



CAPEX Plan for FY 2022-23

Detailed Project Report (DPR)

Submitted By

TP Western Odisha Distribution Ltd

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Executive Summary

TP Western Odisha Distribution Limited (TPWODL) is incorporated as a joint venture of Tata Power (51%) and Odisha Government (49%) on the Public-Private Partnership (PPP) model. TPWODL took over the license from 01.01.2021 to distribute electricity in the western part of Odisha, which was earlier served by erstwhile WESCO, through a competitive bidding process. TPWODL's utility business shall be governed by the provisions of license issued by Honb'le OERC for distribution and retail supply of electricity in Western 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).

TPWODL license area is spread over a geography of 48,207 Sq.Km and serve the registered consumer base of 2.19 million. TPWODL procures power from GRIDCO, which is a state owned company, engaged in the business of purchase of electricity in bulk from various generators located inside Odisha and the state share of power from Central generators for supply in all power distribution utilities, including TPWODL. It receives electrical power at a sub transmission voltage of 33KV from Odisha Power Transmission Company Limited's (OPTCL) 220/132/33 kV Grid Substations and then distributes the power at 33KV / 11KV / 440V / 230V depending on the demand of the consumers. For effective operations, license area is divided in 5 circles, which is further sub divided in 17 Divisions, 57 Sub-division and 202 Sections which manages the commercial and O&M activities in order to serve its consumer.

It is observed that the inherited power distribution network is in a dilapidated state. Distribution lines are lengthy and most of the feeders are of radial nature. Even some of the spans have under-rated / uneven sized conductor thus compromising the circuit capacity as per the lowest capacity of the conductor available in the network even if for a small section. O/H network have worn out conductors, poor Earthing, damaged / tilted poles/ accessories resulting into abnormal sag. As a result, safety clearances are compromised at many locations, which possess threat to the safety of employees, public at large and animals. Similarly, 33/11KV Primary substation and 11/0.415 kV Distribution Substations are in very deteriorated condition. In Primary Substations faulty equipment exists which are either bypassed or removed and supply is being managed without proper switching devices resulting into escalation of faults / cascade tripping to upstream devices thereby impacting the large consumer base. In Distribution Substations the Air Break Switch, HG/DO Fuse units, LV

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Protection devices are not functioning at most of the locations. Apart from this, earthing system in primary Substation, Distribution Substation and Lines are in deteriorated condition. Fuse arrangements installed at Distribution Substations are installed at lower height and exposed thereby creating a potential safety hazard for human being and animals. It is very hazardous for employees to work on such system.

33/11 kV Primary Substation's (PSS) boundary walls are broken and there is no fencing to the outdoor switchyards. This makes the PSS unsafe for stray animals and any unauthorized entry. Apart from this, earthing system is in a very poor condition; many breakers and CTs are bypassed resulting into non-availability of basic protection system.

One of the burning problem observed is the presence of a large number of non-metered and defective meters resulting into poor billing efficiency. Lot of irrigation related area do not have meter. Additionally, Meters installed at consumer premises are of mix type such as electro-mechanical meters, consumer owned meters, electronic meters etc. Meter sealing to ensure revenue protection from unauthorized access to electricity is another area, which needs to be emphasized. TPWODL has taken the action for replacement of identified defective/ electro-mechanical meters.

The level of hygiene and sanitation at the work place is appalling. Office buildings are very old which needs to be strengthened. Infrastructure of the offices requires revamping to ensure conducive work environment, additional space for employees and visiting consumer.

To address the above key challenges and to safeguard the assets along with consumer interest, substantial investment is required. This will enhance the reliability, reduction in AT&C losses, safe environment, meeting new load requirement and efficiency improvement along with customer satisfaction.

With this objective of ensuring reliable power supply and ensuring best customer services to the end consumers, TPWODL, in the last year Capex submission, has come up with capital investment plan in five major heads viz Statutory and Safety, Reliability, Loss reduction, Load Growth and Infrastructure and Technology adoption, same heading will continue for this year Capex plan also. The details of each head are subsequently mentioned along with estimated Capex requirement and associated activities.

As per the our observations and commitment mentioned in the Vesting Order, Rs.1663 Cr Capital investment is required to ensure reliable power supply to the end customer. Since, such a huge investment would adversely affect tariff so investment is staggered in 5 years.

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In FY 21-22, TPWODL has proposed capex investment of Rs. 462.42 Cr and Honb'le OERC has approved the Capital expenditure of Rs. 333.13 Cr. In FY 22-23, TPWODL has proposed Capex investment of Rs. 582.18 Cr.

TPWODL proposes to invest Capital Expenditure of Rs. 582.18 Cr. in FY 22-23 under five proposed major categories i.e.

1. Statutory, Safety and Security
2. Loss Reduction
3. Reliability
4. Load Growth
5. Technology adoption & Infrastructure

Proposed Capex Plan FY 22-23

S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr
1	Statutory, Safety and Security	i) Life enhancement of network and maintaining safe horizontal / vertical clearances	Increase of height for 11 kV and 33 kV sagging line.	5.5
			Cradle guard at 33KV & 11KV- road crossing, populated area, school area.	2
			Intermediate Pole for 33KV,11KV & LT Network near the forest area	4.5
			Replacement of Open Conductor with Covered Conductor	3
		ii) Provision of Testing Equipment & PPEs to workforce	Testing equipment	1.2
			Safety Equipment (like Arc Suit, Neon Tester, Insulating Material and Others) for work force.	3.8
		iii) Earthing, Fencing	Earthing of PSS	0.5
			Earthing of DSS & Pole	3
			Fencing of Distribution Substation	12
		iv) Boundary Wall and infrastructure works at Primary sub-station	Boundary wall of Primary Substation	12
			Gravel filling for Primary substation	1
			Access road to switchyard and stores	2
			control room and Building refurbishment	2
			provision for water supply for PSS/Offices (Watering for Earth pit)	0.5
		Sub Total- Statutory, Safety and Security		
2	Loss Reduction	i) Energy Audit & Meter related activity	Meter Replacement against burnt/Faulty/Obsolete Technology	34.30
			Meter testing equipment for field staff	1.00
			Installation of Metering Unit, Meters and Modems at PSS Boundary Points	2.86

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S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr
			Installation of CT,PT, Meters & Modems for Defective 11 KV Feeder Meters	4.00
			Installation of DT Meters (above 250 KVA)	2.50
			Installation of CT,PT, Meters & Modems for High value Industrial Consumers	1.00
		ii) spot billing	spot billing devices (Bluetooth Printer +Mobile)	3.20
		iii) Replacement of LT Bare conductor with AB cable	Replacement of LT Bare conductor with AB cable	30.00
Sub Total-Loss Reduction				78.86
3	Reliability	i) Replacement/Addition of network component in 33/11KV Primary Substation.	Refurbishment work in PSS (Structure Replacement / Yard Refurbishment)	5
			New 11 Kv breaker	5
			New 33 Kv breaker	4
			Control cable	4
			Replacement of 11 KV and 33 KV damaged CT and PT	2.3
			Replacement of Defective Relay	1
			Replacement of Protection Panel along with associated equipment	3
			Replacement of station transformer 33/0.440 KV	1
			Replacement of Battery & Battery Charger	1.5
			Installation of capacitor bank	1
			Transformer repair shop	12
		New High mast light for area lighting	1	
		ii) Replacement/Addition of network component in 33KV & 11KV Line.	Refurbishment/Augmentation of old 11KV line	30
Refurbishment/Augmentation of old 33KV line	8			
Installation of 11KV & 33 KV FPI	4			

Capex plan for FY 22-23

S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr
			Installation of 11KV & 33 KV 400A/200A AB switches & Isolator	5
			Installation of 33KV & 11 KV RMU	4
			33KV & 11kV Auto Recloser & Sectionaliser	14
		iii) Replacement/Addition of network component in Distribution Substation.	Transformer foundation	1.1
			Refurbishment of 250 & 315 KVA DSS along with LT Protection	8
			Installation of New DD Fuse Unit/LA/Hanging Feeder Pillar at DSS	4
			Mobile Transformer/DTR for Emergency restoration for Hospital/ Collector Office during Cyclone/ Kal Baisakhi	1.5
			Sub Total-Reliability	
4	Load Growth	Network enhancement / Unforeseen emergency.	Construction of 33 KV New/Link Line	35
			construction of new 11 kv agricultural feeder	15
			Construction of 11KV New/ Link Line	35
			Construction of new PSS along with line in urban area (Total Rs.75 Cr for 2 years)	45
			Addition/Augmentation of PTR	15
			Addition/Augmentation of DTR 63 KVA and above	15
			Addition /Augmentation of 1 ph. & 3 Ph. DTR of 16 KVA and 25 KVA in Rural/ Agriculture Area	8
			Addition of New LT ABC Network	6
			Addition of New 11KV/ 33 KV Bay	2
		Sub Total- Load Growth		176
5			Infrastructure for call centre	1.82

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S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr
	Technology & Infrastructure	i) Infrastructure to meet Customer needs.	IT Infrastructure for Commercial Back Office	0.96
		ii) Technology Intervention-IT & Technology.	Data Centre at Sambalpur	1.59
			Front end devices and end user licences	16.31
			DC Hardware	17.26
			DC Software and Licences (ERP, MBC, OS, DB etc.)	8
			Locational Network	16.21
			Optical Fibre Cabling	2.24
		iii) Technology Intervention- GIS, SCADA & Others Implementation.	Implementation of GIS	21.45
			Implementation of Automation/ Scada	23.88
			Communication Infrastructure	18.65
		iv) Improvement of Civil Infrastructure	New wash room	1
			Additional Material Storage area	2
			New store building	2.5
			New Building for Division/ Subdivision Section/Commercial Office.	10
			Refurbishment of old building for office at various location	3
		v) store infrastructure	Racks and other material	4
			Security system in central store	1.05
		vi) Ready to Use assets for Offices	office furniture	2
	Sub Total-Technology & Infrastructure			153.92
	Grand Total			582.18

*The Grand Total cost is exclusive of Project Employee Cost and calculated Interest during Construction (IDC) @4.5 %. The IDC would be approximately Rs.26.2 Cr. Project Employees Cost for Capex job @5% would be approximately Rs. 29.1 Cr.

TPWODL- Profile

TPWODL, a Joint Venture of Tata Power Company Limited and Odisha Government, commenced its power distribution operations in Western Odisha area from 1st Jan 2021. TPWODL is responsible for supplying power supply to 2.19 million customers comprising of industrial, commercial and residential customers. TPWODL operational area is spread across 48,207 Sq.KM covering nine districts of Western Odisha, namely Sundargarh, Jharsuguda, Sambalpur, Debagarh, Bargarh, Sonapur, Naupada, Bolangir and Kalahandi. For effective operations, the entire license area is split into five circles, which are further divided into 17 Divisions, 57 Sub divisions and 202 Sections. Most of the commercial and technical activities are managed at sub-divisions and sections level, which are interface points for customers and utility.

Table 1 indicates the details of Circle, Division & Sub- Divisions

Circle Name	Division Name	Area in Sq. km	Sub Division Name
Sambalpur Circle	SED – SAMBALPUR	2380	SDO-I, AINTHAPALI, SBP
			SDO-II, KHETRAJPUR, SBP
			ELECTRICAL SUB DIVISION , BURLA
			ELECTRICAL SUB-DIVISION , HIRAKUD
	SEED – SAMBALPUR	4400	SDO-I, HUTAPARA
			SDO-II, DHANUPALI
			SDO-RENGALI
			SDO, RAIKAKHOL
	JED – JHARSUGUDA	990	SDO No-1, JHARSUGUDA
			SDO No-2, JHARSUGUDA
			SDO, KUCHINDA
	BED – BRAJRAJNAGAR	1200	SDO,BRAJRAJNAGAR
SDO,BELPAHAR			
DED – DEOGARH	2780	SDO,DEOGARH	
Rourkela Circle	RSED – ROURKELA	1980	SDO No –I, ROURKELA
			SDO No -5, ROURKELA
			SDO No -7, ROURKELA
	RED – ROURKELA	1020	SDO No -2, ROURKELA
			SDO. No-3, ROURKELA
			SDO No – 4,ROURKELA
			SDO No -6, ROURKELA

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Circle Name	Division Name	Area in Sq. km	Sub Division Name
	SED – SUNDARGARH	3920	SDO,SUNDARGARH
			SDO, UJALPUR
	SED – RAJGANGPUR	2950	SDO-I,RAJGANGPUR
			SDO-II, Rajgangpur
SDO,KALUNGA			
Bargarh Circle	BED –BARGARH	2060	SDO No-I, BARGARH
			SDO No-II, BARGARH
			SDO,BHATLI
			SDO,BHEDEN
	BWED – BARGARH	3830	SDO,ATABIRA
			SDO,BARPALLI
			SDO,PADAMPUR
			SDO,PAIKMAL
Bolangir Circle,	BED – BOLANGIR	3240	SDO – I, BOLANGIR
			SDO – II, BOLANGIR
			SDO,TUSURA
			SDO,LOISINGHA
	SED – SONEPUR	2280	SDO,SONEPUR
			SDO,BINKA
			SDO, B.M.PUR
	TED – TITILAGARH	3340	SDO-I, TITILAGARH
			SDO-II, TITILAGARH
			SDO, KANTABANJI
			SDO, PATNAGARH
	Bhawani-Patna Circle	NED – NUAPARA	3852
SDO, KHARIAR ROAD			
SDO, KHARIAR			
KEED – KALAHANDI		4790	SDO NO-I, BHAWANIPATNA
			SDO NO-II, BHAWANIPATNA
			SDO, NARLA
			SDO, KESINGA
KWED – KALAHANDI		3195	SDO, JUNAGARH
			SDO, DHARMAGARH
	SDO,CHARBAHAL		

Existing Supply System

TPWODL receives electrical power at 33KV level from 49 numbers of 220/33KV or 132/33KV transmission substation (OPTCL) located within and in the vicinity of TPWODL operational area. TPWODL distributes the power at 33KV / 11KV / 440V / 230V depending on the demand of the consumers.

At present, there are 154 numbers of 33KV feeders with a combined circuit length of approximately 4918 KMs supplying power to 293 numbers of 33/11KV Primary Substation (Structures). The 33KV supply is stepped down to 11KV level through 630 numbers of 33/11KV power transformers with an installed capacity of 3269 MVA at these primary substations. 1124 numbers of 11KV feeders emanates from the 33/11KV primary substations having cumulative length of approximately 49331 KMs and supply power to HT consumers connected at 11KV level and other LT customers connected to 11/0.415KV distribution substation. Approx. 71181 numbers of distribution transformers are installed in all five circles with an installed capacity of 3294 MVA. The length of the LT network is approximately 55286 KMs. These LT feeders supply power to three phase and single-phase consumers.

Table 2 gives a snapshot of vital parameters and asset base of all five circles of TPWODL.

S No	Circle	ROURKELA CIRCLE	SAMBALPUR CIRCLE	BARGARH CIRCLE	BOLANGIR CIRCLE	KALAHANDI CIRCLE	Total
1	Area (Sq. KM)	9870	11750	5890	8860	11837	48207
2	No. of Consumers- Nov'20	431150	441371	308294	525470	483874	2190159
3	No of 33/11KV Substation	60	69	43	66	55	293
4	No. of PTR 33/11 KV	141	145	100	143	101	630
5	PTR capacity 33/11KV (MVA)	720.35	791.75	555.15	702	498.75	3268.6
6	No. of DTR 11/0.415 KV	13265	16236	11620	15367	14693	71181
7	DTR capacity 11/0.415 KV (MVA)	654	867	326	775	672	3294

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S No	Circle	ROURKELA CIRCLE	SAMBALPUR CIRCLE	BARGARH CIRCLE	BOLANGIR CIRCLE	KALAHANDI CIRCLE	Total
8	33KV Line (O/H & U/G-Ckt Km)	880	960	623	1515	830	4808
9	No of 11kv line (OH&UG)	206	285	165	260	208	1124
10	11KV Line (O/H & U/G-Ckt Km)	11869	11810	6772	9523	9357	49331
11	LT Line (Bare & ABC-Ckt Km)	11129	9513	7790	14939	9533	52904

Network Analysis

In TPWODL, the network conditions in different areas possess different challenges related to unsafe network for our employees, public and animals and equipment.

The following issues are observed and the same needs urgent attention to strengthen network and make network safe, reliable and statutory compliant:

- Unsafe horizontal / vertical clearances in 33 KV, 11KV and LT feeders.
- Damaged Conductor / Poles / Stay wire /Boundary walls.
- Poor Earthing of the Poles & Structure.
- Absence of cradle wire in overhead MV feeders.
- Inadequate DC and protection system.
- Overloading of Network at few locations.
- Damaged / Missing fence at most of the Distribution Transformers Substations & 33/11KV Primary Substations (Structures) resulting into easy accessibility for Public and animals.

After analyzing last five 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.

Table below shows Year wise details of Fatal / Non-fatal Electrical accidents occurred under WESCO's operational area during Calendar Year 2016-2020.

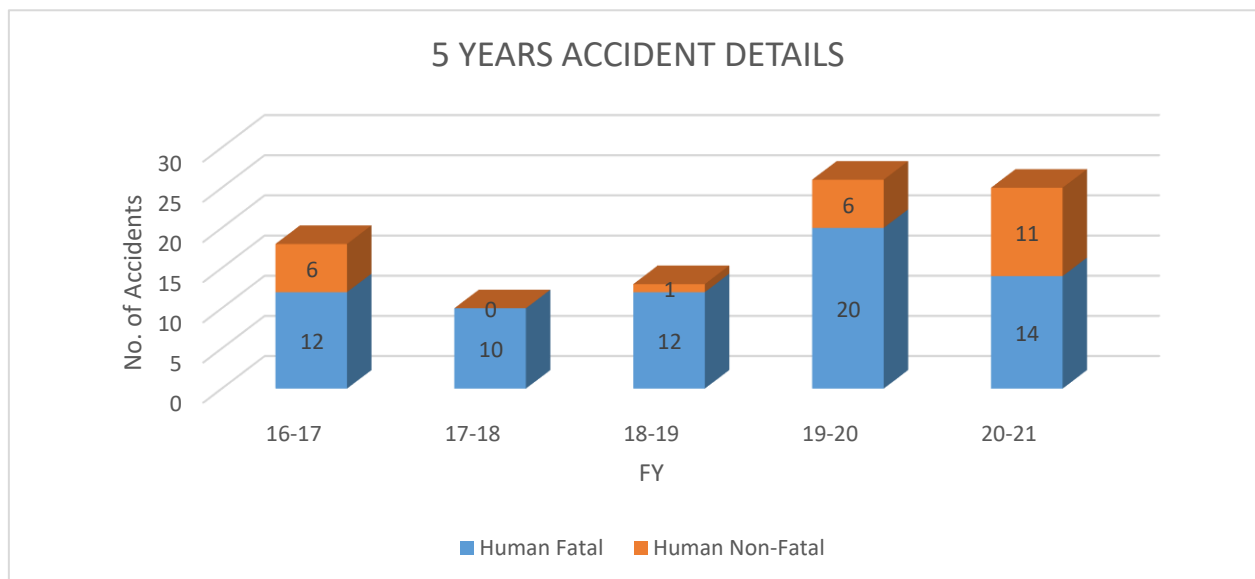
YEAR WISE FATAL/NON-FATAL ACCIDENT REPORT							
Year	Human		Total Human	Animal		Total Animal	Total Victim
	Fatal	Non-Fatal		Fatal	Non-Fatal		
16-17	12	6	18	5	1	6	24
17-18	10	0	10	5	0	5	15
18-19	12	1	13	3	0	3	16
19-20	20	6	26	7	8	15	41
20-21	14	11	25	10	2	12	37
Total	90	32	122	40	11	51	173

It is pertinent to mention here that the number of fatal accident outgo the number of non-

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fatal accident, for both Human and Animals. Further, almost 70% of fatal accident involved humans, which is very serious.

Below figure shows the detailed accident analysis of Humans.



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 the accidents. Hence, potentially unsafe locations needs to be addressed and attended time to time to ensure safe network for employees, Public and Animals.

Apart from high number of Accidents, other major problem is high number of DT failure and extremely high number of interruption at 33 kV and 11 kV level due to poor network conditions. 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

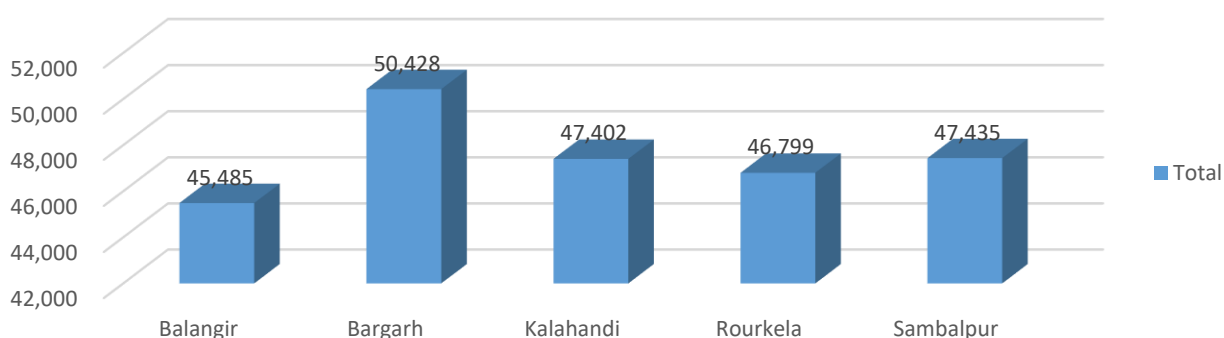
The number of trippings of 11KV Feeders for FY 21-22 (Apr'21 to Oct'21) is as under:

Circle Name	Division	Sum of Total
Balangir	BED, Balangir	13,994
	SED,SONEPUR	13,894
	TED, Titlagarh	17,597
Balangir Total		45,485
Bargarh	BED, Bargarh	24,308

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Circle Name	Division	Sum of Total
	BWED, Bargarh	26,120
Bargarh Total		50,428
Kalahandi	KEED	14,002
	KWED	15,210
	NED	18,190
Kalahandi Total		47,402
Rourkela	RED ,Rourkela	6,240
	RGP, Rajgangpur	15,802
	RSED ,Rourkela	13,014
	SED, Sundergarh	11,743
Rourkela Total		46,799
Sambalpur	BNED,BRAJARAJNAGAR	2,717
	DED,DEOGARH	8,193
	JED, JHARSUGUDA	15,241
	SED,SAMBALPUR	4,800
	SEED,SAMBALPUR	16,484
Sambalpur Total		47,435
Grand Total		237,549

11KV Interruption in FY21-22 (Upto Oct'21)



Issues of Network Infrastructure and Mitigations

TPWODL has identified the below issues and has intimated the Honb'le Commission in last year Detailed Project Report. For the identified issues TPWODL has started the work for the schemes approved by Commission in different head.

Unsafe Horizontal and Vertical Clearance.

Power distribution utility is bound to comply all statutory compliance and any non-compliance attracts penalties apart from damage to brand image. In erstwhile WESCO area, compliance to statutory guidelines was not adhered at many locations. On preliminary analysis, it is observed that most of the network are laid on 8 Mtrs / 9 Mtrs poles with lengthy span. As per construction practice, 1/6th of the total pole length is erected below the ground and thus only available length is approx. 7.5 Mtrs above ground. Considering the fittings and accessories installation, there is hardly any room to account for increased sag or rise in road level. To further worsen the problem; the span length varies from 60-120 Mtrs. More span length causes high sag. In WESCO 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, due to re- construction of the roads, vertical clearances of the lines have reduced to the dangerous level causing violation of statutory guidelines. TPWODL 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.

Damaged Poles / Conductors / Stay / boundary Walls.

Due to vast geography widespread network and absence of preventive maintenance practices, the existing network has become very weak. Major element, which resulted into weak network, includes damaged pole, worn out conductors, and damaged stay wires. 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 done, 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

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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 be 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 TPWODL has planned to replace damaged poles, replacement of worn out conductor, re- sagging of the conductor, installation of mid-span pole, introduction of 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.

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 and animals 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 is worth mentioning that the general mass of the earth do not 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 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,

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earthing is not adequate. Further the condition of earthing in old installations is observed to be extremely bad due to depletion 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. TPWODL 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.

To strengthen earthing system in existing grid station, it is proposed to commission additional earth pit in view of higher soil resistivity, poor earth mesh connectivity.

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 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 public since the network is in dilapidated condition and possibility of conductor parting cannot be ruled out. In such scenario, cradle guard will help in avoiding accidents caused by snapping of conductors of overhead MV feeders. TPWODL proposes to put in place the cradle wire/guard wire on all road crossings near school, college, Hospitals and market area in first priority as a part of the refurbishment activity of lines.

Poor condition/Absence of fencing/ boundary wall at most of the Distribution Substations & 33/11KV Primary Substations (Structure's)

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

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there is no boundary fence majorly 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. TPWODL proposes to put up fencing/build boundary wall under the DSS and PSS Refurbishment job.

Key Challenges

One of the major challenges for TPWODL is the present poor network, which is not up to the industry standards, and pose threat to safety of employees, public at large and animals.

The 33 kV, 11 kV and LV overhead lines are extremely lengthy having radial feed with undersized worn out bare conductor. These lines are having long spans with damaged, bent and tilted poles, poor joints. There is compromised safety clearances, and non-availability of guard wires observed in MV overhead feeders. The Existing O/H 33KV Lines are extended through farms on 8 Mtrs Poles at few sections. Due to surface re-filling the safety vertical clearance has become a threat to the farmers. Hence, it is essential to divert these 33KV lines or replace the 8 Mtrs Pole by higher one.

11/0.415 kV Distribution Substations (DSS) boundary fencing at most of the places are observed either damaged or not available, posing major safety threat to public and animals. Most of the AB switches and DD fuse are bypassed/damaged. There is no effective LT feeder protection system in place at the secondary side of most Distribution Substations. In place of LT Fuse box/MCCB box/ feeder Pillar, aluminium wire are used as fuse wire on the secondary side of the distribution substations at all substations. These fuse units are installed at very low height and with no fencings at DSS. It is a potential safety threat to general public and animals. Earthing system is also in bad condition in almost all feeders and substations. All of the above deficiencies makes the distribution substations highly unsafe and unreliable, which may lead to potential accidents.

At many 33/11 KV primary substations (Structures or PSS), boundary walls are observed broken 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 and undue accident / incident. The existing earthing system is in very bad condition and ineffective. Many circuit breakers and CTs are bypassed since long for want of spares and consumables. Automobile batteries and underrated battery chargers are used at many substations due to non-availability of standard equipment in stores. This puts the basic protection system at stake and there are chances of major damage to substation capital-intensive equipment if the defects are not attended / addressed urgently.

Energy Meters are installed at consumer premises in a mix of electro- mechanical meters,

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consumer owned meters, electronic meters etc., which are connected to TPWODL system through PVC insulated service cable supported by GI wire, which also serves as earth point to the consumer installation. TPWODL is also planning to review the meter seals to avoid chances of meter tempering or any other type of undesired activity by consumer resulting into loss of revenue to TPWODL. In order to maintain the standard, TPWODL intends to discontinue the practice of consumer owned and consumer installed energy meters. Instead, TPWODL is planning to use insulated meter box, armored service cable, and proper meter seals on meter box and terminal cover.

Network therefore needs urgent investment to address the operational, commercial, and safety related challenges to improve the reliability of supply, customer services, and safety of staff, public, and animals.

Besides TPWODL 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 TPWODL employees and all consumer visiting TPWODL offices for one or the other work. Many of the office buildings are very old and need urgent refurbishment. Call Centre and Customer care Centers needs to be established / developed further to provide better connectivity to all category of consumers with TPWODL and provide them unique service experience.

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

TPWODL has taken over the assets of erstwhile WESCO on “as is where is” basis. These assets are not in good operating condition and in a large number of cases, the required safety equipment are not in place. Further the network is in dilapidated condition, in adequate clearances and a total revamping of the network is required for providing reliable and quality power supply to the consumers. The network demands urgent refurbishment like re-stringing of feeders, replacement of damaged / tilted poles, provision of intermediate poles, replacement of short height poles, replacement of joints, introduction of HT spacers and wedge connectors, diversion of lines, new lines, introduction of LT feeder Pillars,

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refurbishment of earthing system, replacement of sick equipment and network augmentation to improve the reliability of power supply. The other interventions includes installation of state of the art equipment to ensure better operation and control of the network and faster restoration of supply in case of interruptions.

Faulty Energy Meters replacement, introduction of advanced technologies and analytics will be prime focus area for improving the accuracy of the meter reading, contain 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.

During the initial phase, capital investments are proposed under the following broad cost centers that shall be aligned with multiple initiatives and schemes 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 by necessary civil jobs and IT facilities to provide a better consumer experience and a modern, rich, and conducive work environment to all employees for better performance.

The Key activities proposed under each categories is listed below:

1. Statutory, Safety and Security:

- 1.1 Life enhancement of feeder network in respect of maintaining safe horizontal / vertical clearances**
- 1.2 Provision of Testing Equipment & PPEs to workforce**
- 1.3 Earthing & Fencing**
- 1.4 Boundary Wall and infrastructure works at Primary Sub-station**

2. Loss Reduction

- 2.1 Energy Audit & Meter related activity**
- 2.2 Spot Billing**
- 2.3 Replacement of LT Bare conductor with AB cable**

3. Reliability

- 3.1 Replacement/Addition of network component in 33/11KV Primary Substation**

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3.2 Replacement/Addition of network component in 33KV & 11KV Line

3.3 Replacement/Addition of network component in Distribution Substation

4. Load Growth

4.1 Network enhancement / unforeseen emergency

5. Technology & Infrastructure

5.1 Infrastructure to meet Customer needs

5.2 Technology Intervention- IT & Technology

5.3 Technology Intervention- GIS, SCADA & Others Implementation

5.4 Improvement of Civil Infrastructure

5.5 Store Infrastructure

5.6 Ready to Use assets for Offices

1. Safety, Statutory and Security

1.1 Life enhancement of feeder network in respect of maintaining safe horizontal / vertical clearances:

33KV or 11KV feeders are important asset for a distribution utility, which connects various substations, and provide power to end consumers. TPWODL has nearly 4808 KMs of 33KV and 49331 KMs of 11KV feeders under its operational area. Besides, nearly 53837 KMs of LT feeders provides power to the end customers. Almost entire MV network is overhead, and nearly 31114 KMs of LT network is also 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 / LT feeders are in deteriorated condition and poses 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 / animals since cradle guards are not provided. Due to scarcity of staff and materials, there is no structured maintenance planning is done. Tree branches / creepers are coming in contact with live conductors at many locations. Huge number of tripping's are reported on 33KV and 11KV feeders in previous years. With poor condition of network and absence of maintenance activity, it is difficult for utility to ensure reliable and quality power supply to the end users. During site visits, it has been observed that conductor of different sizes are being used in different phases which limits the circuit capacity. 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/horizontal clearances of the feeders have been reduced. This is not only causing violation of statutory guidelines but also increasing the chances of accidents.

To ensure safety and reliable power supply to end consumers TPWODL proposes refurbishment of 33KV, 11KV and LV lines in phase manner emphasizing critical areas such as schools, hospitals, markets and other key installations.

Refurbishment job would encompass following scope.

1. Straightening of tilted poles.

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2. Replacement of damaged poles.
3. Earthing of Poles.
4. Erection of mid span pole to reduce sag wherever required.
5. Installation of 11KV Line spacers.
6. Restrunging of conductor to increase the vertical clearance by reducing the sag.
7. Replacement of the conductor in the sections having multiple joints.
8. Installation of cradle guard wire in the feeder crossing 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.
9. Replacement of Bare Conductor with Covered Conductor

1.2 Provision of Safety Equipment & PPEs to workforce

In erstwhile WESCO, required PPEs were not available. TPWODL has purchased and supplied urgent and necessary PPE to all its field employees, the cost of which was either covered in the Capex or Opex (for BA supplied PPEs). There are several incidents occurred while carrying out the operation and maintenance activities on network. Now the most challenging task for TPWODL is awareness among work force for proper utilization of existing PPE. Similarly the desired testing tools are not available resulting sever incidences. The available PPE's and testing instruments needs more setup to create safe and healthy environment and awareness among public.

1.3 Earthing and Fencing

To strengthen earthing system in existing primary substation, it is proposed to commission additional earth pit in view of higher soil resistivity, poor earth mesh connectivity. We proposed to commission 10 Nos. of additional earth pit for PSS 3 Nos. of additional DSS and earthing on every 5th pole.

1.3 Boundary Wall and infrastructure works at Primary sub-station

To enhance the It is proposed to cover 20 Nos. of boundary wall and 1000 Nos of fencings in this DPR

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Capex requirement for Statutory & Safety:

For FY 2022-23, TPWODL proposes capital expenditure of INR 53 Cr 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, TPWODL 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	Works to be covered	Proposed Capex Rs. Cr	Annexure No
1	Statutory, Safety and Security	i) Life enhancement of network and maintaining safe horizontal / vertical clearances	Increase of height for 11 kV and 33 kV sagging line.	5.5	Annexure-1
			Cradle guard at 33KV & 11KV- road crossing, populated area, school area.	2	
			Intermediate Pole for 33KV, 11KV & LT Network near the forest area	4.5	
			Replacement of Open Conductor with Covered Conductor	3	
		ii) Provision of Testing Equipment & PPEs to workforce	Testing equipment	1.2	Annexure-2
			Safety Equipment (like Arc Suit, Neon Tester, Insulating Material and Others) for work force.	3.8	
		iii) Earthing, Fencing	Earthing of PSS	0.5	Annexure-3
			Earthing of DSS & Pole	3	
			Fencing of Distribution Substation	12	
		iv) Boundary Wall and infrastructure works at Grid sub-station	Boundary wall of Primary Substation	12	Annexure-4
			Gravel filling for Primary substation	1	
			Access road to switchyard and stores	2	
			control room and Building refurbishment	2	
			provision for water supply for PSS/Offices (Watering for Earth pit)	0.5	
		Sub Total- Statutory, Safety and Security			

2. Loss Reduction

During limited site inspections, energy meters were observed missing at consumer's premises. There were many non-functional energy meters comprising of obsolete technology based energy meters, burnt, rusted and faulty energy meters. The above issues are resulting into reduction in billing efficiency, high AT&C losses. This also caused increase in making provisional billing, defective bills and substantial 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 unable to measure AT&C losses at DT level. Energy accounting provides the means to identify areas of leakages, wastage and inefficient energy usage.

The present AT&C Loss of existing system is 28.56%. To reduce the techno-commercial losses the following key activities are planned for execution:

- Energy Audit & Meter related activity
- spot billing
- Replacement of LT Bare conductor with AB cable.

2.1 Energy Audit & Meter related activity

Meter Replacement against Burnt / Faulty / Obsolete Technology Meters:

There are around 1,50,000 no of meters are reported defective/ burnt meter present in TPWODL. Many consumers have not been provided energy meters though connection is energized in books and energy is being consumed by the consumers. Count of meters under various fault category have been captured and an estimate is prepared for replacement of these defective meters. Considering the past trends, it is expected that additional fifty thousand meters are likely to become defective in FY 22-23 (2.5% of existing Meters population base). All these meters need to be replaced with new meters along with Service cable, Polycarbonate seals and Modems. For installation of Meters, Meter box will also be installed to protect the meters from energy theft. In FY 22-23, it is planned to replace / install around 1.5 Lacs meters, which are directly contributing to the commercial losses, and

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accordingly Capex investment of Rs. 34.3 Cr will be required for replacement of these meters.

In addition to the meter replacement, various types of energy meters needs to be installed at various level for energy audit.

2.2 Spot Billing

TPWODL is in the process of deploying efficient Spot Billing process throughout its territory. The scope of work includes, Supply of Mobile Printers and Mobile Handsets required to adopt Spot Billing system in more efficient way, so that we can achieve company targets of billing efficiency and collection efficiency. The Spot Billing system is a system, in which the meter reader visits the consumer's premises, records the meter reading and issues the bill on the spot using a hand-held computer/device.

Activity	Sub – Activity	Cost (In Cr)
Spot Billing	Supply of Mobile Printer with mobile Handset	3.2

2.3 Replacement of LT Bare conductor with AB cable.

Most of the LT feeders are connected radially and have long length by typical standards. The number of joints in the feeder are also on higher side. The long length of the feeders and joints are the potential source of technical losses and causing poor voltage regulation in the network. In addition to that, bare LT line is prone to connect the electricity supply in unauthorized manner, which increases the commercial losses. Conversion of bare conductor with LT ABC will help reduce the commercial losses. Therefore, it is proposed to replace LT bare with LT ABC in theft prone area

To summarize, TPWODL proposes capital expenditure of INR **78.86 Cr** for Distribution Loss reduction schemes in FY 22-23 to sustain and further reduce the existing AT&C loss level.

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S.No.	Major Category	Activity	Works to be covered	Proposed Capex FY 23 in Cr	Annexure No
2	Loss Reduction	i) Energy Audit & Meter related activity	Meter Replacement against burnt/Faulty/Obsolete Technology	34.30	Annexure-5
			Meter testing equipment for field staff	1.00	
			Installation of Metering Unit, Meters and Modems at PSS Boundary Points	2.86	
			Installation of CT,PT, Meters & Modems for Defective 11 KV Feeder Meters	4.00	
			Installation of DT Meters (above 250 KVA)	2.50	
			Installation of CT,PT, Meters & Modems for High value Industrial Consumers	1.00	
		ii) spot billing	spot billing devices (Bluetooth Printer +Mobile)	3.20	Annexure-6
		iii) Replacement of LT Bare conductor with AB cable	Replacement of LT Bare conductor with AB cable	30.00	Annexure-7
Sub Total-Loss Reduction				78.86	

3. Network Reliability

TPWODL have a large number of long overhead feeders with an average length of 30 KMs in urban and 110 KMs in rural areas. The present power distribution network is in extremely dilapidated condition resulting into frequent trippings and as a result, consumers are not getting reliable and quality power supply. Out of 293 numbers of 33/11KV Primary Substations, 179 substations are connected with more than one source of supply and remaining 114 Primary Substations are connected in radial mode. There are 172 PSS, which are old and 121 Nos of PSS are recently commissioned vide ODSSP scheme.

Following key issues observed in old type PSS:

- a. Absence of incoming line breakers.
- b. Absence of L.A, CT, PT and AB Switches.
- c. Absence of primary and secondary breakers of Power Transformer.
- d. Absence of protection relays.
- e. Non- functional Battery and Battery charger.

Because of above shortage of equipment and necessary protection co-ordination, we observed multiple trippings resulting into frequent power failure to the end consumer.

To ensure highest reliability, few 33/11KV substations should have more than one source of power supply along with desired protection and equipment. TPWODL intends to implement the following actions to improve the reliability of power supply

- Identification and replacement of faulty equipment causing frequent tripping's.
- Identification and commissioning of new equipment which are required as per industry standard
- Introduction of technology to ensure faster restoration of supply in case of any tripping.

3.1 Replacement/Addition of network component in 33/11KV Primary Substation

PSS being the vital part of entire distribution network. Generally, the primary voltage to PSS is 33KV and secondary at 11KV. In TPWODL, there are 630 numbers of 33/11KV power

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transformers with an installed capacity of 3269 MVA.1124 numbers of 11KV feeders emanates from the 33/11KV primary substations having cumulative length of approximately 49331 KMs.

PSS being a vital installation between customer and utility, it is proposed to refurbish bay equipment's to improve the reliability.

The following activities are planned:

1. Refurbishment work in PSS (Structure Replacement / Yard Refurbishment).
2. Replacement/ Segregation of Old 11 kV breaker/ Group Breaker with new (O/D CT-) (including civil & control cable).
3. Replacement/ Segregation of Old 33 kV breaker/ Group Breaker with new (O/D CT-) (including civil & control cable).
4. Replacement of Old 33 KV & 11 KV 1Ph & 3Ph PT/CT at PSS(O/D Type)
5. Replacement of Defective Relay
6. Replacement of Protection Panel along with associated equipment
7. Replacement of Substation Transformer -33/0.4KV 100KVA Trf.
8. Replacement of Battery & Battery Charger
9. Installation of capacitor bank
10. Transformer repair workshop at TPWODL
11. High Mast/Lighting arrangement for PSS/Store

3.2 Replacement/Addition of network component in 33KV & 11KV Line

As per present network scenario majority of 11KV & 33KV, networks are overhead in nature. Also average feeder length is more than 80 KMs. Many O/H feeders are passing through forest area. Most faults that occur on overhead lines are transient faults caused by lightning and tree branches touching the live line conductor.

The following activities are planned to strengthen the 33KV & 11KV Line:

1. Refurbishment/Augmentation of old 11KV line

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2. Refurbishment/Augmentation of old 33KV line
3. Installation of 11KV & 33 KV FPI
4. Installation of 11KV & 33 KV 400A/200A AB switches & Isolator
5. Installation of 33KV & 11 KV RMU
6. 33KV & 11kV Auto Recloser & Sectionalizer

TPWODL would like to introduce communicable type Fault Passage Indicator, Auto-recloser & Sectionalizer. Moreover, it is observed that multiple 11KV feeders are controlled through single 11KV breaker or AB switch in some primary substation. This year, we propose to install AB switches and isolators identified high tripping feeders. Similarly, in rural section, AB switches are proposed at lengthy 33KV & 11KV Feeders to have provision of isolation of section during any outages. This will help in improving the reliability.

We propose to replace damaged or deteriorated 11KV & 33KV insulators on above identified feeders to enhance reliability of power supply

3.3: Replacement/Addition of network component in Distribution Substation.

The LT feeders emanating from 11/0.415KV distribution substations are connected up to consumer premises. DSS has been commissioned at load center. Which are mostly located in public area.

Most of DSS protection and control are not operating properly. As a result, fault in any one LT circuit resulting into tripping of DT incoming 11KV feeder. Also, while carrying out maintenance or replacing the LT circuit blown fuses the operator needs to take hand trip of entire 11KV feeder from PSS. Thus in above both circumstances affecting the supply of all customers connected on the same grid. In addition to that, various equipments associated in the DSS is not either not maintained or obsolete technology, which needs to be replaced at the earliest.

To overcome this situation, TPWODL is planning to strength the control and protection system at LT side at DSS level. Various initiatives proposed this year to improve the reliability of power supply in 11KV and downstream network are given below,

Installation of LV protection at Distribution substation.

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1. Refurbishment of 250 & 315 KVA DSS along with LT Protection
2. Installation of New DD Fuse Unit/LA/Hanging Feeder Pillar at DSS
3. Mobile Transformer/DTR for Emergency restoration for Hospital/ Collector Office during Cyclone/ Kal Baisakhi
4. DTR plinth/ PTR Foundation

The above initiative will not only ensure availability of LV protection system at DSS but will also ensure positive isolation to maintain safe working condition.

For FY 2022-23, TPWODL proposes Capital expenditure of **Rs 120.4 Cr** to strengthen the network, introduce technologies to enhance customer satisfaction in terms of safe and reliable power supply.

S.No.	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr	Annexure No
3	Reliability	i) Replacement/Addition of network component in 33/11KV Primary Substation.	Refurbishment work in PSS (Structure Replacement / Yard Refurbishment)	5	Annexure -8
			Replacement/ Segregation of Old 11 kv breaker/ Group Breaker with new (O/D CT-) (including civil & control cable)	5	
			Replacement/ Segregation of Old 33 kv breaker/ Group Breaker with new (O/D CT-) (including civil & control cable)	4	
			Different sizes of Control cable	4	
			Replacement of Old 33KV & 11 KV 1Ph & 3Ph PT/CT at PSS(O/D Type)	2.3	
			Replacement of Defective Relay	1	
			Replacement of Protection Panel along	3	

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S.No.	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr	Annexure No
			with associated equipment		
			Replacement of Substation Transformer - 33/0.4KV 100KVA Trf.	1	
			Replacement of Battery & Battery Charger	1.5	
			Installation of capacitor bank	1	
			Transformer repair workshop at TPWODL	12	
			High Mast/Lighting arrangement for PSS/Store	1	
		ii) Replacement/Addition of network component in 33KV & 11KV Line.	Refurbishment/Augmentation of old 11KV line	30	Annexure -9
			Refurbishment/Augmentation of old 33KV line	8	
			Installation of 11KV & 33 KV FPI	4	
			Installation of 11KV & 33 KV 400A/200A AB switches & Isolator	5	
			Installation of 33KV & 11 KV RMU	4	
			33KV & 11kV Auto Recloser & Sectionalizer	14	
		iii) Replacement/Addition of network component in Distribution Substation.	DTR plinth/ PTR Foundation	1.1	Annexure -10
			Refurbishment of 250 & 315 KVA DSS along with LT Protection	8	
			Installation of New DD Fuse Unit/LA/Hanging Feeder Pillar at DSS	4	
			Mobile Transformer/DTR for Emergency restoration for Hospital/ Collector Office during Cyclone/ Kal Baisakhi	1.5	
		Sub Total-Reliability		120.4	

4. Load Growth

Considering the 5% load growth trend, it is expected that approximately 90K-100K new Connections would be applied in FY 2022-23. In order to meet this load growth appropriate network infrastructure needs to be strengthened.

4.1 Network enhancement / unforeseen emergency:

During site survey, it was 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 feeder. Multiple HT consumers are fed through 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 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 establish ring connectivity between nearest 11KV feeder in the vicinity and adjacent PSS 11KV feeder. Few such link lines will be established in first phase for some important feeders like Hospitals, town, commercial and key government establishments.

It is also observed that actual load demand has been increased substantially more than the assessed one due to various government approved electrification schemes. To cater the load enhancement cases and natural load growth it is essential to augment the existing infrastructure as per the need.

In addition to above after establishing the link line it is essential to have adequate capacity DT's and PT's in event of transfer of load from one grid to other. With said addition, there shall be improvement in voltage profile.

To support this phenomenon, we need to add/augment DT's, PTR's, Bay, Lines and PSS considering the following criteria's,

1. Existing load of both adjacent connected grids.

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2. Individual incoming line capacities.
3. Rating of PTR at each PSS.
4. Existing load at each PSS & DSS.
5. New sanctioned load at each PSS & DSS.
6. Future load growth.

Based on the above criteria TPWODL is planning an expenditure of Rs. 176 Crores for Network enhancement / Unforeseen emergency Capex requirement as per below table:

S.No.	Major Category	Activity	Works to be covered	Proposed Capex FY 23 in Cr	Annexure No
4	Load Growth	Network enhancement / Unforeseen emergency.	Construction of 33 KV New/Link Line	35	Annexure-11
			construction of new 11 kv agricultural feeder	15	
			Construction of 11KV New/ Link Line	35	
			Construction of new PSS along with line in urban area (Total Rs.75 Cr for 2 years)	45	
			Addition/Augmentation of PTR	15	
			Addition/Augmentation of DTR 63 KVA and above	15	
			Addition /Augmentation of 1 Ph. &3 Ph. DTR of 16 KVA and 25 KVA in Rural/ Agriculture Area	8	
			Addition of New LT ABC Network	6	
			Addition of New 11KV/ 33 KV Bay	2	
Sub Total- Load Growth			176		

5. Technology & Infrastructure

In this head, all expenditure related to technology adoption and strengthening of various offices and establishment of Call center, data center etc. have been considered. Presently, customers are interacting through very few available medium for resolution of their issues and queries.

5.1 Infrastructure to meet Customer needs.

It is utmost important to resolve the consumer grievances as quickly as possible. Presently, Consumers can visit customer care centers and extension counters running at various places. The present Call Center and Customer Care Centre facilities needs to be enhanced. To ensure basic facilities and hygiene condition at Customer care center / Division / Sub-division / Section, offices the existing set up needs to be renovated.

For establishment of Call Centre and Customer care center at selected locations, capital expenditure of INR 2.78 Cr. is proposed in FY 2022-23.

5.2 Technology Intervention-IT & Technology.

TPWODL is going to implement the private datacenter collaborating with public cloud to facilitated centralized shared IT operations and equipment for the purposes of storing, processing, disseminating data and applications without compromising the IT Securities. The three main properties of an information system that are important to ensure information security are confidentiality, availability and integrity.

Existing workgroup unmanaged endpoint devices needs to be centralized managed for building a robust and reliable communication system founded to support business applications like IT, Operations, Commercial and Customer care services etc. To enable employees to work on automated systems, front-end computing devices (Laptop and Desktop along with UPS) would be required for the employees. All these locations will be equipped with PCs, Printers, Scanners, etc.

A robust, reliable, high availability with stabilized end-to-end secure communication system will be implemented to achieve mission critical IT & OT applications, data traffic between Grids, Offices, Data Centre, private / public network etc.

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Due to the rising demand of information trading in large amounts of data with availability of round the clock, scalable infrastructure will be implemented with load balancing and high availability. To enable employees to work on automated systems, various type of servers and storage would be required for running the applications.

Day by day, technologies are getting advanced and business applications (like Metering, Billing and Collection,) are demanding centralized systems with few clicks in a single window.

To achieve the above business requirement and implementing the technologies with value added applications in addition to current ongoing projects Rs. 61.61 Cr is proposed in FY 22-23 and details under various category is mentioned in the table below:

Sl. No.	Budget Header	Cost (in Cr)
1	Data Centre at Sambalpur	1.59
2	Front end devices and end user licences	16.31
3	DC Hardware	17.26
4	DC Software and Licences (ERP,MBC,OS,DB etc.)	8
5	Locational Network	16.21
6	Optical Fibre Cabling	2.24
TOTAL (With 18% GST)		61.61

5.3 Technology Intervention- GIS, SCADA & Others Implementation.

Operation Technology:

In order to improve the reliability and reduce the losses and to improve the overall performance, effective implementation of technologies is required. TPWODL is in the midst of technology transformation to provide quality customer services and to deliver highly reliable and improved quality supply in safe manner to its consumers by meeting various standards of operation. To bring the various latest technology, systematic investment is planned by TPWODL as given below in Operation Technology

Total OT Capital Expenditure FY 22-23

Sr. No	Automation	GIS	Communication
1	23.88 Cr	21.45 Cr	18.65 Cr
Total - 63.98 Cr			

5.4 Improvement of Civil Infrastructure:

TPWODL currently have offices in all the five circles and subdivisions. Some of them are owned and about 40% offices are on rented property. TPWODL is facing challenge while

Capex plan for FY 22-23

accommodating additional new employees in current office buildings and infrastructure. The current existing infrastructure are old and needs modernization to provide hygienic, well ventilated and spacious work environment.

These office locations are touch base points between end consumers and utility. Hence, aesthetic along with safety of each stakeholders needs to be focused.

To ensure above it is proposed to carry out civil infrastructure of designated offices in phase manner.

Up gradation of Road and Offices

It is observed that various Grid Sub Stations, access road needs repair and strengthening along-with drainage system. In addition, it is required to complete structural rehabilitation and refurbishment of existing Offices/ Control Rooms. The area grading/ leveling, repairs to existing cable trenches and trench covers needs to be done for maintaining safety during operation. During rainy season road condition further, worsen.

Following activities are planned to improve the civil infrastructure:

1. Repair/ New wash room construction for substation.
2. Additional Material Storage area
3. New Store building
4. New Building for Division/ Subdivision Section/Commercial Office
5. Refurbishment of old building for office at various location

5.5 Store Infrastructure:

TPWODL operates his distribution business inventory management through four designated central stores located at Burla, Rajgangpur, Bolangir and Kesinga.

The store offices are observed in dilapidated condition and do not have adequate lighting, access and internal road, storage platforms and fire protection system thereby compromising with the safety & Security of the material and personal .

The internal and access roads are needs to be constructed.

5.6 Ready to Use assets for Offices

In TPWODL, 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.

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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.

- ❖ **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.”**

“Workplace canteens need to provide with options to cater for lunch with meals or light breakfast items and fruit or snacks for mid-afternoon along with tea/ cold drinks/ coffee in order to promote healthy eating & refreshments for employees and stakeholders.

To summarize, total 153.92 Cr. capital expenditure is proposed for Technology and Infrastructure section

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S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs.Cr
5	Technology & Infrastructure	i) Infrastructure to meet Customer needs.	Infrastructure for call centre	1.82
			IT Infrastructure for Commercial Back Office	0.96
		ii) Technology Intervention-IT & Technology.	Data Centre at Sambalpur	1.59
			Front end devices and end user licences	16.31
			DC Hardware	17.26
			DC Software and Licences (ERP, MBC, OS, DB etc.)	8
			Locational Network	16.21
			Optical Fibre Cabling	2.24
			iii) Technology Intervention-GIS, SCADA & Others Implementation.	Implementation of GIS
		Implementation of Automation/Scada		23.88
		Communication Infrastructure		18.65
		iv) Improvement of Civil Infrastructure	New wash room	1
			Additional Material Storage area	2
			New store building	2.5
			New Building for Division/ Subdivision Section/Commercial Office.	10
			Refurbishment of old building for office at various location	3
		v) store infrastructure	Racks and other material	4
			Security system in central store	1.05
		vi) Ready to Use assets for Offices	office furniture	2
		Sub Total-Technology & Infrastructure		

SUMMARY

S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr	Annexure No
1	Statutory, Safety and Security	i) Life enhancement of network and maintaining safe horizontal / vertical clearances	Increase of height for 11 kV and 33 kV sagging line.	5.5	Annexure-1
			Cradle guard at 33KV & 11KV-road crossing, populated area, school area.	2	
			Intermediate Pole for 33KV,11KV & LT Network near the forest area	4.5	
			Replacement of Open Conductor with Covered Conductor	3	
		ii) Provision of Testing Equipment & PPEs to workforce	Testing equipment	1.2	Annexure-2
			Safety Equipment (like Arc Suit, Neon Tester, Insulating Material and Others) for work force.	3.8	
		iii) Earthing, Fencing	Earthing of PSS	0.5	Annexure-3
			Earthing of DSS & Pole	3	
			Fencing of Distribution Substation	12	
		iv) Boundary Wall and infrastructure works at Primary sub-station	Boundary wall of Primary Substation	12	Annexure-4
			Gravel filling for Primary substation	1	
			Access road to switchyard and stores	2	
			control room and Building refurbishment	2	
			provision for water supply for PSS/Offices (Watering for Earth pit)	0.5	
Sub Total- Statutory, Safety and Security				53	
2	Loss Reduction	i) Energy Audit & Meter related activity	Meter Replacement against burnt/Faulty/Obsolete Technology	34.30	Annexure-5
			Meter testing equipment for field staff	1.00	
			Installation of Metering Unit, Meters and Modems at PSS Boundary Points	2.86	

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S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr	Annexure No
			Installation of CT,PT, Meters & Modems for Defective 11 KV Feeder Meters	4.00	
			Installation of DT Meters (above 250 KVA)	2.50	
			Installation of CT,PT, Meters & Modems for High value Industrial Consumers	1.00	
		ii) spot billing	spot billing devices (Bluetooth Printer +Mobile)	3.20	Annexure-6
		iii) Replacement of LT Bare conductor with AB cable	Replacement of LT Bare conductor with AB cable	30.00	Annexure-7
Sub Total-Loss Reduction				78.86	
3	Reliability	i) Replacement/Addition of network component in 33/11KV Primary Substation.	Refurbishment work in PSS (Structure Replacement / Yard Refurbishment)	5	Annexure-8
			New 11 Kv breaker	5	
			New 33 Kv breaker	4	
			Control cable	4	
			Replacement of 11 KV and 33 KV damaged CT and PT	2.3	
			Replacement of Defective Relay	1	
			Replacement of Protection Panel along with associated equipment	3	
			Replacement of station transformer 33/0.440 KV	1	
			Replacement of Battery & Battery Charger	1.5	
			Installation of capacitor bank	1	
			Transformer repair shop	12	
		New High mast light for area lighting	1		
		ii) Replacement/Addition of network component	Refurbishment/Augmentation of old 11KV line	30	Annexure-9
	Refurbishment/Augmentation of old 33KV line	8			
	Installation of 11KV & 33 KV FPI	4			

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S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr	Annexure No
		in 33KV & 11KV Line.	Installation of 11KV & 33 KV 400A/200A AB switches & Isolator	5	Annexure-10
			Installation of 33KV & 11 KV RMU	4	
			33KV & 11kV Auto Recloser & Sectionaliser	14	
		iii) Replacement/Addition of network component in Distribution Substation.	Transformer foundation	1.1	
			Refurbishment of 250 & 315 KVA DSS along with LT Protection	8	
			Installation of New DD Fuse Unit/LA/Hanging Feeder Pillar at DSS	4	
			Mobile Transformer/DTR for Emergency restoration for Hospital/ Collector Office during Cyclone/ KalBaisakhi	1.5	
		Sub Total-Reliability			
4	Load Growth	Network enhancement / Unforeseen emergency.	Construction of 33 KV New/Link Line	35	Annexure-11
			construction of new 11 kv agricultural feeder	15	
			Construction of 11KV New/ Link Line	35	
			Construction of new PSS along with line in urban area (Total Rs.75 Cr for 2 years)	45	
			Addition/Augmentation of PTR	15	
			Addition/Augmentation of DTR 63 KVA and above	15	
			Addition /Augmentation of 1 ph. & 3 Ph. DTR of 16 KVA and 25 KVA in Rural/ Agriculture Area	8	
			Addition of New LT ABC Network	6	
Addition of New 11KV/ 33 KV Bay	2				
Sub Total- Load Growth				176	
5	Technology & Infrastructure	i) Infrastructure to meet Customer needs.	Infrastructure for call centre	1.82	Annexure-12
			IT Infrastructure for Commercial Back Office	0.96	

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S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr	Annexure No
		ii) Technology Intervention- IT & Technology.	Data Centre at Sambalpur	1.59	Annexure-13
			Front end devices and end user licences	16.31	
			DC Hardware	17.26	
			DC Software and Licences (ERP, MBC, OS, DB etc.)	8	
			Locational Network	16.21	
			Optical Fibre Cabling	2.24	
		iii) Technology Intervention- GIS, SCADA & Others Implementation.	Implementation of GIS	21.45	Annexure-14
			Implementation of Automation/Scads	23.88	
			Communication Infrastructure	18.65	
		iv) Improvement of Civil Infrastructure	New wash room	1	Annexure-15
			Additional Material Storage area	2	
			New store building	2.5	
			New Building for Division/ Subdivision Section/Commercial Office.	10	
			Refurbishment of old building for office at various location	3	
		v) store infrastructure	Racks and other material	4	
			Security system in central store	1.05	
		vi) Ready to Use assets for Offices	office furniture	2	
		Sub Total-Technology & Infrastructure		153.92	
		Grand Total		582.18	

*The Grand Total cost is exclusive of Project Employee Cost and calculated Interest during Construction (IDC). The IDC would be approximately Rs.26.2 Cr.

Benefits of Proposal

Refurbishment of substations and feeders will benefit TPWODL through

- i. Improvement of voltage profile.
- ii. Reduction in number of outages
- iii. Increase in vertical clearances
- iv. Reduction in equipment downtime
- v. Reduction in unserved energy
- vi. Enhanced reliability of power supply
- vii. Reduction in number of accidents.
- viii. Ease of Operation and Operational flexibility

Benefits of SCADA:

Centralized operation would ensure optimum resource utilization of the hardware and software and functionalities used in the SCADA System. Other benefits include:

- i. This will ensure efficient operation & monitoring under steady state, dynamic & transient condition of the system.
- ii. To achieve improvement in operations considering complex Load- Demand cycle changes to bring in better and holistic visibility while making critical decisions.
- iii. Optimize on unscheduled power interchange, maximize utilization of the assets
- iv. Better Inventory management, low maintenance cost
- v. Multi-skilling of operational and maintenance personals
- vi. Enhanced operational safety
- vii. Using the latest Operating systems, with enhanced functionalities, enabling Analysis and Power System studies/event analysis including Integrated Graphical User Interface (GUI) for SCADA, ADMS and other applications, which would be uniform across all substations and would be cyber security compliant for IT/OT integration requirements of the future.

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- viii. With common system interfaces, it brings in optimized resource management, common training platform for systems, and maintenance of assets. Avoidance of multiple systems in OS and software is also affected.
- ix. Data exchange with redundancy to any external system
- x. Better Control on Cyber Security Management, optimization of cyber security measures implementation
- xi. Better Data Synchronization between MCC, APSCC, ensuring data accuracy, availability and reliability
- xii. N-2 Communication redundancy will be provided at critical location for communication by using advanced MPLS Technology
- xiii. Improved reliability of service
- xiv. Better Integration and coordination with enterprise system to provide relevant information to those internal & external users that rely on accurate information in a timely manner

Benefits to Customer

- i. Reduction in restoration time of outage
- ii. Improved reliability of service
- iii. Better control of power quality and enhanced use of reactive power sources
- iv. Useful feedback information to the customer in terms of expected outage duration time etc.
- v. Monitoring the potential quality problems and the reliability problems due to supply interruptions.

Annexure -1 DPR of Life enhancement of network and maintaining safe horizontal / vertical clearances

Cost Summary/ No of Items:

Cost sheet has been estimated based on the previous rates available with us, however rate may vary from time to time and accordingly cost summary will be changed.

Different no. of items to be executed has been calculated based on certain assumption/ calculation, however it may vary during execution.

Cost Summary:

S.No.	Description of work	UOM	FY23 Qty	Standard Estimate	Amount
1	Intermediate Pole with 9 Mtr PSC Pole for 11KV Line	EA	3,200	13,446	43,027,637
2	Intermediate Pole with 9 Mtr RS Joist Pole for 11KV Line	EA	680	42,114	28,637,588
3	Intermediate Pole with 11 Mtr RS Joist Pole for 11KV Line	EA	270	49,756	13,434,234
4	Intermediate Pole with 9 Mtr PSC Pole for 33KV Line	EA	100	17,380	1,738,011
5	Intermediate Pole with 11 Mtr RS Joist Pole for 33KV Line	EA	200	53,690	10,738,079
6	Intermediate Pole with 13Mtr RS Joist Pole for 33KV Line	EA	50	61,333	3,066,636
7	Cradle Guard on 33KV Line	EA	2,900	6,051	17,547,900
8	Cradle Guard on 11KV Line	EA	400	6,051	2,420,400
9	Replacement of 11 KV Bare Conductor with 100 Sq.mm Covered Conductor	Ckt Km	30	919,283	27,578,490
10	Replacement of 11 KV Bare Conductor with 148 Sq.mm Covered Conductor	Ckt Km	2	1,128,482	2,256,964
	Total				15,04,45,393

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Cost & Material Estimate for 11KV Intermediate Pole with 9 Mtr PSC Pole, 9 Mtr RS Joist Pole & 11 Mtr RS Joist Pole:

Description of materials	Unit	Qty.	Rate including GST (Rs.)	Amount including GST (Rs.)
Part-A				
11mtr long 150x150 MM RS Joist Pole	No.	270	29192	7,881,845
9 mtr long 150x150 MM RS Joist Pole	No.	680	23884	16,241,378
Supports 9 Mtr long PSC Pole	EA	3200	3540	11,328,000
Part-B				
11 KV V- Cross Arm (MS) (10.2 Kg each)	No.	4150	956	3,966,570
GI Back Clamp for V cross arm (11KV) (0.85 kg each)	No.	4150	94	391,760
11 KV F Clamp 2.9 Kg. each	No.	4150	283	1,175,280
11KV Pin Insulator POLYMER	No.	12450	236	2,938,200
Coil Earthing	No.	4150	196	812,902
G.I. Nuts, bolt & Washer	Kg.	4150	92	381,966
Cupping of pole (Including supply of materials (1 M x0.5 Mx0.5 M)	No.	4150	2576	10,690,151
Sundries (Paint, Danger board, Clamp, Connector, Ant climbing device, Binding tape and wire).	L.S.	4150	236	979,400
Total Cost of material A				35,451,224
Total Cost of material B				21,336,229
Stock, Storage & Insurance @ 3% of A+B		3%		1,703,624
Sub Total A+B=C				58,491,076
T&P @ 2% of C		2%		1,169,822
Contingency @ 3% of C		3%		1,754,732
Transportation @ 7.5% of C+ GST on transportation cost		7.50%		5,176,460
Erection Charges for PSC Pole @ 20% +applicable taxes		20%		2,265,600
Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		1,206,161
Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		2,197,632
Sub-total D				72,261,483
Over Head Charges @ 6% of D (Supervision Charges)=E		6%		4,335,689
Sub-Total D+E=F				76,597,172
Labour Cess @ 1% of F		1%		765,972
Grand Total				77,363,144
INSPECTION FEES				-
APPROVAL OF DRAWING				-

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Description of materials	Unit	Qty.	Rate including GST (Rs.)	Amount including GST (Rs.)
Escalation for FY23 @10%				7,736,314
TOTAL COST FOR CAPEX WORK				85,099,458

Cost & Material Estimate for 33KV Intermediate Pole with 9 Mtr PSC Pole, 11 Mtr RS Joist Pole & 13 Mtr RS Joist Pole:

Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
Part-A				
13mtr long 150x150 MM RS Joist Pole	No.	50	34500	1724983
11 mtr long 150x150 MM RS Joist Pole	No.	200	29192	5838404
9 mtr long 150x150 MM PSC Pole	EA	100	3540	354000
Part-B				
33 KV V cross arm (22kG),GI	No.	350	2124	743400
GI Back Clamp for V Cross arm (33KV)	No.	350	177	61950
33 KV F clamp	No.	350	354	123900
33 KV pin Insulator polymer	No.	1050	668	701770
Coil Earthing	No.	350	196	68558
G.I. Nuts, bolt & Washer	Kg.	350	92	32214
Cupping of pole (Including supply of materials (1 M x0.5 Mx0.5 M)	No.	350	2576	901579
Sundrys (Paint, Danger board, Clamp, Connector, Ant climbing device, Binding tape and wire).	L.S.	350	236	82600
Total Cost of material A				7917387
Total Cost of material B				2715971
Stock, Storage & Insurance @ 3% of A+B		3%		319001
Sub Total A+B=C				10952358
T&P @ 2% of C		2%		219047
Contingency @ 3% of C		3%		328571
Transportation @ 7.5% of C+ GST on transportation cost		7.50%		969284
Erection Charges for PSC Pole @ 20% +applicable taxes		20%		70800
Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		378169

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Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		279745
Sub-total D				13197974
Over Head Charges @ 6% of D (Supervision Charges)=E		6%		791878
Sub-Total D+E=F				13989853
Labour Cess @ 1% of F		1%		139899
Grand Total				14129751
INSPECTION FEES				0
APPROVAL OF DRAWING				0
Escalation for FY23 @10%				1412975
TOTAL COST FOR CAPEX WORK				15542726

Cost & Material Estimate for 11KV & 33KV Cradle Guard:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	75x40M.S. Channel (1.5mtr.x2nos.)	Kg.	69300	76.70	5315310
2	Back clamp for channels	Nos.	6600	94.40	623040
3	Eye' Hook	Nos.	13200	70.80	934560
4	8 SWG G.I. wire	Kg.	80850	88.50	7155225
5	G.I. Nuts, bolt & Washer	Kg.	2604	92.04	239645
6	Total Cost of material A				14267780
7	Stock, Storage & Insurance @ 3% of A=B		3%		428033
8	Sub Total A+B=C				14695813
9	T&P @ 2% of C		2%		293916
10	Contingency @ 3% of C		3%		440874
11	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		1300579
12	Erection Charges for PSC Pole @ 20% +applicable taxes		20%		0
13	Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		0
14	Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		1734106

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
15	Sub-total D				18465289
16	Over Head Charges @ 6% of D (Supervision Charges)=E		6%		1107917
17	Sub-Total D+E=F				19573206
18	Labour Cess @ 1% of F		1%		195732
19	GST @18% Over Head Charges @ 6% of D (Supervision Charges) (E)				199425
20	Grand Total				19968363

Cost & Material Estimate for 11KV Covered conductor:

Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
Supports 11 Mtr long 150x150mm RS Joist Pole	EA	198	29192	5780020
PART -A				5780020
11KV V cross arm (10.2kG),GI	EA	198	956	189248
GI Back Clamp for V Cross arm (11KV)(0.85kG)	EA	198	94	18691
11KV pin Insulator polymer	EA	594	236	140184
11KV F clamp	EA	198	283	56074
G.I Nuts,bolts, &washer	KG	396	92	36448
Concreting of pole	EA	198	2576	510036
PG Clamp for 100 sq.mm Conductor	EA	396	684	271022
PG Clamp for 148 sq.mm Conductor	EA	0	732	0
coil Earthing	EA	198	196	38784
No.8G.I.wire for earthing	Kg.	594	89	52569
Sundries(Danger board, paint, Ant climbing Device)	LS	198	1770	350460
H.T stay set Complete	EA	198	1239	245322
H.T stay Insulator	EA	198	59	11682
HT Stay Clamp	EA	198	148	29205
7/8SWG G.I stay wire	KG	2970	89	262845
Disc Insulator (B&S) 90 KN Polymer	EA	396	1357	537372

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Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
11KV Single tension HW Fittings B&S Type for 100/148 mm sq. AAAC 4 bolted (90 KN)	EA	396	590	233640
PART B				2983583
100 sq.mm Conductor	KM	101.97	106200	10829214
148 sq.mm Conductor	KM	0	158120	0
Part C				10829214
Sub Total D=Part B+Part C				13812797
Sub Total E=Part A+Part D				19592817
Stock Storage & Insurance@3 %of E=I				587785
Sub Total J=I+E				20180601
T&P2% of J				403612
<u>Contingency 3% of J</u>				605418
Transportation 7.5% of J				1785983
Erection Charges 10%ofD+GSTon erection Charge				1629910
Erection Charges 5%ofA+GSTon erection Charge				341021
Sub Total = K				24946546
Labour Cost for Dismantling of Old Conductor	KM	99	8215	813301
Subtotal=L				25759847
Overhead Charges (Including Supervision Charge)6% of K=M				1545591
Sub Total L+M=N				27305437
Labour cess 1%of N				273054
Grand Total				27578492
Inspection Fees	LS	33	1200	39600
Approval Of Drawing	LS		600	600
Escalation for FY23 @10%				2757849
Total Cost for Capex Proposal (Rounded)				30336341

**** The Estimated Item Cost is based on approved Cost Data for Electrical Materials in Year 2018-19 vide No. 1763/EL.DDUGJY-03/2018/ En, dated 25/02/2019. These rates are old and needs revision and accordingly request has been done.**

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Annexure - 2 DPR for Provision of Testing Equipments & PPE

Required Safety Equipment quantity and cost:

S No.	Item Description	Unit	Rev. Qty	TPWODL/ CDB Rates	Rate including GST (Rs.)	Total Amount (Rs.)
1	Arch flash Suit for grid substation (40 cal/cm2)	EA	300	80,000	94,400	28320000
2	Electrical high voltage insulation mat with IS15652:2006	meter	3,000	700	826	2478000
3	Class room training facility (Chair)	EA	560	3,000	3,540	1982400
	Projector with screen (Epson EH-TW 750)	EA	17	80,000	94,400	1604800
	Amplifier with speaker & microphone	EA	17	10000	11,800	200600
	AC	EA	34	50000	59,000	2006000
	Podium	EA	17	7000	8,260	140420
	Miscellaneous	EA	17	50000	59,000	1003000
4	Mobile Van for Public Safety	EA	1	800000	944,000	944000
	Total					38679220

Electrical Testing Equipment will be purchased as per requirement in FY 23 for which equipment will be finalised in due course.

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Annexure - 3 DPR for Earthing and Fencing

Cost Summary:

S.No.	Description of work	UOM	FY23 Qty	Standard Estimate	Amount
29	Earthing of PSS	EA	34	147746	5023363
30	Earthing of DSS	EA	1700	16350	27795838
31	Earthing of Pole	EA	3200	694	2222234
32	Fencing of DSS	EA	1000	120092	120092297
	Total				155133732

Cost & Material Estimate for Earthing of PSS & DSS:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	No.	5440	1239	6740160
2	40x6 MM GI flat for Neutral	Kg.	42160	89	3731160
3	No.6 G.I. wire for Earthing	Kg.	3400	89	300900
4	Material for masonry work for earth pit,charcoal,saltetc, including construction of earthing chamber (Size: 2'x2) and RCC slab cover'	No.	5440	2028	11032320
5	Subtotal= A				21804540
6	Stock, Storage & Insurance @ 3% of A=B		3%		654136
7	Sub Total A+B=C				22458676
8	T&P @ 2% of C		2%		449174
9	Contingency @ 3% of C		3%		673760
10	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		1987593
11	Erection Charges @ 10% of C+GST on erection charge		10%		2650124
80	Over Head Charges (Supervision Charges) @ 6% of E=F		6%		1347521
81	Sub Total =G				29566847
82	Labour Cess 1 % of G		1%		295668
	INSPECTION FEES		1200		
	Escalation for FY23 @10%				2956685
	TOTAL COST FOR CAPEX WORK				32819200

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Cost & Material Estimate for Earthing of Pole:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	Earthing of Support (Coil type)	No.	3200	195.88	626816.00
2	No. 6 G.I.wire for earthing	Kg.	9600	88.50	849600.00
5	Subtotal= A				1476416.00
6	Stock, Storage & Insurance @ 3% of A=B		3%		44292.48
7	Sub Total A+B=C				1520708.48
8	T&P @ 2% of C		2%		30414.17
9	Contingency @ 3% of C		3%		45621.25
10	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		134582.70
11	Erection Charges @ 10% of C+GST on erection charge		10%		179443.60
80	Over Head Charges (Supervision Charges) @ 6% of E=F		6%		91242.51
81	Sub Total =G				2002012.71
82	Labour Cess 1 % of G		1%		20020.13
	INSPECTION FEES		1200		
	Escalation for FY23 @10%				200201.27
	TOTAL COST FOR CAPEX WORK				2222234.11

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Annexure- 4 DPR for Boundary Wall and Infrastructure works at Primary Substation

Works to be covered	Unit Cost (Cr) incl. of Taxes	Qty	Unit	Total Amt
Boundary wall of Primary Substation	0.00174	6900	RM	12
Gravel filling for Primary substation	0.0000714	14000	Sqm	1.0
Access road to switchyard and stores	0.001215	1650	RM	2.0
Control room and Building refurbishment	0.165	12	NOS	2.0
Provision of Water Supply for PSS/Offices (Watering for Earth Pit)	0.01	50	Nos	0.5

Annexure- 5 DPR for Energy Audit & Meter Related Activity

Study of data elaborated that there are connections with are having Defective meters, No Meters and Electromechanical meters. These meters are leading to reduction in billing efficiency and thus are contributing to AT&C losses, increased provisional billing, billing error and complaints. Error in bills is leading to non-payment of bill and thus hampers the collection efficiency and increased dissatisfaction level in the customers.

Parameters	Cost in Cr	Description
Meter Replacement against burnt/Faulty/Obsolete Technology	34.3	There are around 1.5 lakh defective/Burnt meter present in TPWODL and all these meters need to be replaced with new meters. The following accessories are required for Meter replacement 1. Meters 2. Service Cable 3. Polycarbonate seals 4. Modems
Testing Equipment for field inspection of consumer meters	1	In order to fulfil the routine testing requirement of all the HT & LT Consumers under TPWODL as per guidelines of OERC Conditions of Supply Code-2019, the following equipments in sufficient quantity is required to be provided to all the MRT wings. 1.LT Accucheck 2.HT Accucheck 3.CMRI 4.Megger 5.Multimeter
Installation of Metering Unit, Meters and Modems at PSS Boundary Points	2.86	As on September'2021, there are 293 number of 33/11KV PSS present in TPWODL out of which only few PSS are having incomer meters in working condition. In order to carry out 33KV Feeder audit between 33KV Feeders emanating from Grid end w.r.t load end and 33KV vs 11 KV Feeder audit we need to install incomer Metering units at PSS boundary points. For this purpose, the following materials are required: 1.33KV Metering units with control cable and GI Pipe 2.HTTV Meters 3. AMR Modem

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Parameters	Cost in Cr	Description
Installation of CT,PT, Meters & Modems for Defective 11 KV Feeder Meters	4	<p>There are 1148 number of 11KV Feeders in TPWODL as on September'2021 out of which due to breaker CT/PT problem, 272 no of Feeders not recording correct consumption. In order to rectify the issues, we need to procure the following items:</p> <ol style="list-style-type: none"> 1.Oil cooled CT's 2.Oil Cooled PT's 3.HTTV Meters with box 4. AMR Modems
Installation of DT Meters (above 250 KVA)	2.5	<p>There are 68800 number of DTRs of different ratings present in TPWODL as on September'2021 out of which only 6003 number of DT Meters installed. We are planning to install DT Meters as well as Modems of all DTR's on and above 250 KVA in order to conduct real time audit.</p> <p>There are around 1900 number of above 250 KVA DTR present for which the following materials required:</p> <ol style="list-style-type: none"> 1.DRT Meter with box, ring CT and accessories 2.AMR Modem
Installation of CT,PT, Meters & Modems for High value Industrial Consumers	1	<p>As on September'2021, there are 1068 numbers of above 110 KVA HT consumers present in TPWODL. We have already installed approx. 50 numbers of group/one to one-audit meters against some high valued 33KV HT consumers in order to detect pilferage of theft of energy. Further, we are planning to install 78 more number of audit meters by the end of Sept'2022 against some 33KV as well as 11KV Industrial consumers.</p>

Annexure- 6 DPR for Spot Billing

Requirement: 2000 Nos. of Mobile Printers and Mobile Handsets

Mobile Printers and Mobile Handsets are required to adopt Spot Billing system in more efficient way that we can achieve company targets of billing efficiency and collection efficiency. The Spot Billing system is a system, in which the meter reader visits the consumer's premises, records the meter reading and issues the bill on the spot using a hand-held computer/device.

Benefits of Spot Billing

- On the spot billing with accurate meter reading to the satisfaction of the consumer.
- Spot billing leads to much greater revenue-collection, increased efficiency and better decision systems.
- It brings transparency and better customer service to the system.
- Reduction in consumer complaints.
- Instant access to MIS after billing information is fed into the server the same day.

How to implement Spot billing machine?

- When a field executive leaves office, s/he collects addresses and details of all the households s/he should visit in the day. This is actually the data transferred from a PC to a hand-held device by an officer.
- S/he inserts her/his Smartcard into the device to authenticate herself/himself: this provides a high degree of security, as unauthorized persons cannot have access to the data.
- On the field, the field executive can easily get answers to queries like "Show me names and addresses of people who have defaulted payments for the last three months."
- Once s/he reaches the user premises and takes a reading, s/he can quickly enter it on to the device using a soft keyboard.
- S/he then prints out a receipt/bill for the homeowner, and collects the money due as per the bill.
- Finally, when s/he is back in office, s/he puts all the collected data back into a PC/server using a cable, in a simple 2-minute process. The data is used for archives,

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MIS reports, etc. The money collected is deposited at the specified branch of the bank in the specified format.

Bluetooth printer Specifications

- i. Processor with programmable option Program Memory: Min 1 MB
- ii. High Speed USB 2.0 interface
- iii. Wireless Blue Tooth Interface Supporting Bluetooth 2.0/3.0
- iv. Supports Paper Width: Min 58 MM
- v. Paper thickness: Plain 60 GSM
- vi. Print method: Impact
- vii. Rugged ABS Case with clip and bag for easy carrying.
- viii. Built in 2.2 Ahr Lithium-Ion Battery to last 1 full day operation Intelligent & Fast Battery charger

Mobile Specifications

- i. Operating System - Android minimum 6 (Marshmallow)
- ii. Memory - Internal up to 32 GB
- iii. Processor - Dual core/Quad core
- iv. RAM - Minimum 2GB
- v. Connectivity – wi-fi, Mobile data and Bluetooth
- vi. USB - Micro USB v2.0, USB host
- vii. Camera - 8/13MP
- viii. GPS - YES, with A-GPS, GLONASS
- ix. Sensors - Proximity, Accelerometer, Gyro, Magnetic sensors, Temperature, Humidity

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Annexure-7 DPR for Replacement of LT Bare Conductor with AB Cable

Cost Summary:

S.No.	Description of work	UOM	FY23 Qty	Standard Estimate	Amount
19	Conversion of LT Bare with LTABC-3CX95 Sq.mm	Ckt Km	220	828393.96	182246671.2
20	Conversion of LT Bare with LTABC-3CX120 Sq.mm	Ckt Km	100	1185997.76	118599776.2
	Total				300846447

Cost & Material Estimate for Conversion of LT Bare with LT ABC:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	9 Mtr long 300 KG PSC Pole	Nos	1920	3540.00	6796800
2	Arial Bunch Conductor (ABC) with 3x95mm.sq. (for Phase) +1x70mm.sq. Catenary (Neutral) +1x16mm.sq. (Street Light Phase) for 3-Phase 5-wire having overhead line.	Km.	231	286740.00	66236940
3	Arial Bunch Conductor (ABC) with 3x120mm.sq. (for Phase) +1x70mm.sq. Catenary (Neutral) +1x16mm.sq. (Street Light Phase) for 3-Phase 5-wire having overhead line.	Km.	105	510196.60	53570643
4	Pole Clamp for AB Cable	Pair	10560	236.00	2492160
5	Dead end Clamp (For ABC)	Nos.	1920	76.70	147264
6	Eye Hook for AB Cable	Nos.	10560	70.80	747648
7	Suspension Clamp	Nos.	8640	330.40	2854656
8	Neutral Connector Type B	Nos.	10560	38.94	411206
9	LT Stay Set	Nos.	1600	613.60	981760
10	7/12SWG Stay wire	Kg.	14400	88.50	1274400
11	LT Stay Clamp (1.40 Kg./Pair)	Pair	1600	129.80	207680
12	LT Stay Insulator	Nos.	1600	35.40	56640
13	Earthing Coil	Nos.	1920	195.88	376090
14	No.8G.I.wire for earthing	Kg.	5760	88.50	509760
15	G.I. Nut & Bolts(Assorted size)	Kg.	3200	92.04	294528
16	Piercing Connector Type A	Nos.	31680	94.40	2990592

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
17	Service Connection Distribution box (8 way)	Nos.	10560	4720.00	49843200
18	Concreting of Stay	Nos.	1600	1180.00	1888000
19	Cupping of pole (Including supply of materials)	Nos.	1920	2575.94	4945805
20	Total Cost of material A				196625772
21	Stock, Storage & Insurance @ 3% of A=B		3%		5898773
22	Sub Total A+B=C				202524545
23	T&P @ 2% of C		2%		4050491
24	Contingency @ 3% of C		3%		6075736
25	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		17923422
26	Erection Charges for PSC Pole @ 20% +applicable taxes		20%		1652166
27	Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		
28	Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		23071813
29	Sub-total D				255298174
30	Over Head Charges @ 6% of D (Supervision Charges)=E		6%		15317890
31	Sub-Total D+E=F				270616064
32	Labour Cess @ 1% of F		1%		2706161
	Grand Total				273322225
	INSPECTION FEES				0
	APPROVAL OF DRAWING	320	600		192000
	Escalation for FY23 @10%				27332222
	TOTAL COST FOR CAPEX WORK				300846447

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Annexure- 8 DPR for Replacement/Addition of Network component in 33/11KV Primary Substation.

Cost Summary

S.No.	Description of work	UOM	FY23 Qty	Standard Estimate	Amount
1	Refurbishment work in PSS (Structure replacement/ Yard Refurbishment)	EA	125	400000.0	50000000.0
2	Replacement of 11KV Breaker	EA	30	638924.7	19167742.4
3	Addition of 11KV Breaker	EA	36	871825.1	31385704.8
4	Replacement of 33KV Breaker	EA	13	1067042.9	13871557.2
5	Addition of 33KV Breaker	EA	20	1299943.3	25998865.0
6	Control Cable of various sizes	LS	1	40000000.0	40000000.0
7	Replacement of 33KV CT	EA	20	277518.5	5550370.1
8	Replacement of 11KV CT	EA	25	222034.4	5550859.9
9	Replacement of 33KV PT	EA	20	253989.1	5079782.6
10	Replacement of 11KV PT	EA	30	220647.3	6619418.7
11	Replacement of defective relay	LS	1	10000000.0	10000000.0
12	Replacement of Protection panel along with associated equipment	LS	1	30000000.0	30000000.0
13	Replacement of 33/.433 KV PSS Tr.	EA	12	550545.8	6606549.5
14	Addition of 33/.433 KV PSS Tr.	EA	3	1183899.0	3551697.1
15	Replacement of Battery 24V	EA	30	51785.1	1553552.1
16	Replacement of Battery 48V	EA	8	103588.1	828704.8
17	Replacement of Battery Charger 24V	EA	30	305463.6	9163908.6
18	Replacement of Battery Charger 48V	EA	8	438645.8	3509166.0
19	Addition of Capacitor Bank	EA	4	2400000.0	9600000.0
20	Transformer Repair Workshop	EA	1	120000000.0	120000000.0
21	High Mast/Lighting arrangement for PSS/Store	EA	33	300000.0	9900000.0
Total in Rs. Crores					40.8

Cost & Material Estimate for Replacement of 11 KV Breaker

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	11KV 1600 Amp Outdoor VCB with CT & indoor CR panel & with CT console box (CT-600-300-150/1-1A,	No	30	342200	10266000

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
	including bimetallic clamps & connectors for feeder protection.				
2	11Kv 1Ph oil cooler PT (11000v/V3/110v/v3) class 0.5/3P with PT console box.	No	90	20060	1805400
3	2.5sqmm 10core control cable	Mtr	3000	304	913320
4	2.5sqmm 4core control cable	Mtr	1500	132	198240
16	Total cost for VCB				13182960
17	Stock, Storage & Insurance (@3% of A)		3%		395489
18	Sub-Total (A)+Stock/Storage=B				13578449
19	T&P (@2% of B)		2%		271569
20	Contingency (@3% of B)		3%		407353
21	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		1201693
22	Erection Charges (@ 5% of B)+ GST on erection cost		5%		801128
23	Sub Total of Part-B =D				16260192
24	Over Head Charges (Supervision Charges) @ 6% of K		6%		975612
25	Sub Total L				17235804
	Labour Cess 1 % of L		1%		172358
	INSPECTION FEES		30	1200	36000
	Escalation for FY23 @10%				1723580
	TOTAL COST FOR CAPEX WORK				19167742

Cost & Material Estimate for New 11 KV Breaker

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	11KV 1600 Amp Outdoor VCB with CT & indoor CR panel & with CT console box (CT-600-300-150/1-1A, including bimetallic clamps & connectors for feeder protection.	No	36	342200	12319200
2	11Kv 1Ph oil cooler PT (11000v/V3/110v/v3) class 0.5/3P with PT console box.	No	108	20060	2166480
3	2.5sqmm 10core control cable	Mtr	3600	304	1095984
4	2.5sqmm 4core control cable	Mtr	1800	132	237888

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
5	Earthing of VCB	No	36	10000	360000
7	Foundation of 33KV VCB	LS	36	100000	3600000
9	Pipe Earthing	No	108	1239	133812
10	Retaining Wall with Metal spreading	LS	36	20000	720000
11	Nut bolt		108	109	11730
12	GI Structural (6.8kg./mtr.)		3600	91	325822
13	232 sqmm Conductor	km	1.44	217911	313791
14	PG Clamp		216	1357	293112
15	Cable Gland	LS	108	177	19116
16	Total cost for VCB				21596934
17	Stock, Storage & Insurance (@3% of A)		3%		647908
18	Sub-Total (A)+Stock/Storage=B				22244842
19	T&P (@2% of B)		2%		444897
20	Contingency (@3% of B)		3%		667345
21	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		1968669
22	Erection Charges (@ 5% of B)+ GST on erection cost		5%		1312446
23	Sub Total of Part-B =D				26638199
24	Over Head Charges (Supervision Charges) @ 6% of K		6%		1598292
25	Sub Total L				28236491
17	Labour Cess 1 % of L		1%		282365
	INSPECTION FEES		36	1200	43200
	Escalation for FY23 @10%				2823649
	TOTAL COST FOR CAPEX WORK				31385705

Cost & Material Estimate for New 33 KV Breaker:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	33KV 1600 Amp Outdoor VCB with CT & indoor CR panel & with CT console box (CT-600-300-150/1-1A, including bimetallic clamps & connectors for feeder protection.	No	20	637200	12744000
2	33Kv 1Ph oil cooler PT (11000v/V3/110v/v3) class 0.5/3P with PT console box.	No	60	20060	1203600
3	2.5sqmm 10core control cable	Mtr	2000	304	608880

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
4	2.5sqmm 4core control cable	Mtr	1000	132	132160
5	Earthing of VCB	No	20	10000	200000
7	Foundation of 33KV VCB	LS	20	100000	2000000
9	Pipe Earthing	No	60	1239	74340
10	Retaining Wall with Metal spreading	LS	20	20000	400000
11	Nut bolt		60	109	6516
12	GI Structural (6.8kg./mtr.)		2000	91	181012
13	232 sqmm Conductor	km	0.8	217911	174328
14	PG Clamp		120	1357	162840
15	Cable Gland	LS	60	177	10620
16	Total cost for VCB				17898297
17	Stock, Storage & Insurance (@3% of A)		3%		536949
18	Sub-Total (A)+Stock/Storage=B				18435246
19	T&P (@2% of B)		2%		368705
20	Contingency (@3% of B)		3%		553057
21	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		1631519
22	Erection Charges (@ 5% of B)+ GST on erection cost		5%		1087680
23	Sub Total of Part-B =D				22076207
24	Over Head Charges (Supervision Charges) @ 6% of K		6%		1324572
25	Sub Total L				23400779
	Labour Cess 1 % of L		1%		234008
	INSPECTION FEES		20	1200	24000
	Escalation for FY23 @10%				2340078
	TOTAL COST FOR CAPEX WORK				25998865

Cost & Material Estimate for Replacement of 33KV VCB

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	33KV 1600 Amp Outdoor VCB with CT & indoor CR panel & with CT console box (CT-600-300-150/1-1A, including bimetallic clamps & connectors for feeder protection.	No	13	637200	8283600

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
2	33Kv 1Ph oil cooler PT (11000v/V3/110v/v3) class 0.5/3P with PT console box.	No	39	20060	782340
3	2.5 sqmm 10core control cable	Mtr	1300	304	395772
4	2.5 sqmm 4core control cable	Mtr	650	132	85904
16	Total cost for VCB				9547616
17	Stock, Storage & Insurance (@3% of A)		3%		286428
18	Sub-Total (A)+Stock/Storage=B				9834044
19	T&P (@2% of B)		2%		196681
20	Contingency (@3% of B)		3%		295021
21	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		870313
22	Erection Charges (@ 5% of B)+ GST on erection cost		5%		580209
23	Sub Total of Part-B =D				11776268
24	Over Head Charges (Supervision Charges) @ 6% of K		6%		706576
25	Sub Total L				12482844
	Labour Cess 1 % of L		1%		124828
	INSPECTION FEES		13	1200	15600
	Escalation for FY23 @10%				1248284
	TOTAL COST FOR CAPEX WORK				13871557
	GST @18% Over Head Charges @ 6% (Supervision Charges) of (E)				127184
	Grand Total				13998741
	TOTAL WORK FOR DEPOSIT WORK	Or Say			13998741

Cost & Material Estimate for Replacement of 33KV and 11 KV CT

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	11KV CT(400-200/1-1-1A)/((600-300-150/1-1-1A)	No	75	21240	1593000
2	33KV CT (400-200/1-1-1A)/((600-300-150/1-1-1A)	No	60	35400	2124000
3	GI Structural (6.8kg./mtr.)	KG	13508	91	1222564
4	G.I.Bolts, Nuts & Washers.	KG	675	109	73310

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
5	Sundries (Paint, danger Board, Clamp, Connectors, Ant climbing device, Binding Tape, etc.)	L.S.	95	2124	201780
6	Earthing of support (Coil Type)	No.	45	196	8815
7	2.5sqmm 10core control cable	Mtr	4500	304	1369980
8	2.5sqmm 4core control cable	Mtr	2250	132	297360
9	232 sqmm Conductor	km	1.8	217911	392239
10	PG Clamp		270	1357	366390
	Total cost =A				7649438
	Stock, Storage & Insurance (@3% of A)		3%		229483
	Sub-Total (A)+Stock/Storage=B				7878921
	T&P (@2% of B)		2%		157578
	Contingency (@3% of B)		3%		236368
	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		697284
	Erection Charges (@ 5% of B)+ GST on erection cost		5%		464856
	Sub Total of Part-B =C				9435008
	Over Head Charges (Supervision Charges) @ 6% of C		6%		566100
	Sub Total D				10001108
	Labour Cess 1 % of L		1%		100011
	INSPECTION FEES				
	Escalation for FY23 @10%				1000111
	TOTAL COST FOR CAPEX WORK				11101230

Cost & Material Estimate for Replacement of 33KV and 11 KV PT

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	11KV PT(11KV/110V OIL COOLED	No	90	22337	2010366
2	33KV PT(33KV/110V OIL COOLED	No	60	29996	1799736
3	GI Structural (6.8kg./mtr.)	KG	15009	91	1358405
4	G.I. Bolts, Nuts & Washers.	KG	750	109	81455

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
5	Sundries (Paint, danger Board, Clamp, Connectors, Ant climbing device, Binding Tape, etc.)	L.S.	50	2124	106200
6	Earthing of support (Coil Type)	No.	50	196	9794
7	2.5sqmm 10core control cable	Mtr	5000	304	1522200
8	2.5sqmm 4core control cable	Mtr	2500	132	330400
9	232 sqmm Conductor	km	2	217911	435821
10	PG Clamp		300	1357	407100
	Total cost =A				8061477
	Stock, Storage & Insurance (@3% of A)		3%		241844
	Sub-Total (A)+Stock/Storage=B				8303321
	T&P (@2% of B)		2%		166066
	Contingency (@3% of B)		3%		249100
	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		734844
	Erection Charges (@ 5% of B)+ GST on erection cost		5%		489896
	Sub Total of Part-B =C				9943227
	Over Head Charges (Supervision Charges) @ 6% of C		6%		596594
	Sub Total D				10539821
	Labour Cess 1 % of L		1%		105398
	INSPECTION FEES				
	Escalation for FY23 @10%				1053982
	TOTAL COST FOR CAPEX WORK				11699201

Cost & Material Estimate for 33/433 KV Substation transformer:

Sl. No.	Description of materials	Unit	Qty.	Amount in Rupees with GST.	Net amount in Rs
Part-A					
Transformer part - A					
1	Construction of 100KVA,33/0.4KV	No	15	320960	4,814,400

Capex plan for FY 22-23

Sl. No	Description of materials	Unit	Qty	Amount in Rupees with GST.	Net amount in Rs
2	Construction of 250KVA,33/0.4KV		0.00	495600	-
	Sub-Total - A				4814400
Part-B					
1	Supports 11 Mtr long 150x150mm RS Joist Pole	No.	6	29192	175152
	Sub-Total - B				175152
Accessories for DP mounted 33/0.4 Kv s/s using 300Kg X9m PSC pole with double disc arrangement for 25Kva s/s with LT Distribution box & MCCB - 1No					
1	Top channel 100x50x6mm.2.8mtr. Long, 2Nos. (9.2kg./mtr.)	Kg.	155	76.70	11855
2	Transformer mounting channel 100x50x6mm.2.8mtr. Long, 2Nos. (9.2kg./mtr.)	Kg.	155	76.70	11855
3	A/B switch and HG fuse mounting Channel 75x40x6mm. (4x2.8mtr.) Long (6.8kg/mtr.)	Kg.	228	76.70	17524
4	Cantilever Channel for supporting A/B switch HG fuse arm 75x40x6mm. 1.5mtr. Long, 4Nos. (6.8Kg./mtr.)	Kg.	123	76.70	9402
5	Angle for Cantilever arrangement for A/B switch HG fuse 50x50x6mm. 1.5mtr. 4Nos. (4.5Kg./mtr.)	Kg.	95	76.70	7248
6	75x40x6 mm Channel 1.5 mtr. Long 1 No. (6.8 kg/mtr) for supporting of AB Switch handle.	Kg.	31	76.70	2347
7	Transformer belting angle 50X50X6mm angle 2.8mtrs long 2nos (4.5kg per mtr).	Kg.	95	76.70	7248
8	33 KV Disc Insulator (T&C Type)POLYMER	No.	18	566.40	10195
9	33 KV H/W Fitting (T&C Type)	No.	18	590.00	10620
10	33 KV Isolator 3Pole (400Amp)	Set	3	73,124.60	219374
11	33 KV HG fuse 3 pole (400Amp)	Set	3	15,304.60	45914
12	33 KV Lightning Arrestor	No.	45	9145.00	411525
13	H.T Stay Set Complete	No.	6	1239.00	7434
14	H.T Stay Insulator	No.	6	59.00	354
15	H.T Stay Clamp	Pair	6	147.50	885
16	G.I. Pipe Earthing, 40mm. Dia medium gauge 3 mtr. Long	No.	12	1239.00	14868
17	Earthing of Support (Coil type)	No.	6	195.88	1175

Capex plan for FY 22-23

Sl. No	Description of materials	Unit	Qty	Amount in Rupees with GST.	Net amount in Rs
18	G.I. Nuts, bolt & Washer	Kg.	48	92.04	4418
19	Clamp for bracing Channel	Kg.	24	153.40	3682
20	No. 6 G.I.wire for earthing	Kg.	18	88.50	1593
21	7/10 SWG Stay wire	Kg.	30	88.50	2655
22	Concrete material for Stay Anchor Plate	No.	6	450.00	2700
23	Padding & Concreting material for support	No.	6	650.00	3900
24	Material for masonry work for earth pit	No.	12	1239.00	14868
25	Charcoal, Salt etc. for earthing	No.	24	195.88	4701
26	LT distribution box with MCCB and Busbar arrangement no-1	No	3	17617.40	52852
27	LT 3.5 PVC cable 50sqmm for 25Kva s/s	Mtr	36	239.54	8623
28	Socket and other cable accessories	LS	3	600.00	1800
29	Sundries (Ant climbing device, Paint. Danger Board etc.)	LS	3	1000.00	3000
30	Plinth for transformer	LS	3	15000.00	45000
31	Sub-Total of Part - C				939615
32	Sub-total D=C				1879231
33	Total = E, subtotal A+B+D				6868783
34	Stock, Storage & Insurance @ 3% of F=G		3%		206063
35	Sub-Total=F				7074847
36	T&P @ 2% of F		2%		141497
37	Contingency @ 3% of F		3%		212245
38	Transportation @ 7.5% of F+ GST on transportation cost		7.50%		626124
39	Erection Charges @ 20% of B+GST on erection charge		20%		42576
40	Erection Charges @ 10% of D+GST on erection charge		10%		228402
41	Erection Charges @ 5% of A+GST on erection charge		5%		292571
42	Sub-Total=G				8618262
43	Other Over Heads(including supervision charges) @ 6% of G=H		6%		517096
44	Sub-Total G+H=I				9135357
45	Labour Cess 1 % of K		1%		91354
46	INSPECTION FEES		15		18000
47	APPROVAL OF DRAWING		15		9000
48	Escalation for FY23 @10%				913536
49	TOTAL COST FOR CAPEX WORK				10158247

Capex plan for FY 22-23

Cost Estimate for Battery & Battery Charger (24V & 48V):

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
Part-A					
1	1 set of 24 V battery(2x12 Nos cells) VRLA type of 100 AH of AMARON/EXIDE Make	No.	30	34008	1020228
i	Subtotal= A				1020228.00
ii	Stock, Storage & Insurance @ 3% of A=B		3%		30606.84
iii	Sub Total A+B=C				1050834.84
iv	T&P @ 2% of C		2%		21016.70
v	Contingency @ 3% of C		3%		31525.05
vi	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		92998.88
vii	Erection Charges @ 10% of C+GST on erection charge		10%		123998.51
viii	Total of Part-A				1320373.98
80	Over Head Charges (Supervision Charges) @ 6% of E=F		6%		79222.44
81	Sub Total =G				1399596.42
82	Labour Cess 1 % of G		1%		13995.96
	INSPECTION FEES				0.00
	Escalation for FY23 @10%				139959.64
	TOTAL COST FOR CAPEX WORK				1553552.02

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
Part-A					
1	48V 100 AH maintenance free VRLA Battery (Set.4 No's of 12V Battery)	No.	8	68027	544216
i	Subtotal= A				544216.00
ii	Stock, Storage & Insurance @ 3% of A=B		3%		16326.48
iii	Sub Total A+B=C				560542.48
iv	T&P @ 2% of C		2%		11210.85
v	Contingency @ 3% of C		3%		16816.27

Capex plan for FY 22-23

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
vi	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		49608.01
vii	Erection Charges @ 10% of C+GST on erection charge		10%		66144.01
viii	Total of Part-A				704321.63
80	Over Head Charges (Supervision Charges) @ 6% of E=F		6%		42259.30
81	Sub Total =G				746580.92
82	Labour Cess 1 % of G		1%		7465.81
	INSPECTION FEES				0.00
	Escalation for FY23 @10%				74658.09
	TOTAL COST FOR CAPEX WORK				828704.83

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
Part-A					
1	24 V full wave full control 1 ph. 2w 50 Hz float cum boost charger of AMRON /EXIDE Make	No.	30	200600	6018000
i	Subtotal= A				6018000.00
ii	Stock, Storage & Insurance @ 3% of A=B		3%		180540.00
iii	Sub Total A+B=C				6198540.00
iv	T&P @ 2% of C		2%		123970.80
v	Contingency @ 3% of C		3%		185956.20
vi	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		548570.79
vii	Erection Charges @ 10% of C+GST on erection charge		10%		731427.72
viii	Total of Part-A				7788465.51
80	Over Head Charges (Supervision Charges) @ 6% of E=F		6%		467307.93
81	Sub Total =G				8255773.44
82	Labour Cess 1 % of G		1%		82557.73
	INSPECTION FEES				
	Escalation for FY23 @10%				825577.34
	TOTAL COST FOR CAPEX WORK				9163908.52

Capex plan for FY 22-23

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
Part-A					
1	48V,100A Float.um Boost Charger (Float cum boost current as per above (VRLA Battery)	No.	8	288062	2304492.8
i	Subtotal= A				2304492.80
ii	Stock, Storage & Insurance @ 3% of A=B		3%		69134.78
iii	Sub Total A+B=C				2373627.58
iv	T&P @ 2% of C		2%		47472.55
v	Contingency @ 3% of C		3%		71208.83
vi	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		210066.04
vii	Erection Charges @ 10% of C+GST on erection charge		10%		280088.05
viii	Total of Part-A				2982463.06
	Over Head Charges (Supervision Charges) @ 6% of E=F		6%		178947.78
	Sub Total =G				3161410.84
	Labour Cess 1 % of G		1%		31614.11
	INSPECTION FEES				
	Escalation for FY23 @10%				316141.08
	TOTAL COST FOR CAPEX WORK				3509166.04

Cost Estimate for Transformer Repair workshop:

Sl No	Head	cost in Lakh	Remarks
1	Covered shed	400	80 mtr *25 mtr * 10 mtr
2	2 no EOT crane	60	EOT crane 2 no
3	Building & interior	80	
4	Equipment and test lab	150	
5	Sundry item	40	Tools , small machine
6	Filter machine 2 no	40	
7	oven 2 no	40	
8	HV winding & LV winding machine	40	
9	Forklift 5 T capacity-2no	40	handing purposes
10	Paint booth	50	
11	Unforeseen	50	
12	Inventory	200	chemical, oil, salary of 30 person
	Total	1200	

Capex plan for FY 22-23

Annexure- 9 DPR for Replacement/ Addition of Network Component in 33KV & 11KV Line

S.No.	Description of work	UOM	FY23 Qty	Standard Estimate	Amount
1	Augmentation of 33KV Line with 148 sq.mm AAAC	Ckt Km	12	947617	11371404
2	Augmentation of 33KV Line with 232 sq.mm AAAC	Ckt Km	50	1371907	68595350
3	Augmentation of 11KV Line with 100 sq.mm AAAC	Ckt Km	195	727111	141786645
4	Augmentation of 11KV Line with 148 sq.mm AAAC	Ckt Km	190	842095	159998050
5	Addition of 33KV FPI	EA	100	100000	10000000
6	Addition of 11KV FPI	EA	300	100000	30000000
7	Addition of 11KV 400 Amp AB Switch	EA	300	27234	8170115
8	Addition of 11KV 200 Amp AB Switch	EA	50	19528	976380
9	Addition of 11KV 400 Amp Isolator	EA	100	59360	5935970
10	Addition of 11KV 800 Amp Isolator	EA	100	80988	8098823
11	Addition of 33KV 400 Amp AB Switch	EA	40	39598	1583911
12	Addition of 33KV 200 Amp AB Switch	EA	40	32799	1311970
13	Addition of 33KV 400 Amp Isolator	EA	100	109775	10977489
14	Addition of 33KV 800 Amp Isolator	EA	100	132808	13280764
15	Addition of 33KV RMU- 4 way	EA	3	2500000	7500000
16	Addition of 33KV RMU- 3 way	EA	6	2000000	12000000
17	Addition of 11KV RMU- 4 way	EA	10	800000	8000000
18	Addition of 11KV RMU - 3 way	EA	20	600000	12000000
19	Addition of 33KV Auto-Recloser +Sectionalizer (1+3 Nos)	EA	7	6005920	42041437
20	Addition of 11 KV Auto-Recloser +Sectionalizer (1+3 Nos)	EA	35	2833256	99163964
	Total in Rs. Cr				65.28

Cost & Material Estimate for Refurbishment/ Augmentation of Old 11KV Line:

S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	Supports 9 Mtr long PSC Pole	EA	0	3540	0

Capex plan for FY 22-23

S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
2	Supports 11 Mtr long 150x150mm RS Joist Pole	EA	2310	29192	67433566
	PART -A				67433566
1	11KV V cross arm (10.2kG),GI	EA	2310	956	2207898
2	GI Back Clamp for V Cross arm (11KV)(0.85kG)	EA	2310	94	218064
3	11KV pin Insulator polymer	EA	6930	236	1635480
4	11KV F clamp	EA	2310	283	654192
5	G.I Nuts,bolts, &washer	KG	4620	92	425225
6	Concreting of pole	EA	2310	2576	5950421
7	PG Clamp for 100 sq.mm Conductor	EA	2340	684	1601496
8	PG Clamp for 148 sq.mm Conductor	EA	2280	732	1668048
8	PG Clamp for 80 sq.mm Conductor	EA	0	625	0
9	coil Earthing	EA	2310	196	452483
14	No.8G.I.wire for earthing	Kg.	6930	89	613305
10	Sundries(Danger board, paint, Anti climbing Device	LS	2310	1770	4088700
11	H.T stay set Complete	EA	2310	1239	2862090
12	H.T stay Insulator	EA	2310	59	136290
13	HT Stay Clamp	EA	2310	148	340725
14	7/8SWG G.I stay wire	KG	34650	89	3066525
15	Disc Insulator (B&S) 90 KN Polymer	EA	2340	1357	3175380
16	11KV Single tension HW Fittings B&S Type for 100/148 mm sq. AAAC 4 bolted (90 KN)	EA	2340	590	1380600
	PART B				30476922
1	80 sq.mm Conductor	KM	0	50740	0
2	100 sq.mm Conductor	KM	602.55	64900	39105495
	148 sq.mm Conductor	KM	587.1	96760	56807796
	Part C				95913291
	Sub Total D=Part B+Part C				126390213
	Sub Total E=Part A+Part D				193823779
	Stock Storage & Insurance@3 %of E=I				5814713
	Sub Total J=I+E				199638493
	T&P2% of J				3992770
	Contingency 3% of J				5989155
	Transportation 7.5% of J				17668007
	Erection Charges 10%ofD+GSTon erection Charge				14914045

Capex plan for FY 22-23

S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
	Erection Charges 5%ofA+GSTon erection Charge				3978580
	Sub Total = K				246181049
	Labour Cost for Dismantling of Old Conductor	KM	1155	8215	9488510
	Subtotal=L				255669559
	Overhead Charges (Including Supervision Charge)6% of K=M				15340174
	Sub Total L+M=N				271009733
	Labour cess 1%of N				2710097
	Grand Total				273719830
	Inspection Fees	LS	385	1200	462000
	Approval Of Drawing	LS	385	600	231000
	Escalation for FY23 @ 10%				27371983
	Total Cost for Capex Proposal (Rounded)				301784813

Cost & Material Estimate for Refurbishment/ Augmentation of Old 33KV Line:

S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	Supports 11 Mtr long 150x150mm RS Joist Pole	EA	378	29192	11034584
	PART -A				11034584
1	33 KV V cross arm (22kG),GI	EA	378	2124	802872
2	GI Back Clamp for V Cross arm (33KV)	EA	378	177	66906
3	33 KV pin Insulator polymer	EA	1134	566	642298
4	33 KV F clamp	EA	378	354	133812
5	G.I Nuts,bolts, &washer	KG	945	92	86978
6	Concreting of pole	EA	378	2576	973705
7	PG Clamp for 232 sq.mm Conductor	EA	600	1357	814200
8	PG Clamp for 148 sq.mm Conductor	EA	156	732	114130
9	PG Clamp for 100 sq.mm Conductor	EA	0	684	0
9	coil Earthing	EA	378	196	74043
10	Sundries(Danger board, paint, Ant climbing Device	EA	378	1770	669060
11	H.T stay set Complete	EA	378	1239	468342
12	H.T stay Insulator	EA	378	59	22302

Capex plan for FY 22-23

S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
13	HT Stay Clamp	EA	378	148	55755
14	No.8G.I.wire for earthing	Kg.	1134	89	100359
15	7/8SWG G.I stay wire	KG	5670	89	501795
16	Disc Insulator (B&S) 120 KN Polymer	EA	756	1699	1284595
17	33KV Single tension HW Fittings B&S Type for 232 mm sq. AAAC 4 bolted (120 KN)	EA	756	1982	1498694
	PART B				8309846
1	232mmsq AAA Conductor	KM	154.5	184670	28531515
2	148mmsq AAA Conductor	KM	40.17	96760	3886849
3	100 mmsq AAA conductor	KM	0	64900	0
	Part C				32418364
	Sub Total D=Part B+Part C				40728210
	Sub Total E=Part A+Part D				51762793
	Stock Storage & Insurance@3 %of E=I				1552884
	Sub Total J=I+E				53315677
	T&P2% of J				1066314
	<u>Contingency 3% of J</u>				1599470
	Transportation 7.5% of J				4718437
	Erection Charges 10%ofD+GSTon erection Charge				4805929
	Erection Charges 5%ofA+GSTon erection Charge				651040
	Sub Total = K				66156868
	Labour Cost for Dismantling of Old Conductor	KM	189	8215	1552665
	Subtotal=L				67709533
	Overhead Charges (Including Supervision Charge)6% of K=M				4062572
	Sub Total L+M=N				71772105
	Labour cess 1%of N				717721
	Grand Total				72489826
	Inspection Fees	LS	63	1200	75600
	Approval Of Drawing	LS	63	600	37800
	Escalation for FY23 @10%				7248983
	Total Cost for Capex Proposal (Rounded)				79852208

Capex plan for FY 22-23

Cost & Material Estimate for Installation of 11KV AB Switch (400/200 Amp):

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	11 KV AB SWITCH-400 AMP	No	300	13983	4194900
1	11KV AB SWITCH-200Amp	No	50	8673	433650
2	Isolator Mounting Channel 75x40x6mm. 2.8mtr.Long 2Nos. (6.8kg./mtr.)	Kg.	13328	91	1206264
3	75x40x6 mm Channel 1.5 mtr. Long 1 No. (6.8 kg/mtr) for supporting of Isolator. Handle.	Kg.	3570	91	323106
4	Earthing of support (Coil Type)	No	350	196	68558
5	G.I.Bolts, Nuts & Washers.	Kg	700	109	76025
6	Total cost for 11KV Isolator-400Amp				6302503
7	Stock, Storage & Insurance (@3% of A)		3%		189075
8	Sub-Total (A)+Stock/Storage=B				6491579
9	T&P (@2% of B)		2%		129832
10	Contingency (@3% of B)		3%		194747
11	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		574505
12	Erection Charges (@ 5% of B)+ GST on erection cost		5%		383003
13	Sub Total of Part-B =D				7773665
14	Over Head Charges (Supervision Charges) @ 6% of K		6%		466420
15	Sub Total L				8240085
17	Labour Cess 1 % of L		1%		82401
	INSPECTION FEES				0
	Escalation for FY23 @10%				824009
	TOTAL COST FOR CAPEX WORK				9146495

Cost & Material Estimate for Installation of 33KV AB Switch (400/200 Amp):

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	33 KV AB SWITCH-400 AMP		40	22503	900104
1	33KV AB SWITCH-200Amp	No	40	17818	712720

Capex plan for FY 22-23

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
2	Isolator Mounting Channel 75x40x6mm. 2.8mtr.Long 4Nos.(6.8kg./mtr.)	Kg.	3046	91	275717
3	75x40x6 mm Channel 1.5 mtr. Long 1 No. (6.8 kg/mtr) for supporting of Isolator. Handle.	Kg.	816	91	73853
4	Earthing of support (Coil Type)	No	80	196	15670
5	G.I.Bolts, Nuts & Washers.	Kg	160	109	17377
6	Total cost for 11KV Isolator-400Amp				1995442
7	Stock, Storage & Insurance (@3% of A)		3%		59863
8	Sub-Total (A)+Stock/Storage=B				2055305
9	T&P (@2% of B)		2%		41106
10	Contingency (@3% of B)		3%		61659
11	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		181895
12	Erection Charges (@ 5% of B)+ GST on erection cost		5%		121263
13	Sub Total of Part-B =D				2461228
14	Over Head Charges (Supervision Charges) @ 6% of K		6%		147674
15	Sub Total L				2608902
17	Labour Cess 1 % of L		1%		26089
	INSPECTION FEES				0
	Escalation for FY23 @10%				260890
	TOTAL COST FOR CAPEX WORK				2895881

Cost & Material Estimate for Installation of 33KV & 11KV Isolator (800 Amp):

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	33 KV ISOLATOR-800 AMP		100	86730	8673000
1	11KV Isolator-800Amp	No	100	51023	5102320
2	Isolator Mounting Channel 75x40x6mm. 2.8mtr.Long 4Nos. (6.8kg./mtr.)	Kg.	7616	91	689294
3	75x40x6 mm Channel 1.5 mtr. Long 1 No. (6.8 kg/mtr) for supporting of Isolator. Handle.	Kg.	2040	91	184632
4	Earthing of support (Coil Type)	No	200	196	39176
5	G.I.Bolts, Nuts & Washers.	Kg	400	109	43443
6	Total cost for 11KV Isolator-400Amp				14731865

Capex plan for FY 22-23

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
7	Stock, Storage & Insurance (@3% of A)		3%		441956
8	Sub-Total (A)+Stock/Storage=B				15173821
9	T&P (@2% of B)		2%		303476
10	Contingency (@3% of B)		3%		455215
11	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		1342883
12	Erection Charges (@ 5% of B)+ GST on erection cost		5%		895255
13	Sub Total of Part-B =D				18170650
14	Over Head Charges (Supervision Charges) @ 6% of K		6%		1090239
15	Sub Total L				19260889
17	Labour Cess 1 % of L		1%		192609
	INSPECTION FEES				0
	Escalation for FY23 @10%				1926089
	TOTAL COST FOR CAPEX WORK				21379587

Cost & Material Estimate for Installation of 33KV & 11KV Isolator (400 Amp):

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	33 KV ISOLATOR-400 AMP		100	70859	7085900
1	11KV Isolator-400Amp	No	100	36120	3611980
2	Isolator Mounting Channel 75x40x6mm. 2.8mtr.Long 4Nos. (6.8kg./mtr.)	Kg.	7616	91	689294
3	75x40x6 mm Channel 1.5 mtr. Long 1 No. (6.8 kg/mtr) for supporting of Isolator. Handle.	Kg.	2040	91	184632
4	Earthing of support (Coil Type)	No	200	196	39176
5	G.I.Bolts, Nuts & Washers.	Kg	400	109	43443
6	Total cost for 11KV Isolator-400Amp				11654425
7	Stock, Storage & Insurance (@3% of A)		3%		349633
8	Sub-Total (A)+Stock/Storage=B				12004058
9	T&P (@2% of B)		2%		240081
10	Contingency (@3% of B)		3%		360122
11	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		1062359
12	Erection Charges (@ 5% of B)+ GST on erection cost		5%		708239

Capex plan for FY 22-23

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
13	Sub Total of Part-B =D				14374859
14	Over Head Charges (Supervision Charges) @ 6% of K		6%		862492
15	Sub Total L				15237350
17	Labour Cess 1 % of L		1%		152374
	INSPECTION FEES		0		0
	Escalation for FY23 @10%				1523735
	TOTAL COST FOR CAPEX WORK				16913459

Cost & Material Estimate for Installation of 33KV & 11KV Auto-recloser with 3 set of Sectionaliser:

Sl. No	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
	33 KV Auto Reclosure, 3ph Pole mounted.	No	7	1133779	7936456
1	11KV Auto Reclosure, 3ph Pole mounted.	No	35	566884	19840933
	33 KV Sectionaliser, 3ph Pole mounted.	No	21	956779	20092367
	11KV Sectionaliser, 3ph Pole mounted.	No	105	448884	47132799
2	LA 9KV 5KA FOR 11KV POLYMERIC	Set	420	1180	495600
	Lightning Arrester(30KV, 10KA) (Station Class 'class- 1)	No	84	9145	768180
3	Channel 75x40x6mm. 2.8mtr.Long 4Nos. (6.8kg./mtr.)	Kg.	6397.4	91	579007
4	Channel 1.5 mtr. Long 2 No.(6.8 kg/mtr)	Kg.	3427.2	91	310182
5	Earthing of support (Coil Type)	No	168	196	32908
6	G.I.Bolts, Nuts & Washers.	Kg	336	109	36492
7	Sundries (Paint, danger Board, Clamp, Connectors, Ant climbing device, Binding Tape, etc.)	L.S	168	236	39648
8	Total cost for Auto Reclosure & Sectionaliser.				97264572
9	Stock, Storage & Insurance (@3% of A)		3%		2917937
10	Sub-Total (A)+Stock/Storage=B				100182509
11	T&P (@2% of B)		2%		2003650
12	Contingency (@3% of B)		3%		3005475
13	Transportation (@ 7.5% of B)+ GST on transportation cost		7.5%		8866152

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Sl. No	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
14	Erection Charges (@ 5% of B)+ GST on erection cost		5%		5910768
15	Sub Total of Part-B =D				119968555
16	Over Head Charges (Supervision Charges) @ 6% of K		6%		7198113
17	Sub Total L				127166668
18	Labour Cess 1 % of L		1%		1271667
	INSPECTION FEES		42		50400
	Escalation for FY23 @10%				12716667
	TOTAL COST FOR CAPEX WORK				141205401

Capex plan for FY 22-23

Annexure- 10 DPR for Replacement/ Addition of Network component in distribution substation

Cost Summary:

Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr
Reliability	iii) Replacement/Addition of network component in Distribution Substation.	Transformer foundation	1.1
		Refurbishment of 250 & 315 KVA DSS along with LT Protection	8
		Installation of New DD Fuse Unit/LA/Hanging Feeder Pillar at DSS	4
		Mobile Transformer/DTR for Emergency restoration for Hospital/ Collector Office during Cyclone/ Kal Baisakhi	1.5

Capex plan for FY 22-23

Annexure- 11 DPR for Network enhancement/ unforeseen emergency

Cost Summary:

S.No	Major Category	Activity	Works to be covered	Proposed Capex Rs. Cr
4	Load Growth	Network enhancement / Unforeseen emergency.	Construction of 33 KV New/Link Line	35
			construction of new 11 kv agricultural feeder	15
			Construction of 11KV New/ Link Line	35
			Construction of new PSS along with line in urban area (Total Rs.75 Cr for 2 years)	45
			Addition/Augmentation of PTR	15
			Addition/Augmentation of DTR 63 KVA and above	15
			Addition /Augmentation of 1 ph. &3 Ph. DTR of 16 KVA and 25 KVA in Rural/ Agriculture Area	8
			Addition of New LT ABC Network	6
			Addition of New 11KV/ 33 KV Bay	2

Cost & Material Estimate for 33KV New Line:

S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	Supports 11 Mtr long 150x150mm RS Joist Pole	EA	3173	29192	92626279
	PART -A				92626279
1	33 KV V cross arm (22kG),GI	EA	2505	2124	5320620
2	Top Channel 100X50X6mm. 2x2.5x3 = 18mtr. (9.2Kg./mtr.)	Kg.	13827.60	77	1060577
3	Double Pole Bracing Channel 100X50X6mm. 2x2.25X2= 10mtr (9.2 Kg/Mtr)	Kg.	13827.60	77	1060577
4	50x50x6mm.MS Bracing Angle 2x2x3 = 12mtr. (4.5Kg./mtr.)	Kg.	9018.00	85	766169
5	GI Back Clamp for V Cross arm (33KV)	EA	2505	177	443385
6	33 KV pin Insulator polymer	EA	9513	566	5388163

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S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
7	33 KV F clamp	EA	2505	354	886770
8	G.I Nuts,bolts, &washer	KG	2505	92	230560
9	Concreting of pole	EA	3173	2576	8173458
10	PG Clamp for 232 sq.mm Conductor	EA	2004	1357	2719428
11	PG Clamp for 148 sq.mm Conductor	EA	0	732	0
12	PG Clamp for 100 sq.mm Conductor	EA	0	684	0
13	coil Earthing	EA	3173	196	621527
14	No.8G.I.wire for earthing	Kg.	9519	89	842432
15	Sundries(Danger board, paint, Anti-climbing Device	LS	3173	1770	5616210
16	H.T stay set Complete	EA	1670	1239	2069130
17	H.T stay Insulator	EA	1670	59	98530
18	HT Stay Clamp	EA	1670	148	246325
19	7/8SWG G.I stay wire	KG	25050	89	2216925
20	Disc Insulator (B&S) 120 KN Polymer	EA	2004	1699	3405197
21	33KV Single tension HW Fittings B&S Type for 232 mm sq. AAAC 4 bolted (120 KN)	EA	2004	1982	3972730
	PART B				45138712
1	232mmsq AAAC conductor	KM	516.03	184670	95295260
2	148mmsq AAA Conductor	KM	0	96760	0
3	100 mmsq AAA conductor	KM	0	64900	0
	Part C				95295260
	Sub Total D=Part B+Part C				140433972
	Sub Total E=Part A+Part D				233060252
	Stock Storage & Insurance@3 %of E=I				6991808
	Sub Total J=I+E				240052059
	T&P2% of J				4801041
	Contingency 3% of J				7201562
	Transportation 7.5% of J				21244607
	Erection Charges 10%ofD+GSTon erection Charge				16571209
	Erection Charges 5%ofA+GSTon erection Charge				5464950
	Sub Total = K				295335429
	Guarding cost of 1 x-ing	EA	334	8215	2743863
	Subtotal=L				298079292
	Overhead Charges (Including Supervision Charge)6% of K=M				17884758
	Sub Total L+M=N				315964050

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S.No	Description Of materials	unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
	Labour cess 1%of N				3159640
	Grand Total				319123690
	INSPECTION FEES		167	1200	200400
	APPROVAL OF DRAWING		167	600	100200
	Escalation for FY23 @10%				31912369
	TOTAL COST FOR CAPEX WORK				351336659

Cost & Material Estimate for 11KV Agriculture Line:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	100 sqmm AAAC		324.45	64900	21056805
2	148mm ² AAAC	Km.	0.00	96760	0
3	Supports 11 Mtr long 150x150mm RS Joist Pole	EA	1995	29192	58238080
4	Top Channel 100X50X6mm. 2x2.5x3 = 18mtr. (9.2Kg./mtr.)	Kg.	8694.00	77	666830
5	Double Pole Bracing Channel 100X50X6mm. 2x2.25X2= 10mtr (9.2 Kg/Mtr)	Kg.	8694.00	77	666830
6	50x50x6mm.MS Bracing Angle 2x2x3 = 12mtr. (4.5Kg./mtr.)	Kg.	5670.00	77	434889
7	11 KV V- Cross Arm (MS) (10.2 Kg each)	No.	1575	956	1505385
8	GI Back Clamp for V cross arm (11KV) (0.85 kg each)	No.	1575	94	148680
9	11 KV F Clamp 2.9 Kg. each	No.	1575	283	446040
10	11KV Disc Insulator (B & S) 90 KN polymer	No.	1260	1357	1709820
11	11KV H/W Fitting (B & S type) 90KN 3 bolted	No.	1260	414	521867
12	11KV Pin Insulator polymer	No.	5670	278	1578982
13	H.T.Stay set complete	No.	1050	1239	1300950
14	HT stay insulator TYPE-C	No.	1050	59	61950
15	HT stay Clamp (1.9Kg/pair)	Pair	1050	148	154875
16	7/10 SWG G I stay wire, Grade - 2	Kg.	14700	89	1300950
17	Earthing of support (Coil Type)	No.	5985	196	1172342

Capex plan for FY 22-23

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
18	Concreting of Stay (1 M x 0.5 M x 0.5 M)	No.	1050	1180	1239000
19	Cupping of pole (Including supply of materials (1 M x 0.5 M x 0.5 M)	No.	1995	2576	5139000
20	G.I. Nuts, bolt & Washer	Kg.	3150	92	289926
21	Sundries (Paint, danger Board, Clamp, Connectors, Ant climbing device, Binding Tape, etc.)	L.S.	1995	1770	3531150
22	Total Cost of material A				101164350
23	Stock, Storage & Insurance @ 3% of A=B		3%		3034931
24	Sub Total A+B=C				104199281
25	T&P @ 2% of C		2%		2083986
26	Contingency @ 3% of C		3%		3125978
27	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		7814946
28	Erection Charges for PSC Pole @ 20% +applicable taxes		20%		0
29	Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		3539128
30	Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		5217259
	Guarding Cost for 1 X-ing		210		1270710
31	Sub-total D				127251288
32	Over Head Charges @ 6% of D (Supervision Charges)=E		6%		7635077
33	Sub-Total D+E=F				134886365
34	Labour Cess @ 1% of F		1%		1348864
	Grand Total				136235228
	INSPECTION FEES		105		126000
	APPROVAL OF DRAWING		105		63000
	Escalation for FY23 @ 10%				13623523
	TOTAL COST FOR CAPEX WORK				150047751

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Cost & Material Estimate for 11KV New /Link Line:

Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
1	100 sqmm AAAC	km	154.5	64900	10027050
2	148mm ² AAAC	Km.	546.93	96760	52920947
3	Supports 11 Mtr long 150x150mm RS Joist Pole	EA	4313	29192	125905182
4	Top Channel 100X50X6mm. 2x2.5x3 = 18mtr. (9.2Kg./mtr.)	Kg.	18795.6 0	77	1441623
5	Double Pole Bracing Channel 100X50X6mm. 2x2.25X2= 10mtr (9.2 Kg/Mtr)	Kg.	18795.6 0	77	1441623
6	50x50x6mm.MS Bracing Angle 2x2x3 = 12mtr. (4.5Kg./mtr.)	Kg.	12258.0 0	77	940189
7	11 KV V- Cross Arm (MS) (10.2 Kg each)	No.	3405	956	3254499
8	GI Back Clamp for V cross arm (11KV) (0.85 kg each)	No.	3405	94	321432
9	11 KV F Clamp 2.9 Kg. each	No.	3405	283	964296
10	11KV Disc Insulator (B & S) 90 KN polymer	No.	2724	1357	3696468
11	11KV H/W Fitting (B & S type) 90KN 3 bolted	No.	2724	414	1128226
12	11KV Pin Insulator polymer	No.	12258	278	3413608
13	H.T.Stay set complete	No.	2270	1239	2812530
14	HT stay insulator TYPE-C	No.	2270	59	133930
15	HT stay Clamp (1.9Kg/pair)	Pair	2270	148	334825
16	7/10 SWG G I stay wire, Grade - 2	Kg.	31780	89	2812530
17	Earthing of support (Coil Type)	No.	12939	196	2534491
18	Concreting of Stay (1 M x 0.5 M x 0.5 M)	No.	2270	1180	2678600
19	Cupping of pole (Including supply of materials (1 M x0.5 Mx0.5 M)	No.	4313	2576	11110029
20	G.I. Nuts, bolt & Washer	Kg.	6810	92	626792
21	Sundries (Paint, danger Board, Clamp, Connectors, Ant climbing device, Binding Tape, etc.)	L.S.	4313	1770	7634010
22	Total Cost of material A				236132880
23	Stock, Storage & Insurance @ 3% of A=B		3%		7083986
24	Sub Total A+B=C				243216866

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Sl. No.	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount in Rupees including GST
25	T&P @ 2% of C		2%		4864337
26	Contingency @ 3% of C		3%		7296506
27	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		18241265
28	Erection Charges for PSC Pole @ 20% +applicable taxes		20%		0
29	Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		7651258
30	Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		13397074
	Guarding Cost for 1 X-ing		454		2747154
31	Sub-total D				297414461
32	Over Head Charges @ 6% of D (Supervision Charges)=E		6%		17844868
33	Sub-Total D+E=F				315259328
34	Labour Cess @ 1% of F		1%		3152593
	Grand Total				318411922
	INSPECTION FEES		227		272400
	APPROVAL OF DRAWING		227		136200
	Escalation for FY23 @10%				31841192
	TOTAL COST FOR CAPEX WORK				350661714

Cost & Material Estimate for LT New Line:

Sl. No	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount Rupees including GST
1	9 Mtr long 300 KG PSC Pole	Nos	1584	3540	5607360
2	Arial Bunch Conductor (ABC) with 3x95mm.sq. (for Phase)+1x70mm.sq. Catenary Neutral) +1x16mm.sq. (Street Light Phase) for 3-Phase 5-wire having overhead line.	Km.	31.5	286740	9032310
3	Arial Bunch Conductor (ABC) with 3x120mm.sq. (for Phase)+1x70mm.sq. Catenary Neutral) +1x16mm.sq. (Street Light Phase) for 3-Phase 5-wire having overhead line.	Km.	18.9	510197	9642716

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Sl. No	Description of materials	Unit	Qty.	Rate in Rupees including GST	Amount Rupees including GST
4	Pole Clamp for AB Cable	Pair	1584	236	373824
5	Dead end Clamp (For ABC)	Nos.	288	77	22090
6	Eye Hook for AB Cable	Nos.	1584	71	112147
7	Suspension Clamp	Nos.	1296	330	428198
8	Neutral Connector Type B	Nos.	1584	39	61681
9	LT Stay Set	Nos.	240	614	147264
10	7/12SWG Stay wire	Kg.	2160	89	191160
11	LT Stay Clamp (1.40 Kg./Pair)	Pair	240	130	31152
12	LT Stay Insulator	Nos.	240	35	8496
13	Earthing Coil	Nos.	1584	196	310274
14	No.8G.I.wire for earthing	Kg.	4752	89	420552
15	G.I. Nut & Bolts(Assorted size)	Kg.	480	92	44179
16	Piercing Connector Type A	Nos.	4752	94	448589
17	Service Connection Distribution box (8 way)	Nos.	1584	4720	7476480
18	Concreting of Stay	Nos.	240	1180	283200
19	Cupping of pole (Including supply of materials)	Nos.	1584	2576	4080289
20	Total Cost of material A				38721961
21	Stock, Storage & Insurance @ 3% of A=B		3%		1161659
22	Sub Total A+B=C				39883620
23	T&P @ 2% of C		2%		797672
24	Contingency @ 3% of C		3%		1196509
25	Transportation @ 7.5% of C+ GST on transportation cost		7.50%		3529700
26	Erection Charges for PSC Pole @ 20% +applicable taxes		20%		1363037
27	Erection Charges for Joist Pole @ 5%+ applicable taxes		5%		
28	Erection Charges @ 10% of other materials except Pole+applicable taxes		10%		4024749
29	Sub-total D				50795287
30	Over Head Charges @ 6% of D (Supervision Charges)=E		6%		3047717
31	Sub-Total D+E=F				53843004
32	Labour Cess @ 1% of F		1%		538430
	Grand Total				54381434
	INSPECTION FEES				0
	APPROVAL OF DRAWING	48	600		28800
	Escalation for FY23 @10%				5438143
	TOTAL COST FOR CAPEX WORK				59848377

Annexure- 12 DPR for Infrastructure to meet Customer needs

Cost Estimate for Call Centre and Commercial Back Office

Type of Cost	Components	Unit	Rate (Rs Lacs)	Total Expenses in Rs Lacs
Civil/Admin for Call centre	AC with Stabilizer (12 CCC. 4 units per CCC)	48	0.6	28.80
	Workstation (5 per CCC)	60	0.25	15.00
	Partioning & Electrical Parts			25.00
	Chairs	60	0.07	4.20
	Water Cooler + RO System	12	0.25	3.00
	TV	12	0.5	6.00
	Racks for storage	36	1	36.00
	Painting, TPWODL Boards, Banners	12	1	12.00
	Consumers sitting (Sofas)	24	0.5	12.00
	Xerox M/C	12	1	12.00
Commercial Back Office	AC with Stabilizer	16	0.6	9.60
	Workstation	50	0.25	12.50
	Chairs	50	0.07	3.50
	Water Cooler + RO System	4	0.25	1.00
	Racks for storage	20	1	20.00
	TPWODL Boards & banners	12	1	12.00
	Xerox M/C	4	1	4.00
	DG sets	1	15	15.00
	Conference Room (TV Set)	1	2	2.00
Conference Room (TV Set)	25	0.07	1.75	
Cost of Call Centre & CRCs				235.35
GST				42.36
Total Cost of Call Centre & CRCs				277.71

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Annexure- 13 DPR for Technology Intervention-IT & Technology

TPWODL is going to implement the private datacenter collaborating with public cloud to facilitated centralized shared IT operations and equipment for the purposes of storing, processing, disseminating data and applications without compromising the IT Securities. The three main properties of an information system that are important to ensure information security are confidentiality, availability and integrity.

Existing workgroup unmanaged endpoint devices needs to be centralized managed for building a robust and reliable communication system founded to support business applications like IT, Operations, Commercial and Customer care services etc. To enable employees to work on automated systems, front-end computing devices (Laptop and Desktop along with UPS) would be required for the employees. All these locations will be equipped with PCs, Printers, Scanners, etc.

A robust, reliable, high availability with stabilized end-to-end secure communication system will be implemented to achieve mission critical IT & OT applications, data traffic between Grids, Offices, Data Centre, private / public network etc.

Due to the rising demand of information trading in large amounts of data with availability of round the clock, scalable infrastructure will be implemented with load balancing and high availability. To enable employees to work on automated systems, various type of servers and storage would be required for running the applications.

Day by day, technologies are getting advanced and business applications (like Metering, Billing and Collection,) are demanding centralized systems with few clicks in a single window.

To achieve the above business requirement and implementing the technologies with value added applications in addition to current ongoing projects Rs. 61.61 Cr is proposed in FY 22-23 and details under various category is mentioned in the table below:

Sl. No.	Budget Header	Cost (in Cr)
1	Data Centre at Sambalpur	1.59
2	Front end devices and end user licenses	16.31
3	DC Hardware	17.26
4	DC Software and Licenses (ERP, MBC, OS, DB etc.)	8
5	Locational Network	16.21
6	Optical Fiber Cabling	2.24
TOTAL (With 18% GST)		61.61

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Annexure- 14 DPR for Technology Intervention- GIS, SCADA & Others Implementation.

Operation Technology:

In order to improve the reliability and reduce the losses and to improve the overall performance, effective implementation of technologies is required. TPWODL is in the midst of technology transformation to provide quality customer services and to deliver highly reliable and improved quality supply in safe manner to its consumers by meeting various standards of operation. To bring the various latest technology, systematic investment is planned by TPWODL as given below in Operation Technology

Total OT Capital Expenditure FY 22-23

Sr. No	Automation	GIS	Communication
1	23.88 Cr	21.45 Cr	18.65 Cr
Total - 63.98 Cr			

1.0 Automation:

- Implementation of ADMS at Centralized Control center- MCC/BCC
- Conventional PSS Automation
- Fire Alarm System
- WTI and OTI for Power Transformers

SCADA/ADMS System:

TPWODL is planning to implement the SCADA/ADMS project for which order already has been placed and Rs. 15 Cr of capex commitment is expected in FY21-22. Implementation of ADMS will be done in a phased manner once SCADA is completed.

ODSSP PSS are already equipped with automation devices (Communicable Relays, MFTs and RTUs). To integrate the ODSSP PSS with 100% data validation we have installed and commissioned Microscada at PSCC. Once SCADA/ADMS is commissioned, data will be migrated from Microscada to new SCADA system with advanced features. We have targeted to complete 100 ODSSP PSS in FY21-22.

Conventional PSS Automation:

Total 315 Nos. of 33/11 substations automation is planned in TPWODL areas out of which 142 no. of substations are developed/being developed under ODSSP scheme which will be integrated with SCADA in a phased manner. However, conventional PSS shall be retrofitted

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or revamped to make SCADA compatible in FY 22-23. In order to operate and monitor those substations through SCADA, detailed technical study of substation were carried out based on that we have identified 55 Nos of high revenue PSS to automate and 118 Nos of Rural PSS category to automate.

We have envisaged two types of approach to provide reliable, affordable and cost-effective solution for monitoring and control of all these sub stations from a centralized control centre.

In addition, 33/11KV Rural PSS will be developed based on cost effective innovative approach wherein existing electrical infrastructure will be utilized for model development of Grid substation automation system in rural area across TPWODL/Odisha state.

Detailed phase wise plan is given below

S No	Phase	Stations/Major work Description	Total Number of Sub-Station Covered
1	Phase-1, FY 21-22	a) 100 no's of ODSSP S/Stn integration	100
2	Phase -2, FY 22-23	a) 42 no's of ODSSP S/Stn integration b) 35 nos. of High Revenue PSS c) 50 Nos of Rural PSS	127
3	Phase-3, FY 23-24 (incl. proposed PSS for which will be charged in FY22)	a) 20 no's of High Revenue PSS b) 68 no's of Rural PSS	88
	Total Nos. of Sub-Station Covered *In phase-4, contingency of work consider spill over from phase-2 or 3 in case of unavoidable circumstances		315

Fire Alarm System:

One of the most important safety factor for any PSS Substation is protection against fire. An elaborate system of fire protection shall be provided to fight as well as reduce any occurrence of fire within the Substation area. Currently all 33/11KV PSS do not have adequate fire protection and alarm system, fire detection is most important in substations, due to its

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dangerous nature. Traditional approach to monitor the system manually on daily basis, but with the latest technology in place it is recommended to go for preventive approach where in real time status of the system will be available centrally for monitoring.

To provide a proper fire detection and alarm system, it is proposed to implement the new system with integration to SCADA to report the status immediately to central control room.

WTI and OTI for Transformers:

Oil and winding temperature are critical parameters that are measured in power and distribution transformers. Reliable and accurate temperature measurement ensures a longer life for your transformer and is crucial to maintaining the overall health of the asset.

TPWODL is planned to utilize oil and winding temperature indicators to provide alarm and control signals and integration of same will be done with SCADA system. Maintaining proper cooling controls can also extend the lifetime of the transformer past the typical life expectancy. Implementation is planned in phased manner, in FY22-23; we have considered 308 Nos of transformers.

Sr. No	Item Details	Rs Cr
1	Implementation of ADMS System	4
2	Automation of High Revenue PSS (30 Nos)	4.9
3	Automation of Rural PSS (50 Nos)	6
4	Fire Detection and Alarm system	7
5	WTI and OTI for Transformers	1.98
Total		23.88

2.0 Communication Technology

Benefits:

- Communication Technology Guarantee the end user, the uninterrupted power supply by reducing the faults.
- Timely Fault rectification by knowing about fault at real time.
- Communications technology is crucial for the integration of renewables because data can help in optimizing operational and capital expenditures

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- Upgrade distribution infrastructure to improve power quality and cope with the integration of IP based devices in the grids and PSS,
- Increase billing efficiency via digital intervention (Smart Metering)
- Improve asset (Transformers etc.) health for predictive maintenance.

Objectives:

- Setting up MPLS backbone throughout Western Odisha comprising of approximately 625 site locations (IT Network & OT Network).
- Band Optimization by virtue of execution of Passive Network.
- CCTV Installation at high revenue PSS.
- MPLS Backbone is Robust and provides company a robust and dependable backbone.

Communication Backbone MPLS

MPLS extends company's local area network (or LAN) without using the public internet, and as a result provides company with its own private connection. MPLS networking efficiently delivers applications across multiple locations. Hence, safety, security, reliability and speed of operation are greatly increased.

IT Network

This type of Network comprises of all office locations like Circle Offices, Division Offices, Sub Division Offices, Section Offices, MRT Offices, Stores, Customer Care, Collection Counters, and GRF etc. In this type of network, huge bandwidth is required based on number of users availing service in that particular office. There are approximately 317 No of locations under IT Network.

OT Network

This type of Network comprises of all Sub Stations where network should have low latency and low jitters as remote operations and monitoring of substations using the network will be done from central control centres located at Burla. There are approximately 308 No of locations under IT Network.

Passive Network:

Based on the network survey that was executed by M/S Printlink we can reduce the total MPLS Links from approximately 625 Locations to 322 Locations however this count might vary to a small extent based on issues faced during execution phase like geographic difficulties, non-availability of permission to lay UG/OH cables, access issues, critical road

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crossing, railway crossings, river, Nullah, Canals etc.

Close Circuit Camera:

We emphasize to install 1 No 360° High Resolution CCTV Camera with night vision and motion sensors in Each Substation for seamless monitoring of the Substations from a single point.

In first phase, we envisage to cover 150 locations. This will be beneficial to ease the operation and maintenance of PSS and will provide additional benefits as follows:

- Keep a Check upon internal and external theft.
- Crime prevention
- Evidence collection
- Staff security
- Private and sensitive area surveillance
- Substantially reduce Turn-Around-Time (TAT).

NETWORK MONITORING AND FAULT RECTIFICATION TEAM:

THIS TEAM WILL COMPRISE OF 4+1 SET OF NETWORK MONITORING ENGINEERS. Will be responsible for near 100 % up time for every node and will raise an alarm with Airtel if any service goes down. Also, the responsibility of the team will be to generate the down time register and the same will be helpful for us to ask ISP to improve their services.

As and when site or services go down, the team will reach the location and will fix the problem at first level, i.e. SFP cleaning, Patch chords cleaning etc.

The team will be provided a dedicated 24X7 vehicle.

Note:

1. *Only Equipment cost like LSPM and OTDR are being taken for consideration under CAPEX-Head. The Service costs for maintaining the Network will be covered in OPEX.*
2. *Soft faults like patch chord changes and SFP changes, cleaning of patch chords by isopropyl Alcohol or loose connections will be addressed by Shift team at NMS.*
3. *Severe faults like cable cut etc. will be addressed by on call BA team.*

Battery Backup for AC Supply Failure and AC to DC converter (SMPS):

Backup power systems are employed because the loss of power may result in a significant reduction in productivity. In case of power failure, the PSS may go offline and to avert this we need power backup.

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Communication CAPEX Plan

Sr. No	Item Details	Rs Cr
1	Passive Network Execution	7.15
2	Network Equipment for Substations A+B	7
2.1	In first Phase Nearly 150 locations shall be covered in FY-22-23 (A)	3.5*
2.2	In first Phase Nearly 160 locations shall be covered in FY-23-24 (B)	3.5*
3	CCTV Camera	4.5
4	Battery Bank along with SMPS for Backup of AC Power Supply	2.53
Total		21.18

3.0 GIS

To implement enterprise GIS in TPWODL area, four years plan is in place.

Capital Expenditure Plan – FY 22-23 [21.45 Cr]

- Pay out of Installation & Commissioning rest amount (5 % of line-item value) of development environment
- Purchase of High-end systems, printer & plotter for QC and survey purpose for other than pilot area.
- Supply, Installation & Commissioning of Production environment with network & storage components.
- Purchase of High-resolution image for digitization of rest Division of Rourkela circle and Bargarh Circle.
- Consumer indexing & base map creation of rest Division of Rourkela circle and Bargarh Circle.
- Asset Sequence generation and painting for rest Rourkela circle and Bargarh Circle.
- Purchase of Analysis and Map publishing tool.

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Capital Expenditure FY 21-22 to FY 26-27

Sl. No.	Description	LOI Value	FY 21-22 Amount (Rourkela)	FY 22-23 Amount (Bargarh & Rourkela)	FY 23-24 Amount (Sambalpur & Bolangir)	FY 24-25 Amount (Bhawanipatna)	FY 25-26 Amount	FY 26-27 Amount	Total
1	Software Licenses	₹ 2,85,02,921.00	₹ 2,85,02,921.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 2,85,02,921.00
2	Installation, Commissioning of GIS System and other work as per scope of work	₹ 3,71,63,652.00	₹ 3,34,47,286.80	₹ 18,58,182.60	₹ 18,58,182.60	₹ 0.00	₹ 0.00	₹ 0.00	₹ 3,71,63,652.00
3	Network Component for Development	₹ 80,00,000.00	₹ 80,00,000.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 80,00,000.00
4	Highend PC,Printer,Plotter,& Mobile Devices	₹ 42,00,000.00	₹ 21,00,000.00	₹ 21,00,000.00	₹ 0.00	₹ 0.00	₹ 6,00,000.00	₹ 6,00,000.00	₹ 54,00,000.00
5	Production HW		₹ 25,00,000.00	₹ 25,00,000.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 50,00,000.00
6	Network Component for production		₹ 0.00	₹ 20,00,000.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 20,00,000.00
7	Image procurement (As per Annexure-6: Imagery requirement and considerations)	₹ 17,70,000.00	₹ 17,70,000.00	₹ 88,50,000.00	₹ 1,41,60,000.00	₹ 53,10,000.00	₹ 0.00	₹ 0.00	₹ 3,00,90,000.00
8	Base Map creation, Data survey, digitization, QC for pilot area (As per Annexure-6)	₹ 3,18,12,067.00	₹ 2,22,68,446.90	₹ 16,86,03,955.10	₹ 25,44,96,536.00	₹ 9,54,36,201.00	₹ 0.00	₹ 0.00	₹ 54,08,05,139.00
9	Asset Sequence generation and painting	₹ 47,59,779.00	₹ 9,51,955.80	₹ 2,76,06,718.20	₹ 3,80,78,232.00	₹ 1,42,79,337.00	₹ 0.00	₹ 0.00	₹ 8,09,16,243.00
10	Auto Cad Licsnse for 1 year & SLD digitization		₹ 10,76,160.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 10,76,160.00
11	Analysis and Map publishing tool		₹ 0.00	₹ 10,00,000.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 10,00,000.00
12	Staggered license (lot of 5 for Data editing and lot of 50 for concurrent web user) (Optional)	₹ 72,47,769.00	₹ 0.00	₹ 0.00	₹ 72,47,769.00	₹ 0.00	₹ 0.00	₹ 0.00	₹ 72,47,769.00
TOTAL			₹ 10,06,16,770.50	₹ 21,45,18,855.90	₹ 31,58,40,719.60	₹ 11,50,25,538.00	₹ 6,00,000.00	₹ 6,00,000.00	₹ 74,72,01,884.00

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Annexure-15 DPR for Improvement of Civil & Store Infrastructure and Ready to use assets for offices

Estimate for Security system in Central stores

S.No	Particulars	Unit	Estimated Cost per Unit (Rs.)	No of Location	Estimated Value (Rs Lacs)
1	High Mast	NO	416666.67	5.00	20.83
2	Fire Extinguisher	LOT	625000.00	4.00	25.00
3	CCTV	NO	1333333.33	2.00	26.67
4	Watch Tower	NO	400000.00	4.00	16.00
	Total (Rs Lacs)				88.50
	Add GST @ 18%				15.93
	Grand Total (Rs Lacs)				104.43

Details of new Building and repair of existing offices.

Building Construction- Head	Qty
Commercial office	1
Division office	2
SDO office - new	6
SDO office -Repair	20
Section office- new	20
Section office-repair	30
New Customer care centre	10
other offices/building	LS
New Store Building	1
Sub store	2

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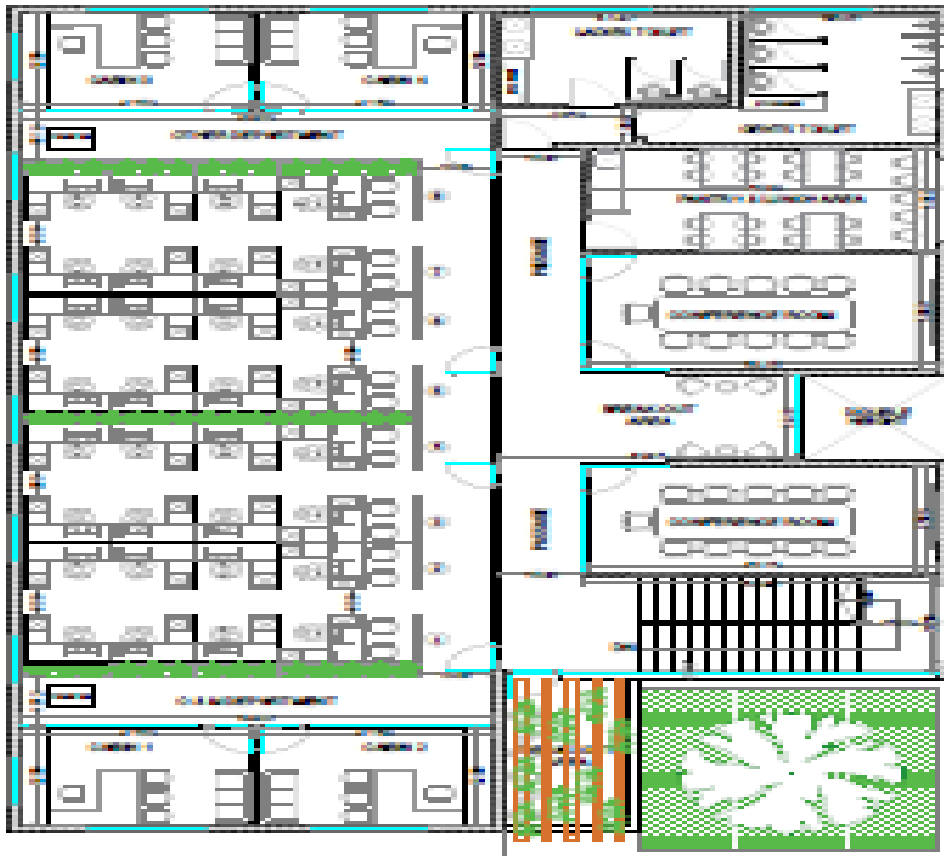
Plan for Office infrastructure:

1. Plan for Jharsuguda sub-division office.



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2. Plan for Burla Section office



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PRAYER:

Pursuant to the direction of Honb'le Commission vide suomotu proceeding in case no 82/2020 dated 28.12.2020, para 39, TPWODL is hereby submitting the CAPEX Plan FY22-23 and prayed as follows to:

1. Admit the CAPEX Plan for FY 2022-23.
2. Approve the CAPEX plan to the extent of Rs.582.18 Crs excluding IDC and employee cost capitalization.
3. It is submitted that these expenses are estimated based on comprehensive field visit by the team across the utility area and may vary on actual.
4. Grant any other relief as deemed fit & proper in the facts and circumstances of this submission.

For & on behalf of TPWODL
GM (RA & Strategy)