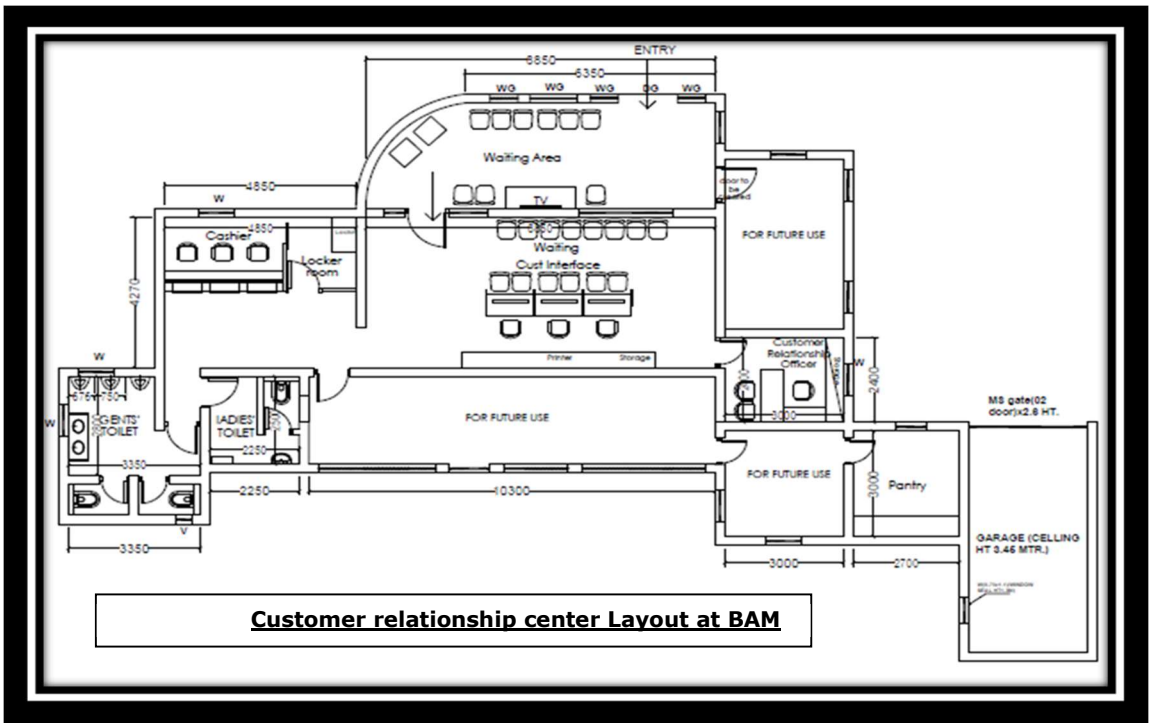
Total Cost Estimate for Civil Infrastructure:

S. No.	Activity		DPR Amount (in Rs. Crores)
1	**Civil Infrastructure**		**20.00**
	Offices infra, rehabilitation & renovation of offices space , Customer Care center, Collection Counter (area 3400 sqm), Furniture, false Ceiling etc.	12.50	
	Furniture	3.80	
	Paving and drains	2.00	
	Administration and Supervision Charges	1.70	

	Total	**20.00**	
2	**Civil Work for Meter Test Bench**		**2.00**
	Creation of one bay measuring (10x16.0 m)	0.60	
	Construction of building 160 sq.m.	0.69	
	Refurbishment	0.47	
	Furniture, administration and supervision charges	0.24	
	Total	**2.00**	
3	**Call Center, PSCC Infrastructure**		**4.00**
	Creation of three bays within existing shed (350 sq.m)	0.60	
	Rehabilitation of building and water proofing	1.20	
	Refurbishment of building	1.20	
	Furniture, Administration and Supervision Charges	1.00	
	Total	**4.00**	
4	**Store**		**4.25**
5	**Upgradation of DT workshop**		**1.00**
6	**Administration**		**4.95**
	Total Amount		**36.20**

Proposed modification/Renovation Drawings





PRAYER:

Pursuant to the direction of Hon'ble Commission vide suo motu proceeding in case no 83/2020 on dated 28.12.2020, para 43, TPSODL is supposed to file the Capital investment plan as per the vesting order.

In compliance to above, I am submitting herewith CAPEX plan to a tune of 408.47 Cr on behalf of TPSODL which may kindly be approved.

Dated:

Chief Executive Officer

TPSODL

Filename:	DPR TPSODL Capex Plan-Final _18
Directory:	C:\Users\acer\Desktop
Template:	C:\Users\acer\AppData\Roaming\Microsoft\Templates\Normal.dotm
Title:	
Subject:	A Report on achievements of mtsa between tata power & wpg services ltd.
Author:	tATA pOWER sOUTHERN ODISHA DISTRIBUTION LIMITED
Keywords:	Association of Nigerian Electricity Distributors (ANED) & AFD
Comments:	
Creation Date:	11-02-2021 11:56:00
Change Number:	14
Last Saved On:	11-02-2021 17:14:00
Last Saved By:	acer
Total Editing Time:	40 Minutes
Last Printed On:	11-02-2021 17:14:00

As of Last Complete Printing

Number of Pages:	174
Number of Words:	42,838 (approx.)
Number of Characters:	244,182 (approx.)