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PUBLIC NOTICE

DATED: 17.07.2020

Tata Power Central Odisha Distribution Ltd. (TPCODL) (Distribution Licensee) which is a joint venture of Tata Power and Odisha Government has filed an application before this Commission for approval of Detailed Project Report (DPR) for its CAPEX Plan for FY 2020-21 as per order dated 26.05.2020 of OERC in Case No. 11/2020. The Commission has registered it as Case No. 32/2020. The Commission has decided to dispose of this case through a public hearing on 05.08.2020 at 11.00 AM. This project report is available in OERC website (www.orierc.org) and TPCODL website www.tpcentralodisha.com. Interested persons can file their objections / suggestions to this DPR by 04.08.2020 through e-mail (orierc@gmail.com) or through person/post at OERC office. The persons who are interested to participate in the public hearing through video conferencing should also indicate their e-mail address to the Commission at OERC e-mail (orierc@gmail.com) by 04.08.2020 positively.

Sd/-

SECRETARY

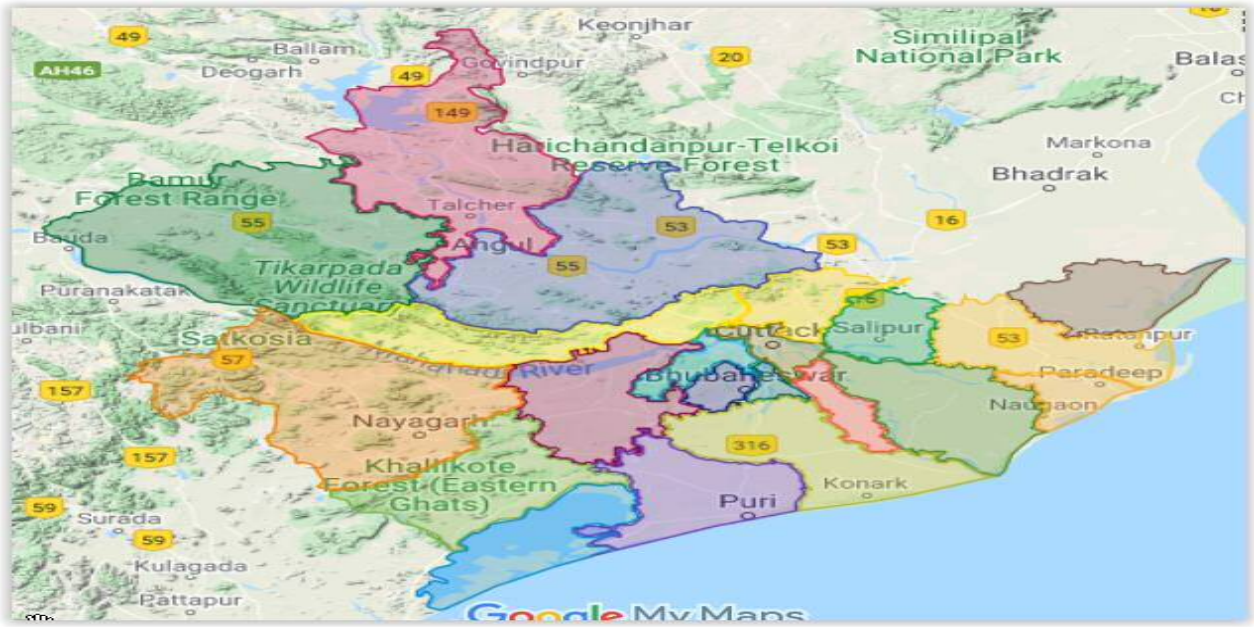
Detailed Project Report (DPR)

For

Capex Plan- FY 2020-21

Submitted By

TP Central Odisha Distribution Ltd



CONTENT

Executive Summary

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

TPCODL license area is spread over a geography of 29354 Sq.Km and serve the registered consumer base of 2.6 million. TPCODL 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 TPCODL. It receives electrical power at a sub transmission voltage of 33KV from **O**disha **P**ower **T**ransmission **C**ompany **L**imited'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 20 Divisions and 65 Sub-division which manages the commercial and O&M activities in order to serve its consumer.

In FY 19 – 20, against the total input energy of 8160 MU, billed energy was 6271 MU resulting into billing efficiency of around 77%. Out of this 6271 MU billed energy, Approximately, 43% (23% Rural, 20% Urban) of the energy billed in a particular year is supplied to Domestic Consumers with Commercial and Industrial Consumers contributing to 18% and 26% of the total billing (in terms of units) respectively. Balance 12% energy is billed to Railways/Public Street Lighting/Public Water Work/Irrigation and Agriculture etc. In terms of Revenues, Domestic Consumers contribute to around 30% with Commercial.

Overall input has reduced by 7% in FY 19-20 vis a vis FY 18-19. On analysis, it is discovered that maximum reduction in billed MU is of EHT customer as it has reduced by 16% from 1245.71 MU in FY 18-19 to 1038.27 MU in FY 19-20.

During the initial understanding, it is observed that the inherited power distribution network is not compliant to requisite statutory standards at most of the places and is in a dilapidated state. Distribution lines are lengthy and most of the feeders are of radial nature. Even some of the span have underrated / 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 bad condition. In Primary Substations some Faulty equipment exists which are either bypassed or removed and supply is being managed without proper switching devices resulting into escalation of faults / tripping to upstream devices thereby impacting the large consumer base. In Distribution Substations the Air Break Switch, DD Fuse units, LV Protection devices are bypassed at most of the locations. Apart from this, earthing system in primary Substation, Distribution Substation and Lines is in deteriorated condition. Fuse arrangements installed at Distribution Substations are installed at low height and exposed thereby creating a potential safety hazard for kids and animals roaming in the vicinity of the substation and employees who would go there for attending to NCC.

33/11 kV Primary Substation's (GSS) boundary walls are broken and there is no fencing of the outdoor switch yards. This makes the GSS unsafe for stray animals and any unauthorized entry. Apart from this, earthing system is in a very bad condition; many breakers and CTs are bypassed. This puts the basic protection system at bay which does not clear the fault in case of any accident takes place downstream resulting in increased casualty.

One of the burning problems observed is the presence of a large number of non-metered and defective meter cases resulting into under billing and poor billing efficiency.

Additionally, Meters installed at consumer premises are a mix of 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 checked.

The level of hygiene and sanitation at the work place and different offices is appalling. Office buildings are very old which may need strength through major civil works. Infrastructure of the offices need revamping and major civil works are to be addressed for ensuring conducive work environment for Employees and consumer visiting that office.

To address the above stated challenges and to safe guard the assets, public and animals from the accident and ensuring statutory compliant network, huge investment is required. Moreover, in order to improve the reliability and reduce the losses, major interventions like network reinforcement, Meter replacement, technology adoption is proposed in this plan so that equipment failure / tripping can be reduced; Reliability, billing & collection efficiency can be improved. Further Business process re-engineering is required to improve the customer services. Technology adoption is also required to provide quality customer services, manage revenue cycle processes for reduction of AT&C losses and efficiently manage to deliver reliable and quality supply in safe manner to its consumer by meeting various standards of operation.

With this objective of ensuring reliable power supply and ensuring best customer services to the end consumers, TPCODL has come up with capital investment plan in five major heads viz Statutory and Safety, Reliability, Loss reduction, Load Growth and Infrastructure and Technology and these heads are detailed in subsequent sections along with fund requirement and activities to be performed.

Given the condition of network; it would take **2600 Cr** worth of investment to ensure that entire network is compliant to statutory guidelines and 24X7 supply is available to each and every customer be it in City, Town or Rural area. However such a huge investment would adversely impact tariff and as such we have staggered investment in 8 years. With Capex investment of Rs. 344.44 Cr. planned for year 20-21; we shall start our journey on the path of becoming a benchmark utility in next 10 years.

TPCODL proposes Capital Expenditure of INR 344.44Cr. for FY 20 – 21 to carry out various activities under 5 major categories i.e.

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

Summary of Capex required in FY 20 -21 is as under:

S. No.	Major Category	Activity	DPR Cost (In Cr.)
1	Statutory & Safety	33KV Network refurbishment to ensure Horizontal / Vertical clearances	6.37
		PPEs, FFEs, Safety & Testing Equipment	9.48
		DSS Refurbishment for safety of Employees, Public and Animals	50.17
		Establishment of Meter Testing Lab	6.78
			72.80
2	Loss Reduction	Meter replacement against burnt / Faulty and Mechanical / No Meter	45.24
		Installation of DT meters for Energy Accounting	15.36
		Solution for Meter reading and Spot billing	3
		Optimize the Feeder length / load to reduce technical loss	9.67
			73.27
3	Reliability	110 Nos. GSS refurbishment for SCADA operationalization	26.43
		Installation of Auto reclosure / Sectionalizers, FPI & RMU	23.88
		Installation of LV protection at DSS	6.73
		Replacement of Battery & Battery Charger	2.26
		Installation of AB switches for improving Reliability	13.18
			72.48
4	Load Growth	Meter Installation for all new connection	24.43
		Network augmentation / addition to meet load growth	9
			33.43
5	Infrastructure	Infrastructure for Customer Care , Call Centre , Payment Centre and Section Offices	6.36
		IT & Technology for process efficiency & enhanced productivity.	67.77
		Implementation of 1st phase of GIS Roadmap	2
		Security system in Central Store	3.48
		Civil Upgradation	7.95
		Ready to Use assets for Offices	4.9
			92.46
Grand Total (A+B+C+D+E)			**344.44**

Note: All cost are inclusive of taxes and do not includes staff cost and IDC charges.

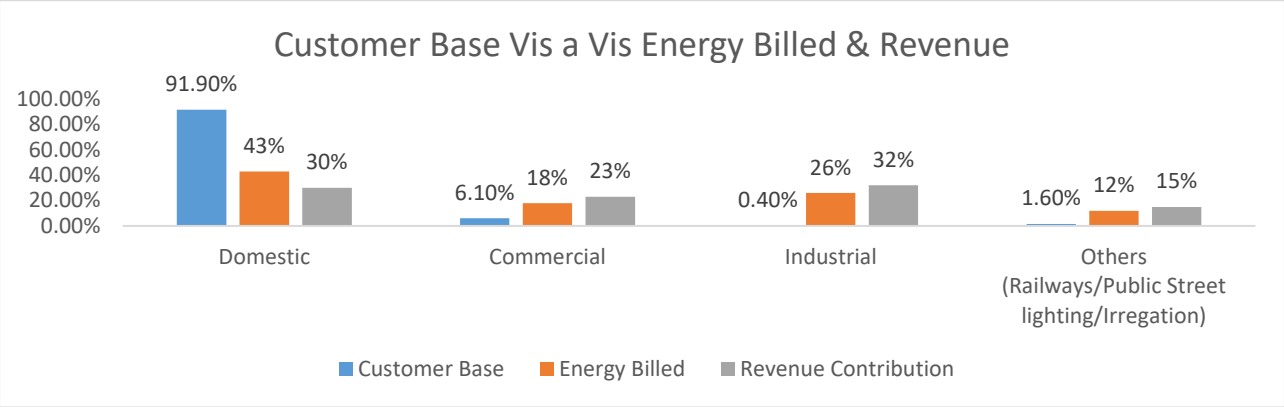
TPCODL- Profile

TPCODL, a Joint Venture of Tata Power Company Limited and Odisha Government, commenced its power distribution operations in central Odisha area from 1st June 2020. TPCODL is responsible for supplying power supply to 2.6 million customers comprising of industrial, commercial and residential customers. TPCODL operational area is spread across 29354 Square kM covering 9 Revenue Districts of Odisha State, namely: Cuttack, Puri, Dhenkanal, Angul, Khurda, Kendrapara, Nayagarh, Jagatsinghpur and part of Jajpur. For effective operations; the entire license area is split into 5 circles which is further divided into 20 Divisions, 65 Sub divisions and 251 Sections. Most of the commercial and O&M activities are managed by sub-divisions and Sections which are interface points for customers. Table 1 shows the Name of Circle, Division & Sub- Divisions.

Circle Name	Division Name	Sub-Division Name	
C-10 Electrical Circle - I ,Bhubaneswar	D-101 Bhubaneswar City Distribution Division- I (BCDDI)	SD-1011	SDO1
		SD-1012	SDO2
		SD-1013	SDO3
	D-102 Bhubaneswar City Distribution Division- II (BCDDII)	SD-1021	KHANDAGIRI
		SD-1022	NAYAPALLI
		SD-1023	PERIPHERY
	D-103 Bhubaneswar Electrical Division, Bhubaneswar (BED)	SD-1031	RASULGARH
		SD-1032	TEMPLE
	D-104 Nimapada Electrical Division, Nimapada (NED)	SD-1041	KAKATPUR
		SD-1042	NIMAPARA
		SD-1043	PIPILI
C-20 Electrical Circle - II ,Bhubaneswar	D-201 Khurda Electrical Division, Khurda (KHD)	SD-2011	BANKI
		SD-2012	BEGUNIA
		SD-2013	JANKIA
		SD-2014	JATNI
		SD-2015	KHURDA
	D-202 Puri Electrical Division, Puri (PED)	SD-2021	PURI-1
		SD-2022	PURI-2
		SD-2023	PURI-3
		SD-2024	SAKHIGOPAL
	D-203 Nayagarh Electrical Division, Nayagarh (NYD)	SD-2031	DASAPALLA
		SD-2032	ITAMATI
		SD-2033	KHANDAPARA
		SD-2034	NAYAGARH
	D-204	SD-2041	BALUGAON

Circle Name	Division Name	Sub-Division Name	
C-30 Electrical Circle, Cuttack	Balugaon Electrical Division, Balugaon(BAED)	SD-2042	TANGI
	D-301 Athagarh Electrical Division, Athagarh (AED)	SD-3011	ATHAGARH
		SD-3012	NARASINGHPUR
	D-302 City Distribution Division- I, Cuttack (CDDI)	SD-3021	SDO-1
		SD-3022	SDO-3
		SD-3023	SDO-4
		SD-3024	SDO-6
	D-303 City Distribution Division- II, Cuttack (CDDII)	SD-3031	BADAMBADI
		SD-3032	JOBRA
		SD-3033	MAHANADI VIHAR
	D-304 Cuttack Electrical Division, Cuttack (CED)	SD-3041	BADACHANA
		SD-3042	CHOUDWAR
		SD-3043	GOPALPUR
	D-305 Salipur Electrical Division, Salipur (SED)	SD-3051	MAHANGA
		SD-3052	NISCHINTA KOILI
		SD-3053	SALIPUR
C-40 Electrical Circle, Dhenkanal	D-401 Angul Electrical Division, Angul(ANED)	SD-4011	ANGUL
		SD-4012	BOINDA
		SD-4013	CHENDIPADA
	D-402 Dhenkanal Electrical Division, Dhenkanal (DED)	SD-4021	DHENKANAL
		SD-4022	GONDIA
		SD-4023	HINDOL ROAD
		SD-4024	KAMAKHYA NAGAR
	D-403 Talcher Electrical Division, Talcher (TED)	SD-4031	CHAINPAL
		SD-4032	PALLAHARA
		SD-4033	PARJANG
		SD-4034	TALCHER
C-50 Electrical Circle, Paradeep	D-501 Jagatsinghpur Electrical Division, Jagatsinghpur (JED)	SD-5011	BALIKUDA
		SD-5012	JAGATSINGPUR
		SD-5013	R N PUR
	D-502 Kendrapara Electrical Division, Kendrapara (KED)	SD-5021	AUL
		SD-5022	KENDRAPARA
		SD-5023	PATTAMUNDAI
		SD-5024	RAJNAGAR
	D-503 Marshaghai Electrical Division, Marshaghai (MED)	SD-5031	MAHAKALPADA
		SD-5032	MARSAGHAI
	D-504 Paradeep Electrical Division, Paradeep (PDP)	SD-5041	KUJANGA
		SD-5042	PARADEEP
		SD-5043	TRITOL

Below graph represents the share of customer base, their energy consumption and contribution in revenue based on FY 18 – 19 data. It is learnt that thought the EHT & HT consumers are very few in numbers but sharing highest revenue contribution to the TPCODL total annual revenue



In 2012-13; CESU had taken a strategic decision of engaging Distribution Franchisee in high AT&C loss divisions. The model was Input Based Franchisee- Incremental Revenue Sharing. Out of twenty divisions; fourteen divisions were given to three Distribution Franchisee after a successful competitive bidding process. M/S Fedco was awarded 4 Divisions, Engen Global 6 Division and Riverside Utilities (Shyam Indus) 4 Divisions respectively. Rest of the 6 divisions were continued to be managed by CESU. However, in 2018-19 Shyam Indus surrendered and therefore these divisions also came under direct operations of CESU.

As per the Agreement; the responsibility of Distribution Franchisee starts from the secondary side of the Distribution Transformers from O&M perspective; however from commercial (Metering, billing & Collection) perspective the ownership starts at the 33 kV exchange points at 132/33 kV and 220/33 kV Substations of Odisha Power Transmission Corporation Limited (OPTCL).

Existing Supply System

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

At present, there are 186 numbers of 33KV feeders with a combined circuit length of approximately 3908 KMs supplying power to 289 numbers of 33/11KV Primary Substation (Structures). The 33KV supply is stepped down to 11KV level through 644 numbers of 33/11KV power transformers with an installed capacity of 3798 MVA at these primary substations. Nearly 970 numbers of 11KV feeders emanates from the 33/11KV primary substations having cumulative length of approximately 35719 KMs and supply power to HT consumers connected at 11KV level and other LT customers connected to 11/0.415KV distribution substation. Approx. 71000 numbers of distribution transformers are installed in all five circles with an installed capacity of 4475 MVA. The length of the LT network is approximately 54000 KMs. These LT feeders supply power to three phase and single phase consumers.

The Table 2; gives a snapshot of vital parameters and asset base of all five circles of TPCODL.

Circle	BBSR - I	BBSR - II	Cuttack	Paradeep	Dhenkanal	Total
Area	2183	9422	2754	4430	10565	29354
Input Energy (MU)	2101	1505	1778	982	1794	8160
AT&C (%)	19.38%	29.40%	41.58%	34.74%	31.28%	30.44%
No. of Consumers	488675	631122	506538	477978	428091	2532404
No of 33/11KV Substation	56	70	62	48	53	289
Transformation capacity 33/11 (No's / MVA)	134 / 1066	159 / 841	132 / 828	102 / 492	117 / 571	644 / 3799
Transformation capacity 33/0.415 (No's / MVA)	146 / 62	123 / 31	121 / 38	52 / 7	38 / 9	480 / 147
Transformation capacity 11/0.415 (No's / MVA)	10508 / 1398	12496 / 863	8462 / 858	7836 / 475	9353 / 559	48655 / 4152
Transformation capacity 11/0.230 (No's / MVA)	2625 / 39	6477 / 94	3567 / 64	4018 / 67	4841 / 60	21528 / 323

Circle	BBSR - I	BBSR - II	Cuttack	Paradeep	Dhenkanal	Total
33KV Line (O/H-Ckt Km)	688.22	890.79	665.74	535.92	957.65	3738.32
33KV Line (U/G- Ckt Km)	21.45	95.05	43	2.49	7.34	169.33
11KV Line (O/H- Ckt Km)	4237.91	9026.22	5588.67	7386.49	9090.53	35329.81
11KV Line (U/G-Ckt Km)	77.01	251.389	41.81	7.245	12.21	389.664
LT Line (Bare-Ckt Km)	4108.972	5308.898	5304.5	6618.86	5227.05	26568.28
LT Line (ABC-Ckt Km)	3310.736	7642.488	5440.71	5845.01	5133.31	27372

The reported billing and collection efficiency at the end of FY20 was 75.4% and 90.34% respectively. To improve the billing and collection efficiency, there is an urgent need of technological interventions and consumer centric commercial processes. Customers are interacting at different available avenues for payment, registering request for new connection, attribute change, and registration of commercial or supply related complaints and requests.

SCADA is implemented for selected 33/11KV Primary Substation in Bhubaneswar (30), Cuttack (22) and Puri (4) under various schemes. These 56 nos Substations can be remotely monitored and controlled from 3 Nos independent Control centre located at Bhubaneswar, Cuttack and Puri town with no concept of backup control centre.

Key Challenges:

One of the major challenges for TPCODL is the present dilapidated network which is **not compliant to statutory guidelines** and pose threat to safety of employees, public at large and animals.

The 33 kV, 11 kV and LV overhead lines are long, radial with undersized, worn out bare conductor having extremely long spans, having damaged, bent, tilted poles, poor joints, compromised safety clearances, and non-availability of guard wires in MV overhead feeders.

11/0.415 kV Distribution Substations (DSS) don't have fencing at most of the places, posing major safety threat to public at large 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; aluminium wire are used as fuses on the secondary side of the distribution substations at almost all substations. These fuse units are installed at very low height; and with no fencings at DSS; it is a potential safety threat to general public and animals. Earthing system is in very bad condition in almost all feeders and substations. All of the above deficiencies makes the distribution substations highly unsafe and unreliable. There are chances of serious accidents and fatalities if not addressed on urgent basis.

At many 33/11 KV primary substations (Structures or GSS), boundary walls are lying broken and there is no fencing between the substation premises and 33KV outdoor switchyard. This makes the GSS highly unsafe as there are chances of entry of unauthorised 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 lying bypassed since long for want of spares. 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 bay and there are chances of major damage to substation capital intensive equipment if the defects are not attended / addressed urgently. Some of the pictures depicting the network condition and violation of statutory compliance posing safety threat to Public, Employees and animals are captured and presented in **Annexure - 1**

To safe guard the power distribution equipment, to ensure safety of staff, general public and animals from the accident, and to ensure that the network is compliant to statutory standards, huge investment is required in immediate near future. Investment is also required to improve the reliability of power supply and reduce the technical losses.

On commercial front, Energy Meter installed at consumer premises are a mix of electro-mechanical meters, consumer owned meters, electronic meters etc. which are connected to TPCODL system through PVC insulated service cable supported by GI wire which also serves as earth point to the consumer installation. TPCODL 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 TPCODL. In order to maintain the standard, TPCODL intends to discontinue the practice of consumer owned and consumer installed energy meters. Instead, TPCODL is planning to use insulated meter box, armored service cable, and proper meter seals on meter box and terminal cover.

As out of 20 Divisions, 14 Divisions were with Distribution Franchisee, it is understood that almost no Capex was infused by any of the Distribution Franchisee in last three years. 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, general public, and animals.

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

Proposed Capex Plan for FY 20 - 21:

As explained earlier, TPCODL 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 TPCODL. The proposed Capex plan represents a justified and efficient level of total capital investment estimated by TPCODL to meet the service obligation; improving safety, reliability of network, level of service standards

TPCODL has taken over the assets of erstwhile CESU 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 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-conductoring of feeders, replacement of damaged / tilted poles, provision of intermediate poles, replacement of joints, enhancing system protection, replacement of sick equipment and network augmentation to improve the reliability of power supply. 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 centres that shall be aligned with multiple initiatives and schemes so as to reduce AT&C losses, improve system reliability and augment the network to support continuous load growth. Further, a need is also felt to improve the existing facilities and infrastructure to provide a better consumer experience and a modern, rich, and conducive work environment to all employees for better performance.

1) Statutory Compliance/Safety
2) Loss Reduction

3) Reliability Improvement

4) Load Growth

5) Technology & Infrastructure

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

1. Statutory & Safety

A. Statutory & Safety Compliance

i. Refurbishment / Life enhancement of feeder network in respect of maintaining safe horizontal / vertical clearances.

ii. Refurbishment / Life enhancement of 11KV Distribution Substation (DSS).

iii. Provision of Safety Equipment & PPEs to workforce.

iv. Establishment of Meter Testing Lab.

2. Loss Reduction

A. Defective Meter Replacement

i. Burnt Meter Replacement

ii. Faulty Meter replacement

B. Mass Meter Replacement

i. Installation of Smart DT meters for Energy Accounting

ii. Meter replacement against old electromechanical meter

C. Optimize the Feeder length / load to reduce technical loss.

i. Laying of additional feeders to reduce loading and length of existing feeders.

3. Reliability Improvement

Network Reliability

i. Refurbishment/Life enhancement of 33/11KV Primary Substation for operationalization of SCADA.

ii. Installation of 11KV RMU, Auto Reclosures, Sectionalizers and FPI

iii. Installation of LV protection at DSS

iv. Installation of AB switches in 33KV & 11KV feeders for sectionalisation at different locations.

v. Replacement of Battery & Battery Charged to strengthen the DC system in 33/11KV Substations.

4. Load Growth

A. Energy Meter Installation for all new Connection

B. Network Addition or Augmentation

5. Technology & Infrastructure

A. Setting up of Call Centre's/Customer Care Centre's

B. IT Application's

C. Security System in Central Store

D. Improvement of Civil Infrastructure

E. Admin Ready to use asset

Network Analysis- Statutory Guidelines

In TPCODL, Every area has different characteristics and thus have different challenges. However, some common challenges which were witnessed during our limited site visits, appears to be unsafe network from safety point of view to our employees, public and animals.

Objective of site visit was to understand the issues, reasons and area where improvement can be made. The following issues were observed and the same needs urgent attention to make the network safe, reliable and statutory compliant:

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

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

Having done analysis of last ten years accident data, it is observed that most of the accident happened either due to deficiency in the network infrastructure or easy accessibility of the live parts to the Public and Animals. Even to operate network, necessary PPEs are also not available in sufficient quantity. Some of the PPEs were never procured by the erstwhile CESU.

Table below shows Year wise details of Fatal / Non-fatal Electrical accidents occurred under CESU's operational area during Calendar Year 2010-2020.

Sl No	Calendar Year	Total Accident cases	Human		TOTAL	Animal (Excl. Elephant)		Death of elephant	TOTAL Victims
			Fatal	Non-fatal		Fatal	Non-fatal		
1	2010	**62**	27	33	**60**	28	0	5	**93**
2	2011	**78**	43	53	**96**	34	0	2	**132**
3	2012	**57**	35	24	**59**	16	0	5	**80**
4	2013	**55**	36	32	**68**	8	0	1	**77**
5	2014	**97**	61	36	**97**	27		3	**127**
6	2015	**80**	42	48	**90**	10	2	4	**106**
7	2016	**102**	67	65	**132**	14	0	6	**152**
8	2017	**79**	48	29	**77**	19	0	2	**98**
9	2018	**60**	31	28	**59**	8	0	12	**79**
10	2019	**27**	23	6	**29**	3	0	2	**34**
11	2020	**38**	26	8	**34**	4	0	0	**26**
TOTAL		**735**	**439**	**356**	**770**	**171**	**2**	**42**	**985**

It is pertinent to mention here that the number of fatal accident outgo the number of non-fatal accident, for both Human and Animals. Further, **almost 70% of fatal accident involved humans, which is very serious**.

Below figure shows the detailed accident analysis of Humans.

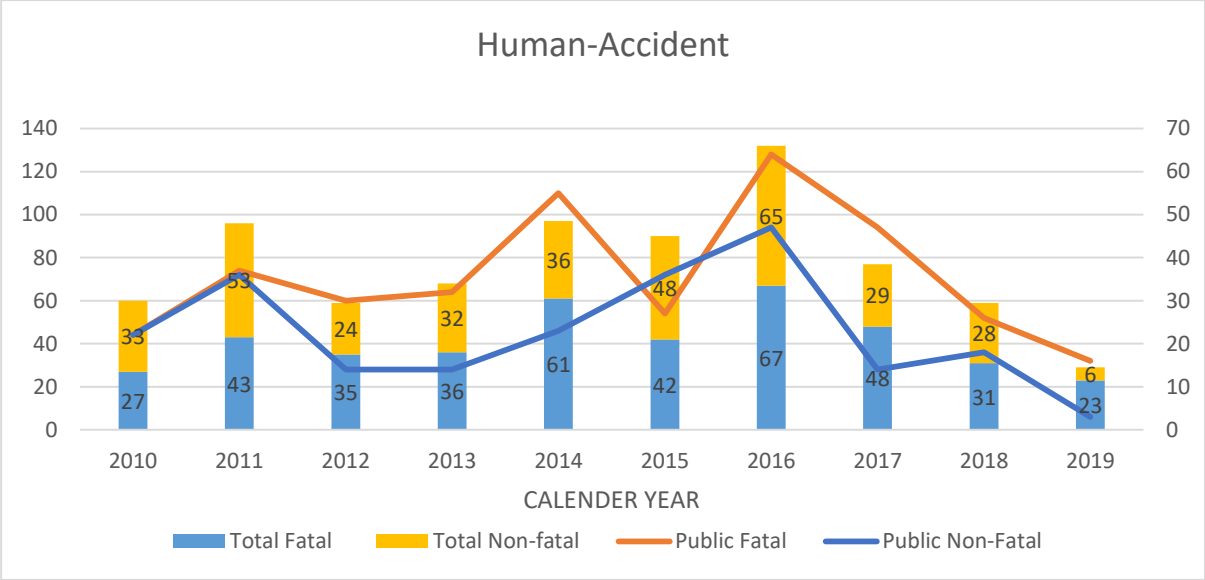


Table below shows the Fatal and non-fatal accident happened during the last 2.5 Years at different voltage level.

Volt	FY 17 – 18				FY 18 – 19				H1'20			
	Fatal		Non-Fatal		Fatal		Non-Fatal		Fatal		Non-Fatal	
	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal	Human	Animal
33KV	0	0	1	0	3	0	4	0	0	0	1	0
11KV	15	4	24	0	17	6	14	0	13	4	6	0
LV	28	15	1	0	14	5	4	0	13	0	1	0
Total	**43**	**19**	**26**	**0**	**34**	**11**	**22**	**0**	**26**	**4**	**8**	**0**

From the above table, it is observed that majority of the fatal and non-fatal accident occurred in 11KV & LV network and thus focused approach must be followed on these segments to make the network safe & secure. Though reduction has been observed in total accidents in last 2-3 years; but as a responsible distribution utility, we need to curtail it further. Hence potentially unsafe locations needs to be addressed in time so as to ensure safe network for employees, Public and Animals.

Apart from high number of Accidents; other major problem is high number of DT failure and extremely high number of interruption at 11 kV and 33 kV level due to dilapidated network condition. This affects the supply system very badly. The interruption at 11 kV feeders is too high by any utility standard. The table below gives a snapshot of feeder tripping

recorded at the 33/11 kV Substations in different circles. In one year total tripping are at a staggering 4.49 lacs. Total count of 11 kV feeder in 18-19 was 896; so on an average basis each of the 11 kV feeder tripped 502 times /annum. Distribution Transformer failure is very high at 5%. In year 18-19; 3212 Distribution Transformers failed.

CIRCLE	Interruptions in 18-19
BBSR-I	93823
BBSR-II	114323
CUTTACK	83036
DHENKANAL	84011
PARADEEP	74692
Total	449885

1.1 Issues of Network Infrastructure

1.1.1 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 CESU area, compliance to statutory guidelines was not adhered at many locations. For example, the height of the lowest conductor in many MV feeders from the ground is not meeting the safe clearances as mentioned in the Regulation 58 of CEA regulations (Measures relating to Safety and Electric Supply – 2010). On preliminary analysis, it is observed that most of the network are laid on 8mtrs / 9 mtrs poles and 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 CESU 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. TPCODL 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.

1.1.2 Damaged Poles / Conductors / Stay / boundary Walls.

Due to vast geography; wide spread 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 damage to the line. To prevent tilting of any pole from its normal position due to abnormal wind pressure, installation of Stay wire is required. At many places egg (stay/guy) insulators are either missing or damaged, which may cause major safety concern not only for the safety of Public but animal also in case of leakage current. Especially animal use the stay wire for rubbing their skin and if the stay wire is live, the animals are likely to get electrocuted. Moreover, there are other reasons, which have resulted into depletion of existing network such as use of undersized conductor in overhead feeders, poor condition of the conductor, multiple joints in a single span in many sections, poor binding wire joints etc. witnessed in the sections causing hot spot and may result into jumper parting. At some locations, stay wire are also damaged resulting into weaker mechanical support to the poles. Under the refurbishment/life enhancement activity TPCODL has planned to replace damaged poles, replacement of worn out conductor, re-sag the conductor, install mid-span pole, introduce stay-wire at start, end and at every H-pole with at least two stay together with two-anchor rod in same pit. This will strengthen the line and will reduce the effect of the bad weather conditions and at the same time will help to reduce accident due electrocution caused by leakage current.

1.1.3 No or poor Earthing of the Poles & Structure.

In an electrical installation, earthing system play important role for proper working of the power distribution system, and protection of human beings against electric shock. Metal frame of all power distribution equipment are connected with the general mass of the earth which is always at zero potential. It's worth mentioning that the general mass of the earth don't have any resistance. As per Central Electricity Authority Regulations (Measures relating to Safety and Electric Supply,2010) rule 41, there is provision of earthing, neutral wire in a 3-phase, 4-wire system and the additional third wire in a 2- phase, 3-wire system. The grounding system must have minimum of two or more 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, 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. TPCODL proposes to strengthen the earthing system by introducing fresh earthing in both DSS and GSS as part of refurbishment activity. This will enhance life not only of equipment but shall also help in proper functioning of protection relays.

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

Guarding is an arrangement provided in overhead MV/HV/LV feeders, by which a live conductor, when accidentally gets broken, is prevented to come in contact with public or animals and vehicles moving beneath the road. By having cradle guards in place, immediately after a live conductor breaks, it first touches the cradle guard 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 pose serious safety threat to the general 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. TPCODL proposes to put in place the cradle wire/guard wire on all road crossings as part of the refurbishment activity of lines.

1.1.5 Poor condition / Absence of fencing 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 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 unauthorised persons or animals in high voltage switchyards. There are information's regarding electrocution of human beings and animal's at substations in the past. TPCODL proposes to put up fencing/build boundary wall under the DSS and GSS Refurbishment job.

1.1.6 Temporary work for restoration of supply post cyclone, FANI.

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

are unreliable and unsafe for operations. Although the funds are provided for rectifying the issues developed due to temporary restoration but it covers upto 11KV and as such 33KV network remained ignored and needs attention. TPCODL proposes to correct the network adequately under 33KV Line Refurbishment activity.

1.1.7 Non-availability of safety equipment & PPEs.

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

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

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

1.2 Proposals for overcoming issues

1.2.1 Distribution Substation (DSS) Refurbishment:

Distribution Substation (DSS) comprises of various equipment which perform specific task to ensure delivery of power supply at appropriate voltage to the end consumers. Main components are 11 kV Switching device, 11 kV Protection, Transformer, LV Protection, Earthing, fencing and O/G LV feeders. The most expensive equipment in the DSS is Transformer and its life depends upon healthy condition of all other components be it LV Protection, HV Protection, Earthing or fencing. The age of Transformer can be enhanced by ensuring healthiness of all other components. Generally, in power distribution utility, most of the transformers are either approaching or have outlived their operational life but replacement of power distribution equipment merely on the basis of ageing is not advisable and other factors such as asset's health, its associated components health and criticality also needs to be considered. This is necessary as replacement of equipment is capital intensive and has direct impact on tariff. In our preliminary site visits, it is observed that existing DSS are in shabby condition with damaged or ill-maintained HT & LT protection equipment. All connections at pole mounted or plinth mounted substations are in very bad condition which not only cause high technical loss but also give rise to undue interruptions. The Aluminium lug / sockets used in DTs and other equipment in the substations are observed to be of inadequate size and proper crimping the lugs with the help of crimping tools found missing at almost all places. This is resulting into generation of hotspots and failure of connections. At all location, fuse cut-out arrangement found with oversize fuse wire. Most of the fuse cut-outs are installed at a lower height accessible to general public and animals thus creating safety hazard. Analysis of distribution transformer's failure data for the last few years also suggest that effective HV & LV protection might have reduced the transformer failure. For example, if there is no effective protection on LV side and any fault occur on the load side, the fault current will pass through the transformer for a higher duration till such time the fault is isolated by upstream network. Since the magnitude of the fault current is high, it is likely to produce mechanical and thermal stresses in the transformer causing pre-mature failure of the transformer.

Refurbishment/Life Enhancement of DSS helps in addressing the above mentioned issues, improve the reliability of power system and above all ensures safety. TPCODL proposes for activities under Refurbishment of Distribution Substation:

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

1.2.2 Feeder / Line Refurbishment:

33KV or 11KV feeders are important asset for a distribution utility which connects various substations and provide power to end consumers. TPCODL has nearly 3900KMs of 33KV and 36000KMs of 11KV feeders under its operational area. Besides, nearly 53000KMs of LT feeders provides power to the end customers. Almost entire MV network is overhead, and nearly 27000KMs 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 / LV lines are in very poor 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 program. Tree branches / creepers are interfering with live conductor at many locations. Huge number of tripping's are reported on 33 and 11KV feeders in previous years. With poor condition of network and absence of maintenance program, it is difficult for utility to ensure delivery of reliable and quality power supply to the end users. During site visits, it has been observed that conductor of different sizes are used in different phases which restricts the circuit capacity limiting to the lowest size of the conductor used in the circuit. Moreover, over sagged wires in 33KV or 11KV feeders are posing major threat to the lives of human beings and animals. At some places, due to re-construction / widening of roads, vertical clearances of the feeders have reduced to the dangerous level. This is not only causing violation of statutory guidelines but also enhancing chances of fatal accidents.

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

1. Straightening of tilted poles,
2. Replacement of damaged poles,
3. Replacement of damaged insulators,
4. Earthing of every 5th Pole and poles which are installed across the road.
5. Erection of Mid span pole wherever the span length is more than 50 Mtrs to reduce the Sag.
6. Restringing 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. All conductor in the section crossing the road shall be replaced if found to have even single joint.

9. Replacement of weak Jumpers and connections
10. Replacement of binding wire joints with wedge connector to remove hotspots.
11. Installation of Danger boards, Anti climbing devices, stay sets etc. to ensure safety & statutory compliance.

1.3 Investment Required for Network Safety

The works explained above for ensuring compliance to statutory standards; we shall require an investment of approx. Rs 2600 Cr. However it is not possible to take up the entire work in immediately considering mammoth efforts and huge investment required. As such we have considered bare minimum quantity

Summary of Investment Required for Making Network Compliant to Statutory Guidelines

Asset Description	UoM	Total Asset Base	Considering 50% as new asset installed in last 4-5 years	Asset base require investment to improve Safety / Reliability (50%)	Unit cost (In Lacs)	Total investment required for Assets (50%) (Rs. Lacs)	Qty Proposed for 1st Year	Cost proposed in 1st Year (Rs. Lacs)
33KV Line (O/H-Ckt Km)	Ckt Km	3738	1869.2	1869.2	8.0	14878.5	80	636.71
11KV Distribution S/stn (1000/800/630 kVA)	Nos.	107	53.5	53.5	7.1	381.5	46	333.19
11KV Distribution S/stn (500/315/300 kVA)	Nos.	1443	721.5	721.5	5.2	3722.9	640	3379.48
11KV Distribution S/stn (250 kVA)	Nos.	3665	1832.5	1832.5	2.8	5076.0	450	1304.18
11KV Distribution Substation (below 250 KVA)	Nos.	43446	21723.0	21723.0	2.4	52135.2	0.0	0.0
Personal Protective Equipment						948.35		948.35
Total						**77142.45**		**6601.91**

As estimated in the above table, first year we would require approx. INR 66.02 Cr. for making the network safe and Statutory compliant at selected locations.

Establishment of Meter Testing Lab:

At present, there are 5 labs in TPCODL where 7 meter test bench are installed for testing of Single Phase and Three Phase meters. These test bench are in dilapidated condition. To ensure high quality in bulk supply of meters, TPCODL has estimated that meter testing lab has to be developed in every Circle in next three years, these labs will ensure the statutory requirement of meter testing across pan TPCODL. Three years plan for developing three labs is given below, however in current DPR, CAPEX for activities in year one has been taken.

Material	Year 1 Qty	Year 2 Qty	Year 3 Qty
SINGLE PHASE 20 POSITION BENCH	2	1	1
THREE PHASE 10 POSITION BENCH	2	0	0
Total	4	1	1

Note : If 3 Phase 20 position test bench will be available at the cost approved, then 20 position bench will be procured.

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

Testing equipment	Year-1
LT meter- testing equipment(onsite testing)	20
HT meter- testing equipment(onsite testing)	5
HT-CTPT testing equipment	5

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

Capex requirement for Statutory & Safety:

For FY 2020 - 21, TPCODL propose capital expenditure of INR 72.80 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, TPCODL shall address network deficiencies at critical locations. Table below suggest the activities to be performed along with funds required under Statutory and Safety Head.

Major Category	Sub Category	Activity	DPR Cost	DPR
Statutory & Safety	Statutory	33KV Network refurbishment to ensure Horizontal / Vertical clearances	6.37	Annexure – 3
		Establishment of Meter Testing Lab	6.78	Annexure – 4
		DSS Refurbishment for safety of Employees, Public and Animals	50.17	Annexure – 5
		PPEs, FFEs, Safety & Testing Equipment	9.48	Annexure – 6
	Total		72.80	

2. Loss Reduction:

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

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

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

- Replacement of Burnt / Faulty / Electromechanical Meters
- Installation of Smart DT Meters for Energy Accounting along with back end IT infrastructure
- Solution for Meter Reading & Spot billing

Meter Replacement:

It is learnt that nearly 1 lacs meters are reported defective and equal number of consumer's 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. In total, around 1.06 Lacs no meters cases and 1.49 Lacs defective meters cases exists in TPCODL area. Considering the past trends, it is expected that additional 70 thousands meters are likely to become defective in FY 20-21 (2.5% of existing Meters population base). Further there are around 6.25 Lacs electro-mechanical meters which also require replacement so as to record the energy consumption accurately. In No meter or defective meter cases, it is estimated that service cable replacement would be required wherever found defective or missing and thus certain percentage of service cable is also considered

in the plan. For installation of Meters, Meter box will also be installed to protect the meters from energy theft. In FY 20-21, it is planned to replace / install around 2.59 Lacs meters which are directly contributing to the non-technical losses and accordingly capex investment of Rs. 45.24 Cr will be required for replacement of these meters.

Activity	Sub - Activity	DPR Cost (In Cr)	DPR
Meter replacement against burnt / Faulty and Mechanical / No Meter	Meter Replacement	22.80	Annexure – 7
	Meter Box for the above Meters	6.75	
	Service Cable	13.65	
	Meter Accessories like Seals / Modems etc	2.03	
Total		**45.24**	

Installation of Smart DT Meter:

It is advisable to install energy meters on all three phase distribution transformers for carrying out energy accounting to identify high loss areas. This will help in making plans to reduce the commercial losses in specific areas. Currently Static meters are installed only on 7000 DTs out of about 17000 DTs with rating of 100 KVA and above. Smart Meters will be installed on all Distribution Transformers of 100KVA & above in a span of next two years.

Further, the data recorded through DT meter will help in improving the network efficiency by optimizing the loading on the transformers and balancing the load on the LT feeders emanating from the transformers. Accurate information about transformer loading will help in taking corrective action in time to prevent transformer failure on account of overloading.

In first year, Capex fund of around 15.36 Cr. is planned for installation of Smart DT meters along with required IT infrastructure for energy accounting.

Activity	Sub - Activity	DPR Cost (In Cr)	DPR
DT Meters	Installation of DT meters for Energy Accounting	15.36	Annexure – 7

Meter Reading:

The Spot Billing system is a system, in which the meter reader visits the consumer's premises, records the energy meter reading and issues the energy bill on the spot using a hand-held Android Phone and Bluetooth Printer. Solution has ready to use Spot Billing Solution framework which can be easily customized and delivered quickly depending upon client requirement On Premise Deployment based on Preference Integration with ERP (SAP etc.) System it has Source Code Ownership & Unlimited users/devices.

For this initiative, Capex fund of 3 Cr. is planned in this FY, and segregation of activities are mentioned in the table below:

Activity	Sub - Activity	DPR Cost (In Cr)
Solution for Meter reading and Spot billing	Custom Solution Cost with Billing Module Calculation (Mobile App) 100% Offline	0.2
	On Premise Server Configuration - Production Environment Database Server	**2.8**
	On Premise Server Configuration - Production Environment Application Server (2X)	
	On Premise Server Configuration - Disaster Recovery / UAT Server Application Server (2X)	
Total		3.0

Optimizing the 11KV Feeder Length:

Most of the 33KV, 11KV & LV 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. This year, it is proposed to introduce new 11KV Feeders to re-configure the existing lengthy feeders in such a way as to reduce the length and loading of existing feeder and thus the technical loss. For this, an amount of approx. **9.67 Cr**. is provisioned to lay new 11KV feeders with total length of 55 Ckt Km.

To summarize, TPCODL proposes capital expenditure of INR **73.27 Cr** for Distribution Loss reduction schemes in FY 20-21 to sustain and further reduce the existing AT&C loss level.

Major Category	Sub Category	Activity	DPR Cost (In Cr.)	DPR
Loss Reduction	Defective Meter Replacement	Meter replacement against burnt / Faulty and Mechanical / No Meter	45.24	Annexure - 7
	DT Meters	Installation of DT meters for Energy Accounting	15.36	
	Meter Reading	Solution for Meter reading and Spot billing	3	
	Network Optimization	Optimize the Feeder length / load to reduce technical loss	9.67	Annexure - 8
	Total		**73.27**	

3. Network Reliability

TPCODL have a large number of long overhead feeders with an average length of 30 KM in urban and 110 KMs in rural areas. The present power distribution network is in extremely dilapidated condition resulting into frequent tripping's and as a result consumers are not getting reliable and quality power supply. Out of 289 numbers of 33/11KV Primary Substations, 179 substations are connected with more than one source of supply and remaining 111 Primary Substations are connected in radial mode. To ensure highest reliability, all 33/11KV substations should have more than one source of power supply. Similarly out of 289 numbers of 33/11KV substations, 26 numbers of substations have single power transformer. Failure of the transformer in these substations will result in total outage of power supply to all customers connected with these transformers.

Table below shows the Tripping occurred in 1st six months of FY 19-20 and its comparison with the 1st and last six months period of FY 18-19. From the below table it is clear that Tripping in first six months of FY 18-19 were 2,39,544 numbers whereas the number of tripping's in the same period of FY 19-20 were 1,85,545. Though the number of tripping have reduced in 1st six months of FY 19-20, still the number of tripping's are extremely high when compared to best in class utilities.

33/11KV S/S	First six months of the previous year FY 18-18		Last six months of the previous year FY 18-19		First six months of the current year FY 19-20	
	No. of Tripping	Duration of Tripping in (Min.)	No. of Tripping	Duration of Tripping in (Min.)	No. of Tripping	Duration of Tripping in (Min.)
ALL 33 KV Incoming Feeders	26,484	8,97,915	15,603	5,14,914	16,704	5,51,541
ALL 11 KV outgoing Feeders	2,39,544	46,43,274	1,86,398	29,82,388	1,85,545	29,68,820

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

- Identification and replacement of faulty / sick equipment causing frequent tripping's.

- Introduction of technology to ensure faster restoration of supply in case of any tripping. .

To address above mentioned actionable points, it is recommended to Refurbish the primary substations by replacement of faulty equipment and make the substation SCADA compatible so that it can be monitored and controlled through SCADA resulting into faster restoration in case of any interruption.

Out of 289 Sub-stations, 56 numbers of substations can be monitored and controlled from 3 numbers of independent control Centre located at Bhubaneswar, Cuttack and Puri town. However, these substations are manned at present and operation is being taken care by the substation operators stationed at these primary substation. No of substation currently connected with Control Centre are mentioned below

Existing Control Centre Details			
Sl. No.	**Control Centre Location**	**No. of Sub-Stations Covered**	**Established under Scheme**
1	Bhubaneswar	30	R-APDRP
2	Cuttack	22	R-APDRP
3	Puri Town	4	Puri Nabakalebar Project
	Total	56	

Implementation of SCADA will help in better network management triggered by remote operations & monitoring of the substations. SCADA will help in controlling network operations from one central location per circle thus minimizing equipment downtime and chances of any accident. All the grids are proposed to be automated and shall be remotely monitored by SCADA Centre in a phased manner. TPCODL is planning to construct main and backup control centres at Bhubaneswar and Dhenkanal .As a Disaster recovery plan it is also proposed to establish SCADA System at Area power system control centre in 5 Circles i.e Bhubaneswar-I, Bhubaneshwar-II, Cuttack ,Pradeep and Dhenkanal circles. Detail plan has been prepared for replacement/upgradation of the existing SCADA System for the configuration as proposed. In addition to SCADA System upgradation/ replacement the conventional substation are also planned to be augmented with state of art CRP Panel, replacement faulty / obsolete equipment, Transformer Monitoring Unit, RMU, Isolator, FPI,

FRTU and RTUs for remote monitoring & control through SCADA System for faster restoration and quick decision Making Primary substation automation require replacement of 33 / 11 KV control and relay panel with new panels fitted with state-of-art IEDs and data concentrator. These stations shall be equipped with devices to make all control, monitoring and protection signal available at remote control Centre for efficient control and monitoring of electrical network. Implementation of SCADA is being planned for 500 Grid Substation considering futuristic Grids in next five years and for this investment of around 700 Cr would be required and therefore it is not advisable to implement SCADA for all primary substation immediately. A Road map has been prepared for implementation of SCADA in phase manner and that would be submitted to Hon'ble Commission separately.

In 1st phase, all 56 Grids which are currently connected with existing SCADA system have been considered. Capital investment is proposed to replace the faulty / defective equipment at these substations along with provision of bus section is also considered.

Moreover, another 54 numbers of substations commissioned under ODSSP and require minimum investment for SCADA operationalization would also be considered in 1st phase. These substations are feeding the load to Industrial, Urban and Rural Consumers.

To make these 110 nos substations operational from SCADA, certain refurbishment jobs are considered which includes:

1. Replacement of faulty / defective equipment.
2. Installation of communicable devices to communicate with Remote terminal unit.
3. Installation of Ethernet switches to make them communicable with SCADA.

Description of Activities	UoM	Phase-1		
		RAPDRP S/s	ODSSP S/S	Total
No. of Sub-Stations		**56**	**54**	**110**
Switchyard Fencing, Fire Protection, Civil Works, Equipment including CRP (33 kV), Equipment including CRP (11 kV)	L/S	23.75	0	23.75
Total		**23.75**	**0**	**23.75**
Ethernet Switch (24 Port)	No.	0	108	108
	Unit Rate		0.002	0.002
	Total Cost		0.216	0.216
Total		**0**	**0.216**	**0.216**
SCADA System MCC, BCC, APSC & Comm.	L/S	2.46	0	2.46
Total		**2.46**	**0**	**2.46**
Grand Total Cost		**26.21**	**0.216**	**26.43**

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

Circle Name	Division Name	Interruption longer than 5 min	Duration of Interruption longer than 5 min	Interruption Shorter than 5 min
BBSR-I	Bhubaneswar City - I	1,359	31,630	1,249
	Bhubaneswar City - II	12,922	3,70,236	11,780
	Bhubaneswar Electrical	8,648	1,38,884	8,244
	Nimapara	31,583	2,89,050	18,038
BBSR-I Total		**54,512**	**8,29,799**	**39,311**
BBSR-II	Balugaon	12,076	4,08,747	7,490
	Khurda	24,271	5,48,421	14,940
	Nayagarh	8,261	1,43,808	10,520
	Puri	21,909	6,95,957	14,856
BBSR-II Total		**66,517**	**17,96,932**	**47,806**
CUTTACK	Athagarh	10,309	1,12,604	2,238
	Cuttack Electrical	23,757	7,12,470	9,496
	Cuttack-I	4,908	1,88,757	4,468
	Cuttack-II	8,505	3,17,934	3,394
	Salipur	12,779	3,08,898	3,182
CUTTACK Total		**60,258**	**16,40,663**	**22,778**
DHENKANAL	Angul	24,103	12,16,273	935
	Chainpal	20,406	9,53,233	5,120
	Dhenkanal	26,578	9,12,370	6,869
DHENKANAL Total		**71,087**	**30,81,876**	**12,924**
PARADEEP	Jagatsinghpur	11,173	3,29,502	5,557
	Kendra para	24,535	1,32,609	9,694

Circle Name	Division Name	Interruption longer than 5 min	Duration of Interruption longer than 5 min	Interruption Shorter than 5 min
	Marshaghai	10,476	4,93,035	2,686
	Paradeep	7,186	1,90,062	3,385
PARADEEP Total		**53,370**	**11,45,208**	**21,322**
Grand Total		**3,05,744**	**84,94,478**	**1,44,141**

Faults on overhead lines fall into following two categories:

1. Momentary (Less than 5 minutes duration)

2. Sustained. (More than 5 minutes duration)

From above table, it is clear that approximately 50% of faults observed on overhead feeders are transient (Momentary faults) in nature. The remaining 50% of faults are of Sustained (Permanent) in nature. Most faults that occur on overhead lines are transient faults caused by lightning and tree branches touching the live line conductor. The transient fault caused by lightning results in damage to insulators if lightning arresters are not provided or not working. Transient faults caused by tree branches interfering with line conductor are removed immediately by operation of a protection relay. Regular inspection of feeders followed by tree regular helps to minimize transient faults,

Almost 60-70% of faults are transient in nature and in most cases trial recloser are found to be successful. However each time the feeders are tripped due to transient fault, all customers connected to the feeder experience outage. Utilities at times finds it difficult to identify the exact reason of the fault. In a long distribution feeder with many unprotected branches, it becomes difficult to identify the faulty and healthy sections of the feeder. TPCODL intends to use auto reclosers, sectionalizers, and fault passage indicators to improve the reliability of overhead feeders. Apart from installing the above stated equipment, it is also planned to introduce AB switches at 33KV & 11KV long feeders so as to sectionalize at the appropriate location for any planned / unplanned shutdown thereby reducing the no. of affected consumers.

As discussed earlier, most of the LT feeders emanating from 11/0.415KV distribution substations don't have protection and control as a result, fault in any one LT circuit is likely

to affect the supply of all customers connected on the same DT. Same is true with maintenance outages. To overcome this situation, TPCODL is planning to provide circuit breakers on LT feeders for control and protection of the feeder. Various initiatives proposed this year to improve the reliability of power supply in 11KV and downstream network are given below

- Installation of Auto Reclosure & Sectionalizers in important and critical feeders.
- Installation of Communicable overhead FPIs for faster identification of faults.
- Installation of LV protection at Distribution substation to arrest the LT faults at LT level itself instead escalating to the 11KV feeder level.
- Replacement of Battery & Battery Charger to strengthen the DC protection system in 33/11KV Grid Substations.
- Installation of AB switches at 33KV & 11KV lengthy feeders for improving Reliability during planned / unplanned outages.

Auto-reclosures, Sectionalizers, RMU and AB switches: Auto-reclosures are very efficient in minimizing outages from transient faults on overhead feeders. When installed along with Sectionalizers, they can isolate the faulty sections of the feeder while re-energizing the rest of the feeders. In case of very long circuits, the sectionalizers can also be connected in series. TPCODL currently has a large number of very long overhead feeders, particularly in rural areas, with lengths as high as 110 km. Moreover, it is observed that multiple 11KV feeders are controlled through single 11KV breaker or AB switch in some primary substation. Fault in any 11KV feeder or maintenance activity in 11KV breaker at primary substation affects the supply of consumers connected on all 11KV feeders controlled from that breaker. In order to improve reliability of power supply at such substations, installation of auto-recloser, sectionalizers and Ring Main Units (RMU) is being proposed in phase manner. In first year a total of 40 numbers of autoreclosers and 120 numbers of sectionaliser have been proposed for installation in top 40 identified high tripping feeders. TPCODL is also planning to install 60 numbers of RMUs at 33/11KV primary substations to control individual 11KV feeders. Similarly, in rural section, AB switches are proposed at lengthy 33KV & 11KV Feeders to have provision of isolation of

section during any planned / unplanned outages. This will help in improving the reliability since currently entire feeder is forced tripped for such outages.

Fault Passage Indicator: Installation of overhead Fault Passage Indicators (O/H FPIs) is proposed for faster identification and restoration of faults on long 11KV feeders with multiple sections. In first year, 1500 numbers of communicable FPIs are proposed for installation.

Battery & Battery Charger: Installation of Battery & Battery charges have been proposed to strengthen the DC system in the 33/11KV Grid Substations. During the field visits, it is learnt that some of the Battery and Battery charges are not operational and needs immediate replacement. In this year, 43 sets of Battery & Battery chargers (18 nos 48 V and 25 nos 24 V DC) are proposed to be replaced.

For FY 2020 - 21, TPCODL proposes Capital expenditure of Rs **72.48 Cr** to strengthen the network, introduce technologies to enhance customer satisfaction in terms of safe and reliable power supply.

Major Category	Sub Category	Activity	DPR Cost	DPR
Reliability	Network Reliability	110 Nos. GSS refurbishment for SCADA operationalization	26.43	Annexure - 9
		Installation of Auto reclosure / Sectionalizers, FPI & RMU	23.88	Annexure - 10
		Installation of AB switches for improving Reliability	13.18	
		Installation of LV protection at DSS	6.73	Annexure - 11
		Replacement of Battery & Battery Charger	2.26	Annexure – 12
	Total (B)		72.48	

4. Load Growth

Load growth in a system is a natural phenomenon. Load growth is the outcome of increase in number of connections and addition of new load by existing customers. Taking reference from past two years, it is expected that approximately 70K – 80K new connections would be applied in FY 20 - 21. In order to meet this load growth, both network infrastructure needs to be strengthened, and new energy meters to be installed to release the new connection. However, considering the huge investment done in recent 2–3 years under various schemes of Govt. of Odisha & Govt. of India, requirement of capital expenditure for network augmentation / strengthening will be considerably less. The existing network - is considered adequate to cater the load growth and therefore only new energy meters and associated accessories would be required to release the new connections.

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

Meter Category	Quantity (In Nos.)
Single Phase	42000
Poly Phase	5000
LTCT	500
HTCT -11kV/110V	80
HTCT -33kV/110V	5
Interface Meter	5
Net Meter- Single Phase	400
Net Meter- Poly Phase	100
Net Meter – LTCT	100
Net Meter- HTCT	50
Grand total	48240

For installation of Energy Meters, Meter box will also be installed to protect the meters and avoid the possibility of energy theft. Further, suitable size of the service cable to extend the supply to the consumer premises has also been considered. Seven different rating of

service cable are considered in the plan according to the load demand and connection category.

Further, accessories like Modems, Bus bar and Distribution Boxes are required to extend the supply and to take energy readings from remote.

Therefore in FY 20-21, it is planned to install approx. 48K new energy meters under load growth category and accordingly CapEx investment of **24.43 Cr** is planned for providing new connections.

Activity	Sub – Activity	DPR Cost (In Cr)	DPR
New connection	New Meter Installation	4.46	Annexure - 13
	Meter Box for the above Meters	2.91	
	Service Cable	11.01	
	Meter Accessories like Seals / Modems etc	4.49	
	New connection site visit	1.35	
	Smart tools for Meter Installation	0.21	
Total		**24.43**	

5. Technology & Infrastructure

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

Call Centre & Customer Care centre:

Call Centre and Customer care Centre facilities needs to be developed as existing facilities are inadequate. At present only one call centre with 4 lines are available for handling both commercial and supply related calls from all consumer of TPCODL. Further, Customer interaction at Customer care centre / Division / Sub-division / Section lacks basic amenities and require renovation / revamping to make it convenient for customers. Considering the vast geography and diversified consumer segments, existing call centre and customer care centres are required to be revamped to improve the customer experience.

For establishment of Call Centre and Customer care centre at selected locations, capital expenditure of INR 6.36 Cr. is proposed in FY 20 – 21. Details and cost break up is mentioned in the table below:

S.no	Item Description	Total Budget (In Crs)	DPR
1.	Call Centre @ Bhubaneswar *	0.97	Annexure - 14
2.	Payment Cum Customer Care Centre @ Division (20 Nos) ^	2.82	
3.	Payment Cum Customer Care Centre @ Sub-Division (16 Nos out of 65) **	0.90	
4.	Payment Cum Customer Care Centre @ Section (35 Nos out of 251) **	1.67	
Total		**6.36**	

Information Technology:

TPCODL is going to leverage the power of Information Technology to provide best in class services to the consumers and improving efficiency through automation of certain processes. Existing website is hosted on the domain of service provider's environment and this needs to be migrated to the data centre of the utility for security and further integration needs. The current site is a static site and for enhancing customer satisfaction and engagement, the same needs to be made responsive dynamic website which can be opened on any device or mobile. Apparently the employees in CESU are using GMAIL as their internal communication mailing platform which is being migrated to Microsoft Outlook for security and integrity needs. Hence, integration and establishing single sign on and enabling authentication using windows login in all applications is required and thus active directory web services would need to be in place.

IT systems will be implemented to provide end-to-end solutions for important business functions viz Commercial, Operations, Finance, HR and Administration etc.

A robust and reliable communication system will be the foundation to support business applications like IT, Operations, Commercial and Customer care services. Communication Network will be required to support value added services like Video applications (Video Conferencing), Enterprise services, Commercial - ERP, CRM, Payment Gateway etc. It is proposed to develop a robust, reliable, resilient, scalable and Secure Communication system in a phased wise manner. When various mission critical IT & OT applications and data traffic between (Grids/Offices) is required t. communication technology should be deployed through IP/MPLS VPN system. In digital utility there is need to strengthen cyber security while increasing digital coverage. To enable employees to work on automated systems, various type of servers would be required for running the applications.

Metering, Billing and Collection will be the backbone for various enterprise functions & same will be implemented for customer relationship management, billing and other commercial processes. 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.

To meet above mentioned requirement, a robust IT infrastructure is required to be developed well supported by state of the art equipment, capital expenditure of Rs 67.77

Cr is proposed in FY 20 – 21 and details under various category is mentioned in the table below:

S. No.	Name of scheme	Cost to be booked in FY 21 (Cr.)	DPR
1	ERP, MBC, CIS and Business Intelligence Systems	**33.48**	Annexure - 15
2	Application Software	**0.127**	
3	Database Software	**4.71**	
4	Servers	**5.83**	
5	Laptop / Desktop	**5.30**	
6	Printer	**1.55**	
7	Network Equipment for location	**11.02**	
8	Communication Network	**3.70**	
9	Data Centre Extension	**2.048**	
	Total	**67.77**	

Security System at Central Stores:

TPCODL Central stores at Choudwar and Power house are in dilapidated condition and do not have adequate lighting and fire protection system thereby compromising with the safety & Security of the inventory kept in these stores. To address this challenge and ensure adequate lighting arrangement and fixed fire protection system in place, capital expenditure of Rs 3.48 Cr proposed in FY 20 – 21.

S.no	Item Description	Total Budget (In Crs)	DPR
1.	High Mast arrangement	0.60	Annexure - 16
2.	Water hydrant system	2.00	
3.	Fire Extinguishers	0.12	
4.	CCTV Cameras and Intrusion detection system	0.75	
Total		**3.48**	

Civil Infrastructure:

TPCODL currently have offices in all the five circles and subdivisions. Some of them are owned and others are on rented property. Currently the Offices in Bhubaneswar circle I and II are accommodating office and associated services staff. The challenges exists in TPCODL using current buildings and infrastructure is to accommodate more employees and providing a hygienic, well ventilated and spacious working environment with minimum expenditure. It may also be noted that no annual repairs or refurbishment in all office buildings have been made in recent years, hence, immediate rehabilitation of the said buildings is required.

To ensure safe, hygienic, well ventilated and spacious working environment for employees as well as consumers, a capital expenditure of approx. INR 7.95 Cr is proposed, break up of which is mentioned below:

S. No.	Activity	DPR Amount (in Cr)	DPR
1	Creation of office space at 9th floor of IDCO Tower	0.25	Annexure - 17
2	Structural Strengthening and remodelling of Power House(Corporate office)	2.95	
3	Customer care centres at BBSR I, Puri, Cuttack	0.60	
4	Structural strengthening of existing Central Store Sheds BBSR 1	0.45	
5	Structural strengthening of existing Central Store Sheds at Choudwar	0.90	
6	Structural strengthening of existing store Sheds 2 nos.(Khorda) & 3 no's at Puri	0.60	
7	New sub-store at Banarpal and Scrap store at Jagatpur	0.60	
8	Renovation for additional office space in 2nd floor Corporate Office	0.75	
9	Furniture (Office Furniture, Workstation, Chairs etc. in Circle office /Division / sub-Division)	0.85	
	Total Amount	**7.95**	

Administration:

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

Some of offices are owned and others are on rented property. Currently the Offices in Bhubaneswar circle I and II are accommodating office and associated services staff.

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

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

- **Office air conditioning systems** are required to provide a comfortable working environment to bring and control Energy Efficiency, Humidity, Air Quality, and Reduction in Noise & Keeping Business Critical Equipment at the Right Temperature.
- **Water cooler & Purifiers** are required for proper hydration employees and to ensure good health and improve overall efficiency. An employee should drink at least eight glasses of water a day to be properly hydrated as Water increases the amount of blood flow and oxygen to the brain and other body parts which in turn increases brain activity and attentiveness
- **Ergonomic office chairs** for sitting long periods with ease. This naturally helps employees work more efficiently and productively. Another benefit is reduction in healthcare expenses related to poor posture from unsuitable office chairs.
- **Photocopier machines** to offer a fast and easy way of getting single or multiple copies of documents & Improves Functionality of businesses.
- **Vehicles** to provide car pool facility to the company staff as well as car facility to the sr. management team.
- **File cabinets** are basic requirements to keep office space organized and tip-top. It helps store important papers, documents, photographs, magazines and training

materials in one single place for easy and immediate access besides offering secure storage, it offers instant access to files of thousands of customers and employees.

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

“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 facilitate smooth operation and support hygiene and conducive work environment, TPCODL proposes INR 4.90 Cr. under Admin head to support various departments / locations.

To summarize, total 90.46 Cr. capital expenditure is proposed for Technology and Infrastructure section

Major Category	Sub Category	Activity	DPR Cost	DPR
Technology & Infrastructure	Call Centre	Infrastructure for Customer Care , Call Centre , Payment Centre and Section Offices	6.36	Annexure – 14
	Information Technology	IT & Technology for process efficiency & enhanced productivity	67.77	Annexure – 15
	Stores	Security system in Central Store	3.48	Annexure - 16
	GIS	Implementation of 1st phase of GIS	2.0	Annexure - 17
	Civil	Civil Upgradation	7.95	Annexure – 18
	Admin	Ready to Use assets for Offices	4.9	
	Total (D)		**92.46**	

Summary:

TPCODL proposes Capital Expenditure of INR 344.44 Cr. for FY 20 – 21 to carry out various activities to ensure delivery of safe and reliable power supply to consumers with efficient operations.

S. No.	Major Category	Activity	DPR Cost (In Cr.)
1	Statutory & Safety	33KV Network refurbishment to ensure Horizontal / Vertical clearances	6.37
		PPEs, FFEs, Safety & Testing Equipment	9.48
		DSS Refurbishment for safety of Employees, Public and Animals	50.17
		Establishment of Meter Testing Lab	6.78
			72.80
2	Loss Reduction	Meter replacement against burnt / Faulty and Mechanical / No Meter	45.24
		Installation of DT meters for Energy Accounting	15.36
		Solution for Meter reading and Spot billing	3
		Optimize the Feeder length / load to reduce technical loss	9.67
			73.27
3	Reliability	110 Nos. GSS refurbishment for SCADA operationalization	26.43
		Installation of Auto reclosure / Sectionalizers, FPI & RMU	23.88
		Installation of LV protection at DSS	6.73
		Replacement of Battery & Battery Charger	2.26
		Installation of AB switches for improving Reliability	13.18
			72.48
4	Load Growth	Meter Installation for all new connection	24.43
		Network augmentation / addition to meet load growth	9
			33.43
5	Infrastructure	Infrastructure for Customer Care , Call Centre , Payment Centre and Section Offices	6.36
		IT & Technology for process efficiency & enhanced productivity.	67.77
		Implementation of 1st phase of GIS Roadmap	2
		Security system in Central Store	3.48
		Civil Upgradation	7.95
		Ready to Use assets for Offices	4.9
			92.46
Grand Total (A+B+C+D+E)			**344.44**

Note: All cost are inclusive of taxes and do not includes staff cost and IDC charges.

Annexure:

Annexure: 2 (Statutory Guidelines)

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

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

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

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

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

• For lines of voltage not exceeding 650 volts—5.8 metres

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

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

• For lines of voltage not exceeding 650 volts—5.5 metres

• For lines of voltage exceeding 650 volts but not exceeding 33 kV—5.8 meters

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

• For lines of voltage up to and including 11000 volts, if bare----4.6 meters.

• For lines of voltage up to & including 11,000 volts, if insulated—4.0 meters.

• For lines of voltage exceeding 11,000 volts—but not exceeding 33 kV----5.2 meters.

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

69. Lines crossing or approaching each other and lines crossing- Street and road.
ii) Guarding shall be provided where lines of voltage not exceeding 33 kV cross a road or street.
(iii) Where an overhead line crosses or is in proximity to another overhead line, guarding arrangements shall be provided so to guard against the possibility of their coming into contact with each other.

70. Guarding- (1) Where guarding is required under these regulations the following shall be observed namely:
(i) Every guard-wire shall be connected with earth at each point at which its electrical continuity is broken.
(ii) Every guard-wire shall have an actual breaking strength of not less than 635 kg and if made of iron or steel, shall be galvanised.
(iii) every guard-Wire or cross-connected systems of guard-wires shall have sufficient current-carrying capacity to ensure them rendering dead, without risk of fusing of the guard-wire or wires, till the contact of any live wire has been removed.

72. Earthing- (1) All metal supports and all reinforced and pre-stressed cement Concrete supports of overhead lines and metallic fittings attached thereto, shall be either permanently and efficiently earthed by providing a continuous earth wire and securely fastening to each pole and connecting with earth ordinarily at three points in every km with the spacing between the points being as neatly equidistant as possible or each support and the metallic fitting attached thereto shall be efficiently earthed.
(2) Metallic bearer wire used for supporting insulated wire of overhead service lines of voltage not exceeding 650 V shall be efficiently earthed or insulated.

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

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

95. Supports (Poles and Towers)-

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

96. Line Span- (1) Line span shall be decided taking into consideration topography, wind pressure, type of support, conductor configuration and ultimate tensile strength of conductor.
(2) The span shall be within the range specified by IS.

(3) Uniform span shall be maintained as far as possible between consecutive pole structures.

(4) While constructing a line, if a road crossing occurs at mid span, then a pole shall be placed on one side of the road so as to avoid mid span at the road crossing.

(5) While crossing another power line, the lower voltage line shall be underneath. The lower line shall normally not cross at mid span of the upper line.

(6) While placing poles on high ground, shorter poles can be used while maintaining proper ground clearance at the middle of the span.

(7) Poles shall normally not be placed along the edges, cuts, or embankments of creeks and streams.

(8) At all the places where the new line crosses over roads or another existing line, adequately earthed guard wire mesh below the line shall be provided to avoid the conductor of the new line falling over the areas below, in case of any break. In cases where the line passes below an existing line, the guard wire mesh shall be provided above the new line under construction.

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

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

100. Stay Arrangements-

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

(a) Angle locations;

(b) Dead end locations;

(c) Tee off points;

(d) Steep gradient locations;

(e) cut- point;

(f) Along the straight run at minimum two locations in 1 km.

(2) Galvanized iron stay wires and stay rods of adequate size shall be used. The individual wire used to form "stranded stay-wire" shall have a minimum tensile strength complying with relevant IS. For double pole structure, four stays along the line, two in each direction and two stays along the bisection of the angle of deviation or as required depending on the angle of deviation shall be provided.

(3) When two or more stays are provided on the same pole, each stay shall be grouted entirely separate from the other.

(4) The angle between the pole and stay wire shall be about 45 degrees and in no case it shall be less than 30 degrees. ·

(5) Stays shall be anchored by either providing base plates, angle iron or rail.

(6) Stay wires shall be connected to the pole with a Porcelain Guy Strain Insulator. The standard Guy Strain insulators shall be as per relevant IS. The Porcelain insulator shall be inserted in the stay wire at a height of minimum 3 m vertically above the ground level. The strain insulators shall be free from defects, thoroughly vitrified and smoothly glazed.

(7) Wooden insulators shall not be used for stay/guy wire.

99. Earthing of Poles-

(1) All metallic supports shall be permanently and effectively earthed. The Earthing arrangement shall conform to relevant IS.

(2) Metal cross arms and insulator pins for PCC and PSCC poles shall be bonded together and normally earthed at every pole for 33 kV or 22 kV or 11 kV lines and at every 5th pole for lines below 500 volts.

(3) The support on each side of a road crossing, railway crossing or river crossing shall be earthed.

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

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

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

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

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

77. Transformer Mounting Structure-

(1) The transformer shall be mounted on a single pole, H pole structure or on a plinth depending upon site requirements, size and weight of the transformer.

(2) Direct single pole mounting shall be used for transformers up to 25 kVA only.

(3) The transformers of more than 25 kVA and up to 250 kVA can be mounted on H pole structure or on plinth. Transformers above 250 kVA shall be mounted on plinth only.

(4) The structures shall be provided with anti-climbing devices and danger board.

(5) The plinth shall be higher than the surroundings. The plinth foundation shall be of concrete.

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

Annexure: 3 DPR for Refurbishment of 33kV Feeders

Need of the Project:

33KV feeders are important asset for an electric utility which connects various substations and provide power to end consumers. TPCODL has nearly 3700KMs ckt length of 33KV feeders under its operational area. Almost entire 33KV feeders are overhead, and hardly 5% feeder network is of underground type.

Proper upkeep of the feeders is important from ensuring safety and reliability of power supply. During limited site visits, it was observed that most of the 33KV / 11KV / LV lines are in very poor condition and pose safety threat to the human beings and animals. Most of the feeders have binding wire / multiple joints. As a result there are chances of snapping of conductors and subsequent electrocution of human beings / animals since cradle guards are not provided. . Due to scarcity of staff and materials, there is no structured maintenance program. Tree branches / creepers are interfering with live conductor at many locations. Huge number of tripping's are reported on 33KV and 11KV feeders in previous years. With poor condition of network and absence of maintenance program, it is difficult for utility to ensure delivery of reliable and quality power supply to the end users. During site visits, it has been observed that conductor of different sizes are used in different phases which restricts the circuit capacity limiting to the lowest size of the conductor used in the circuit. Moreover, high Sag in 33KV or 11KV feeders are posing major threat to the lives of human beings and animals. At some places, due to recarpeting / widening of roads, vertical clearances of the feeders have reduced to the dangerous level. This is not only causing violation of statutory guidelines but also enhancing chances of fatal accidents. The following observations were made during recent inspection of the network;

Findings / observations during sample site visit:

1. At some locations, poles or support structure found rusted, tilted, and damaged. Tilting of poles also resulted into increasing the sag at some locations.
2. In rural area, feeders are passing through thick vegetation and tree branches found interfering with feeders at many locations. These feeders are tripping frequently during summer and rainy season due to tree branches coming in arcing zone of the live conductor.
3. Most of the feeders do not have cradle guard even on road crossings and in busy markets area / near schools and thus pose safety threat to the human beings.

Moreover, this is non-compliance of the statutory guidelines (Regulation 73 clause 1 of CEA – Measures relating to Safety and Electric Supply, Regulation 2010.

4. Some feeders are in dilapidated condition with undersized conductor and multiple joints. Many of the joints are done with binding wire. Service connections are given directly from the main conductor. This resulted into hotspot creation and reducing the overall life of the conductor.
5. Average span length of the 33KV Lines between two poles are more than 60 meters.
6. Stay wires supporting the poles found damaged at some locations and even at few location, egg insulator found damaged.
7. Earthing is either not available or found ineffective at 33KV substations and feeders.

Recommendation:

In order to restore the efficiency of the substation and feeders, and improve the safety and reliability of the network assets, TPCODL intends to refurbish the select assets during the financial year. Refurbishment of assets will also enhance the operational life of the equipment.

Scope of the Proposal:

Refurbishment job would cover the following activities;

1. Detailed technical inspection of the substation and feeder to identify the deficiencies.
2. Refurbishment / Strengthening of substations and feeders to remove the defects by replacement of poles, conductors, insulators, stay wires, and earthing.
3. Replacement of undersized conductor and provision of cradle guards at identified locations

S. No.	Description	UOM	Qty	Amount in Lacs
1	33kV Line Refurbishment-232 sq.mm AAAC	Ckt Km	40	345.43
2	33kV Line Refurbishment-148 sq.mm AAAC	Ckt Km	40	291.28

Cost Estimate:

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

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	232 sqmm All Alloy Aluminum Conductor AAAC	48240	M	185	89,08,481
2	150X 150mm RS joist (13 Mtr long)(34.6 ky Per meter)(Each 415.2kg)	280	EA	34,500	96,59,905
3	BOLT & NUT GI 16MMX75M HEX	600	KG	97	58,056
4	BOLT & NUT GI 16MMX200MM HEX	120	KG	97	11,611
5	ISA-50*50*6 GI Angel (4.6KG/M)	6000	KG	121	7,26,600
6	ISMC-75*40 GI Channel (7.24KG/M)	2320	KG	121	2,80,952
7	ISMC-100*50 GI Channel (9.76KG/M)	5760	KG	121	6,97,536
8	FLAT GI SIZE 50X6MM	4320	KG	89	3,82,320
9	FLAT GI SIZE 25X6 MM	1280	KG	89	1,13,280
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	160	EA	1,239	1,98,240
11	PIPE HDPE SIZE 25 MM	480	M	36	17,304
12	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	640	EA	8	5,075
13	WASHER MS SIZE 16MM DIA	120	KG	83	9,904
14	BOARD DANGER 33KV SIZE 8X10 INCH	640	EA	102	65,248
15	ANTICLIMBING DEVICE FOR TOWER (BRACKET)	640	EA	507	3,24,794
16	INSULATOR STAY (GUY/EGG) 11KV	640	EA	59	37,760
17	PLATE BASE RCC SIZE 450X450X50MM	920	EA	123	1,12,902
18	ANCHOR ROD SIZE 20MMX2100MM	640	EA	454	2,90,752
19	TENSION SCREW GI SIZE 750X20MM	640	EA	397	2,54,035
20	33 KV POLYMER DISC INSULATOR 120 KN	480	EA	944	4,53,120
21	H/W FITTING S/T FOR AAA PANTHER COMPRESS	480	EA	2,955	14,18,376

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
22	V-CROSS ARM STEEL FOR 11KV	480	EA	956	4,58,784
23	WIRE STAY GI 7/10 SWG	8000	KG	89	7,08,000
24	CLAMP TOP HAMPER FOR 11 KV PCC POLE.	480	EA	238	1,14,130
25	WIRE GI 4 SWG	21504	KG	65	14,08,297
26	COVER MVLC - 38 FOR GOAT COND	240	M	590	1,41,600
27	PIN INSULATOR POLYMER 33 KV (10 KN)	1680	EA	566	9,51,552
Subtotal Material					**2,78,08,613**
Contingency @ 3%					**8,34,258**
0.5 % of Mat as Mis (in CDB Only)					**1,43,214**
Total Material					**2,87,86,086**
Part B (Services)					**57,57,217**
Grand Total					**3,45,43,303**

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

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	148mm2 All Aluminium Aloy Conductor. AAAC	48240	M	97	46,67,702
2	150X 150mm RS joist (13 Mtr long)(34.6 ky Per meter)(Each 415.2kg)	280	EA	34,500	96,59,905
3	BOLT & NUT GI 16MMX75M HEX	600	KG	97	58,056
4	BOLT & NUT GI 16MMX200MM HEX	120	KG	97	11,611
5	ISA-50*50*6 GI Angel (4.6KG/M)	6000	KG	121	7,26,600
6	ISMC-75*40 GI Channel (7.24KG/M)	2320	KG	121	2,80,952
7	ISMC-100*50 GI Channel (9.76KG/M)	5760	KG	121	6,97,536
8	FLAT GI SIZE 50X6MM	4320	KG	89	3,82,320
9	FLAT GI SIZE 25X6 MM	1280	KG	89	1,13,280
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	160	EA	1,239	1,98,240

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
11	PIPE HDPE SIZE 25 MM	480	M	36	17,304
12	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	640	EA	8	5,075
13	WASHER MS SIZE 16MM DIA	80	KG	83	6,602
14	BOARD DANGER 33KV SIZE 8X10 INCH	640	EA	102	65,248
15	ANTICLIMBING DEVICE FOR TOWER (BRACKET)	640	EA	507	3,24,794
16	INSULATOR STAY (GUY/EGG) 11KV	640	EA	59	37,760
17	PLATE BASE RCC SIZE 450X450X50MM	920	EA	123	1,12,902
18	ANCHOR ROD SIZE 20MMX2100MM	640	EA	454	2,90,752
19	TENSION SCREW GI SIZE 750X20MM	640	EA	397	2,54,035
20	33 KV POLYMER DISC INSULATOR 120 KN	480	EA	944	4,53,120
21	H/W FITTING D/T FOR WOLF COMPRESSION.	480	EA	2,718	13,04,539
22	V-CROSS ARM STEEL FOR 11KV	480	EA	956	4,58,784
23	WIRE STAY GI 7/10 SWG	8000	KG	89	7,08,000
24	CLAMP TOP HAMPER FOR 11 KV PCC POLE.	480	EA	238	1,14,130
25	WIRE GI 4 SWG	21480	KG	65	14,06,725
26	COVER MVLC - 38 FOR GOAT COND	240	M	590	1,41,600
27	PIN INSULATOR POLYMER 33 KV (10 KN)	1680	EA	566	9,51,552
Subtotal Material					**2,34,49,125**
Contingency @ 3%					**7,03,474**
0.5 % of Mat as Misc. (in CDB Only)					**1,20,763**
Total Material					**2,42,73,362**
Part B (Services)					**48,54,672**
Grand Total					**2,91,28,034**

Benefits of Proposal:

Refurbishment of substations and feeders will benefit TPCODL through

- Improvement of voltage profile.
- Reduction in number of outages
- Increase in vertical clearances
- Reduction in equipment downtime
- Reduction in unserved energy
- Enhanced reliability of power supply
- Reduction in number of accidents.

Annexure 4 DPR of Establishment of Meter Testing Lab

Need of the Project:

To ensure high quality in bulk supply of meters, TPCODL has estimated that meter testing lab has to be developed in every Circle, these labs will ensure the statutory requirement of meter testing in pan TPCODL.

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

Below mentioned testing equipment are required to be procured in addition to facilities already available.

Material	Unit Rate (W/o Tax)	Rate with Tax	Year 1 Qty	Year -1 Cost (Cr)
SINGLE PHASE 20 POSITION BENCH	8600000.00	10148000.00	2	2.03
THREE PHASE 10 POSITION BENCH	8600000.00	10148000.00	2	2.03
Grand Total				4.06

One Meter Testing Lab has been envisaged in 03 circles each in 03 years to handle large volume of meters deployment with quality.

Test Equipment for meter testing in field

To ensure the statutory guidelines of testing of meters in field, and to address the meter testing on consumer request against fast/slow meter.

As per the guideline of OERC supply code, Clause No. 111(iii) "The licensee/supplier shall also conduct periodical inspection/testing of the meters at site as per the following schedule or earlier":

Distribution utility needs to test the consumers meters as per the below mentioned scheduled:

(a) Single phase meters at least once every five years
(b) LT three phase meters at least once every three years
(c) HT/EHT meters including MDI at least once a year

Below mentioned testing equipment are required to be procured.

Testing equipment	Year-1	Cost per equipment	Total Cost(Crs)
LT meter- testing equipment(onsite testing)	20	110000	0.26
HT meter- testing equipment(onsite testing)	5	600000	0.35
HT-CTPT testing equipment	5	1000000	0.59
Total			1.20

One LT Standard Meter per Division and one HT standard Meter (HT Meter Testing Equipment + HT CTPT Test Equipment) per Circle has been taken in to considerations.

Civil Works

To ensure smooth operation of Meter Management and establish a robust quality chain of meters and accessories with in area of operations, meter testing labs to be developed at 03 circles with new test bench facility. There will be one NABL accredited lab in 1st year of operations and then in subsequent years all 03 will be under NABL umbrella.

In each lab there shall be storage facility available for meters and allied equipment (10x10 Room) in addition to the existing structure.

In existing structure there will be requirement civil work with respect to false celling, luminous level and cooling to adhere the requirements of IS-17025:2019

Below table given tentative cost for developing of one MMG Lab at any of the three locations. Total cost of refurbishment of three labs will be 6.78 Cr.:

S.No.	Description	Cost (in Rs. Cr)
1	Creation of one bay measuring (10x16.5 m) including false ceiling , CC flooring , Bath & Toilet (10.5x 5M) etc.	0.6
2	Construction of Structural Shed	0.68
3	Furniture, Administration and Supervision Charges etc. *(For details refer Annexure - 1)*	0.24
Total		**1.52**

Annexure 5 DPR for refurbishment of 11kV Distribution Substations

Need of the Project:

Distribution Substation comprises of various equipment which perform specific task to ensure delivery of power supply at appropriate voltage to the end consumers. In substation, Transformers and LT feeders are key element serving power at the convenient voltage level as desired by the consumer. Generally, in a typical power distribution utility, most of the transformers are either approaching or have outlived their operational life but replacement of power distribution equipment merely on the basis of ageing is not advisable and other factors such as asset's health and criticality also needs to be considered. This is necessary as replacement of equipment is capital intensive and has direct impact on tariff. In our preliminary site visits, it is observed that existing DSS are in shabby condition with damaged or ill-maintained HT & LT protection equipment. All connections at pole mounted or plinth mounted substations are in very bad condition which not only cause high technical loss but also give rise to undue interruptions. The Aluminium lug / sockets used in DTs and other equipment in the substations are observed to be of inadequate size and proper crimping the lugs with the help of crimping tools found missing at almost all places. This is resulting into generation of hotspots and failure of connections... At all location, fuse cut-out arrangement found with oversize fuse wire. Most of the fuse cut-outs are installed at a lower height accessible to general public and animals thus creating safety hazard. Analysis of distribution transformer's failure data for the last few years also suggest that effective HV & LV protection might have reduced the transformer failure. For example, if there is no effective protection on LV side and any fault occur on the load side, the fault current will pass through the transformer for a higher duration till such time the fault is isolated by upstream network. Since the magnitude of the fault current is high, it is likely to produce mechanical and thermal stresses in the transformer causing pre-mature failure of the transformer. In such cases, major refurbishment helps in addressing the above mentioned issue by revamping the existing infrastructure with optimized capital investment.

In our preliminary visits, it is observed that existing DSS are in shabby condition with damaged or ill-maintained HT & LT protection of transformers. Data of Distribution transformer's failure in last year also suggest that effective HV & LV protection might have reduce the transformer failure. For example, if there is no effective protection on LV side and any fault occur on the load side, the fault current will pass through the transformer.

Fault current flowing through the transformers are significantly higher than the rated current and produce both mechanical and thermal stresses in the transformer causing pre-mature failure of the transformer.

Therefore, to protect the transformers from fault current if the fault is occurring at source or load end, we plan to carry out major overhauling of the existing DSS by providing switchgear controlled LV protection (either through LT ACB or MCCB) depending on the transformer rating. Similarly, condition of GO switch can be checked and replacement with new GO switch can be considered for better control at DT level.

Findings / observations during sample site visit:

1. At all locations DT structure is not as per standard and also rusted or broken and supported by some other means.
2. At most of the location, DTs condition seems to be deteriorated and leakage of oil, hotspot observed at terminations and jumpers.
3. At all location, fuse cut-out arrangement found with inappropriate fuse wire sizes. Most of the fuse cut-outs are installed at accessible height thus creating unsafe situation.
4. Earthing required if the results of existing earthing are poor.
5. Apart from few sub-stations, no physical fencing exists. There is possibility of easy access to live parts by human beings and animals and may endanger their safety.
6. Non-compliance of statutory guidelines witnessed at most of the location. There is no Danger boards, minimum safety clearances observed at these locations.
7. Iron / MS / GI structure are in dilapidated condition.
8. LT conductors are either having multiple joints or uneven size conductor are used for jumpering.

Recommendation:

Refurbishment is expenditure on an asset that creates a material extension to the Expected operational Life of the asset. It does not improve its attributes. This is distinct from maintenance work, which is carried out to ensure that an asset is able to perform its designated function for its normal Expected operational Life. Expenditure involved in refurbishment of GSS / DSS / Lines covered under Capital Expenditure.

Scope of the Proposal:

To ensure safety of the Equipment and life of human beings / animals, it is required to carry out refurbishment of Distribution Substation. Refurbishment job would encompass following scope and shall be covered under capital expenditure.

1. First of all, visible inspection and operational testing shall be done to identify the equipment / element which require replacement or strengthening.
2. Replacement of support structure at DSS which are either rusted or damaged. This includes all support porcelain insulators, MS / GI structure, channels etc. Dismantling of existing structure and erection of new structure at same location shall be considered in scope.
3. Inspection & testing would be done for Distribution Transformers and minor repairing like gasket replacement, tightening of connections etc. would be done.
4. Installation of Palm connectors at LT side of Distribution Transformers and shifting of LT termination from LT bushing to Palm connectors.
5. Replacement of all Jumpers and connections with standard conductor size to remove hotspot and standardization.
6. Replacement / provision of AB switch, DD Fuse units, LT ACB or MCCB (depending on Transformer ratings) and all associated cables / conductors.
7. Provision of new earthing in all DSS in line with standard drawings.
8. Installation of fencing to protect the DSS equipment and to maintain safety clearances.
9. Installation of Danger boards, Anti climbing devices, stay sets etc. to ensure safety & statutory compliance.
10. Civil works as & where basis.

Circle	Division	1000/800/630kVA	500/315/300kVA	250kVA
Bhubaneswar No-I Circle	BCDD-I ,BBSR	7	90	45
	BCDD-II ,BBSR	16	137	45
	BED-BBSR	10	107	45
	NED-Nimapara	0	5	1
	Total	**33**	**339**	**136**
Bhubaneswar No-II Circle	PED-Puri		36	10
	NED-Nayagarh		4	5
	KED-Khurda		31	60
	BED-Balugaon		2	5

	Total	**0**	**73**	**80**
Cuttack Circle	**CDD-I- CTC**	5	82	36
	CDD-II- CTC	5	60	36
	CED-CTC	1	40	36
	AED-Athagarh		3	9
	SED-Salipur		4	5
	Total	**11**	**189**	**122**
Paradip Circle	**KED-I-Kendrapara**		4	9
	KED-II-Marshaghai		2	2
	PDP-Paradip		3	5
	JED-J.S.Pur		0	8
	Total	**0**	**9**	**24**
Dhenkanal Circle	**DED-Dhenkanal**	1	9	35
	TED-Chainpal	1	13	44
	AED-Angul		8	9
	Total	**2**	**30**	**88**
CESU Total		**46**	**640**	**450**

Cost Estimate:

S.No.	Description	UOM	Rate	Qty	Amount in Lacs
1	DSS Refurbishment of 1000/800/630 kVA	EA	7.13	46	333.19
2	DSS Refurbishment of 500/315/300 kVA	EA	5.16	640	3,379.48
3	DSS Refurbishment of 250 kVA	EA	2.77	450	1,304.18

Estimate for 1000 kVA Distribution Substation Refurbishment

S No.	Item Description	Qty	Unit	Unit Rates	Amount (INR)
1	TRANSFORMER 1000 KVA 3PH-11KV	0	EA	1158746	0
2	ACB LT 400A	184	EA	40558	7462615
3	FUSE ELEMENT FOR 11KV DD FUSE 30AMP PINK	138	EA	61	8468
4	BOARD DANGER 11KV SIZE 8X10 INCH	92	EA	94	8685
5	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	322	EA	1239	398958
6	PIPE HDPE SIZE 25 MM	276	M	36	9950
7	LUG AL CRIMPING 95 SQ MM XLPE SINGLE HOLE	920	EA	9	8464

S No.	Item Description	Qty	Unit	Unit Rates	Amount (INR)
8	CABLE 1.1KV AL 1X300 SQ MM UNAR	1104	M	230	253445
9	LUG AL CRIMPING 300 SQ MM XLPE ONE HOLE	736	EA	45	33341
10	WIRE STAY GI 7/10 SWG	4830	KG	89	427455
11	CABLE 1.1KV AL 1X630 SQ MM UNAR XLPE	4140	M	466	1930234
12	LUG AL CRIMPING 630 SQ MM XLPE ONE HOLE	736	EA	136	99875
13	ISMC-75*40 GI Channel (7.24KG/M)	7820	KG	121	947002
14	ISA-50*50*6 GI Angel (4.6KG/M)	3220	KG	121	389942
15	FLAT GI SIZE 50X6MM	1380	KG	89	122130
16	BOLT & NUT GI 16MMX75M HEX	460	KG	97	44510
17	BOLT & NUT GI 12MMX75MM HEX	230	KG	97	22255
18	BOLT & NUT GI 16MMX200MM HEX	230	KG	97	22255
19	WASHER GI SIZE 12MM DIA	23	KG	118	2714
20	WASHER GI SIZE 16MM DIA	23	KG	118	2714
21	TEMPLETE FOR TRANSFORMER MAINT.RECORD	46	EA	80	3664
22	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	92	EA	25817	2375184
23	FRP CROSS ARM 1150MM 11KV	92	EA	499	45945
24	CLAMP TOP HAMPER FOR 11 KV PCC POLE.	92	EA	238	21875
25	11KV PIN INSULATOR 5 KN COMPOSIT POLYMER	276	EA	236	65136
26	GO SWITCH FOR 11 KV 200 AMPS	46	EA	9,960	458160
27	LA 9KV 5KA FOR 11KV POLYMERIC	138	EA	1156	159583
28	ANTICLIMBING DEVICE FOR 11 M PCC POLE	92	EA	242	22255
29	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	138	EA	1600	220788
30	CONDUCTOR ACSR RABBIT PVC 61.70 SQ MM	1058	M	56	59661
31	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	138	EA	280	38593
32	PLATE BASE RCC SIZE 450X450X75MM	92	EA	259	23828
33	CONNECTOR MINI WEDGE 25 SQ MM TO DOG	138	EA	216	29825
34	BUS BAR COPPER HDT SIZE 75X10MM	46	M	2191	100795
35	CONNECTOR PALM LT BRASS 2000A 1000KVA TR	184	EA	3374	620849

S No.	Item Description	Qty	Unit	Unit Rates	Amount (INR)
36	CABLE 1.1KV AL 4CX300 SQ MM XLPE ARM	2760	M	1198	3305900
37	JT. KIT O/D 1.1KV XLPE 4X300 SQ.MM HS	368	EA	1472	541836
38	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	552	M	872	481344
39	FLAT GI SIZE 25X6 MM	920	KG	89	81420
40	BOLT & NUT GI 12MMX50MM HEX	92	KG	97	8902
41	FRP FENCING	1932		3086	5962152
Subtotal Material					**2,68,22,705**
Contingency @ 3%					**8,04,681**
0.5 % of Mat as Misc. (in CDB Only)					**1,38,137**
Total Material					**2,77,65,523**
Part B (Services)					**55,53,105**
Grand Total					**3,33,18,627**

Estimate for 500 kVA Distribution Substation Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	TRANSFORMER 630KVA 3PH 11KV/433V CU	0	EA	7,18,689	-
2	ACB LT 400A	1280	EA	40,558	5,19,13,843
3	BOARD DANGER 11KV SIZE 8X10 INCH	1280	EA	94	1,20,832
4	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	4480	EA	1,239	55,50,720
5	LUG AL CRIMPING 95 SQ MM XLPE SINGLE HOLE	15360	EA	9	1,41,312
6	FUSE ELEMENT FOR 11KV DD FUSE 30AMP PINK	1920	EA	61	1,17,811
7	WIRE STAY GI 7/10 SWG	48000	KG	89	42,48,000
8	CABLE 1.1KV AL 1X630 SQ MM UNAR XLPE	40960	M	466	1,90,97,190
9	LUG AL CRIMPING 630 SQ MM XLPE ONE HOLE	10240	EA	136	13,89,568
10	ISMC-75*40 GI Channel (7.24KG/M)	108800	KG	121	1,31,75,680
11	ISA-50*50*6 GI Angel (4.6KG/M)	44800	KG	121	54,25,280
12	FLAT GI SIZE 50X6MM	19200	KG	89	16,99,200

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
13	BOLT & NUT GI 16MMX75M HEX	6400	KG	97	6,19,264
14	BOLT & NUT GI 12MMX75MM HEX	3200	KG	97	3,09,632
15	BOLT & NUT GI 16MMX200MM HEX	3200	KG	97	3,09,632
16	WASHER GI SIZE 12MM DIA	320	KG	118	37,760
17	WASHER GI SIZE 16MM DIA	320	KG	118	37,760
18	TEMPLETE FOR TRANSFORMER MAINT.RECORD	640	EA	80	50,976
19	CONNECTOR PALM LT BRASS 1000A 630KVA TRF	2560	EA	1,350	34,55,795
20	150X 150mm RS joist (11 Mtr long)(30.6 kv Per meter)(Each 336.6kg)	1280	EA	25,817	3,30,46,042
21	FRP CROSS ARM 1150MM 11KV	1280	EA	499	6,39,232
22	CLAMP TOP HAMPER FOR 11 KV PCC POLE.	1280	EA	238	3,04,346
23	11KV PIN INSULATOR 5 KN COMPOSIT POLYMER	3840	EA	236	9,06,240
24	GO SWITCH FOR 11 KV 200 AMPS	640	EA	9,960	63,74,402
25	LA 9KV 5KA FOR 11KV POLYMERIC	1920	EA	1,156	22,20,288
26	ANTICLIMBING DEVICE FOR 11 M PCC POLE	1280	EA	242	3,09,632
27	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	1920	EA	1,600	30,71,827
28	CONDUCTOR ACSR RABBIT PVC 61.70 SQ MM	14720	M	56	8,30,061
29	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	1920	EA	280	5,36,947
30	PLATE BASE RCC SIZE 450X450X75MM	1280	EA	259	3,31,520
31	CONNECTOR MINI WEDGE 25 SQ MM TO DOG	1920	EA	216	4,14,950
32	BUS BAR COPPER HDT SIZE 75X10MM	640	M	2,191	14,02,368
33	PIPE HDPE SIZE 25 MM	7680	M	36	2,76,864
34	CABLE 1.1KV AL 4CX300 SQ MM XLPE ARM	19200	M	1,198	2,29,97,568
35	JT. KIT O/D 1.1KV XLPE 4X300 SQ.MM HS	2560	EA	1,472	37,69,293
36	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	3840	EA	872	33,48,480

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
37	FLAT GI SIZE 25X6 MM	6400	M	89	5,66,400
38	BOLT & NUT GI 12MMX50MM HEX	640	EA	97	61,926
39	FRP Fencing	26880	Sq.M	3,086	8,29,51,680
Subtotal Material					**27,20,60,322**
Contingency @ 3%					**81,61,810**
0.5 % of Mat as Misc. (in CDB Only)					**14,01,111**
Total Material					**28,16,23,242**
Part B (Services)					**5,63,24,648**
Grand Total					**33,79,47,890**

Estimate for 250 kVA Distribution Substation Refurbishment

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	250 kVA ,11/0.4 KV(AL) Transformer with tape changer, BIS Energy level-II	-	EA	3,16,771	-
2	BOX DIST.WITH 500A 50KA TP MCCB 5 O/G	450	EA	56,640	2,54,88,000
3	FRP CROSS ARM 1150MM 11KV	900	EA	499	4,49,460
4	CLAMP TOP HAMPER FOR 11 KV PCC POLE.	900	EA	238	2,13,993
5	11KV PIN INSULATOR 5 KN COMPOSIT POLYMER	2,700	EA	236	6,37,200
6	GO SWITCH FOR 11 KV 200 AMPS	450	EA	9,960	44,82,001
7	LA 9KV 5KA FOR 11KV POLYMERIC	1,350	EA	1,156	15,61,140
8	FUSE UNIT DD 11KV 200A 1P SIL.RUBBER W/B	1,350	EA	1,600	21,59,879
9	FUSE ELEMENT FOR 11KV DD FUSE 20A WHITE	1,350	EA	58	78,057
10	CONDUCTOR ACSR RABBIT PVC 61.70 SQ MM	10,350	EA	56	5,83,637
11	CABLE 1.1KV AL 4CX150 SQ MM ARM	3,600	EA	636	22,90,284
12	GLAND FOR ARM CABLE 4X150 SQ.MM	900	M	227	2,03,904
13	ISMC-125*65 GI Channel (13.3KG/M)	39,686	M	121	48,05,914
14	ISMC-100*50 GI Channel (9.76KG/M)	26,811	EA	121	32,46,812
15	ISMC-75*40 GI Channel (7.24KG/M)	44,861	KG	121	54,32,607
16	ISA-50*50*6 GI Angel (4.6KG/M)	33,993	KG	121	41,16,552
17	FLAT GI SIZE 50X6MM	22,914	KG	89	20,27,889
18	FLAT GI SIZE 25X6 MM	7,578	KG	89	6,70,653

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
19	Hexagonal Bolts with Nuts(GI)	2,723	KG	97	2,63,429
20	WASHER GI SIZE 16MM DIA	2,048	KG	118	2,41,605
21	WASHER GI SIZE 12MM DIA	873	KG	118	1,03,014
22	LUG AL CRIMPING 95 SQ MM XLPE SINGLE HOLE	4,500	KG	9	41,400
23	LUG AL 70 SQ MM FOR 7/8 SWG WIRE/EARTHING	24,300	KG	8	1,92,699
24	LUG AL CRIMPING 150 SQ MM XLPE ONE HOLE	3,600	EA	16	56,016
25	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	1,350	EA	280	3,77,541
26	TEMPLETE FOR TRANSFORMER MAINT.RECORD	450	EA	80	35,843
27	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	2,250	EA	1,239	27,87,750
28	PIPE HDPE SIZE 25 MM	10,350	EA	36	3,73,118
29	WIRE STAY GI 7/10 SWG	32,715	EA	89	28,95,278
30	CONNECTOR MINI WEDGE 25 SQ MM TO DOG	1,350	M	216	2,91,762
31	FRP Fencing	12,600	Sq.M	3,086	3,88,83,600
Subtotal Material					**10,49,91,035**
Contingency @ 3%					**31,49,731**
0.5 % of Mat as Misc. (in CDB Only)					**5,40,704**
Total Material					10,86,81,470
Part B (Services)					**2,17,36,294**
Grand Total					**13,04,17,763**

Benefits of Proposal:

- Enhance the life of Assets and reduce the no. of tripping due to LT faults.
- Safety of Public and animal after installation of Fencing and Earthing.
- Improved Reliability.

Annexure 6 DPR of Personal Protective Equipment, Safety & Testing Equipment

Need of the Project:

Existing Network condition poses safety threat to the human beings and animals moving near power distribution network. It also becomes difficult of ensuring delivery of reliable & safe power supply to the end user. Every area has different characteristics and thus have different challenges. However, some of the common challenges, which are witnessed during our visits and appears to be unsafe from safety point of view to our Employees are non- availability of Personal Protective Equipment (PPE), Safety tools and Various Testing equipment. Safety Gloves are available at some place but employees are not aware about its healthiness.

Analysis to prove Need of Project:

Table 1 depicts the No. of Fatal & Non-fatal accident of Human Being happened in last two year.

	FY17-18 (Human)		FY18-19 (Human)		H1 19-20 (Human)	
Line	**Fatal**	**Non-Fatal**	**Fatal**	**Non-Fatal**	**Fatal**	**Non-Fatal**
33KV	0	1	3	4	0	1
11KV	15	24	17	14	13	6
LV	28	1	14	4	13	1
Total	**43**	**26**	**34**	**22**	**26**	**8**

Table 1: No. of Fatal & Non-fatal accident of Human Being

From the above table, it is observed that major of the fatal, non-fatal accident occurred in 11KV & LV network. On analysis of last two years accident data and discussion with operation team and Safety team, major problem found among the employee was absence of PPE and non-use of PPE and safety tools. Another major problem is the awareness among the employee about the regulation that their employer should provide them the PPE and train them on how to use those PPE.

Recommendation:

There are many locations, which are not complying with the statutory guidelines and hence require funds and efforts to make it safe network. Corrective action proposed was to procure the Personal Protective Equipment and provide them training on use and maintenance of PPEs. Safety glasses and safety gloves are probably one of the most common (and effective!) forms of PPE while work at ground. This is because any

substance, whether corrosive or not, and any material, sharp or not, can be hazardous when it comes in contact with your eyes and at the same time it protects you from any flash. Moreover, Use of safety Belt and Helmet plays a pivotal role while working at height. It is important to know that safety equipment provided on the job should meet Personal Protective Equipment Regulation, and that it is most effective when it meets the correct size, fit and height of its user. In addition to that various Safety and Testing equipment is required to ensure that network and asset is safe to use.

Scope of the Proposal:

To ensure safe working environment during operation, maintenance testing of medium/high voltage power cables and electrical equipment including switchgear and transformers following safety items are proposed.

S No.	Item Description	Quantity
1	FIRE EXTINGUISHER DCP 25KG CAP.	313.00
2	FIRE EXTINGUISHER DCP 50KG CAP.	313.00
3	FIRE EXTINGUISHER ABC 9KG CAP.	1,457.00
4	FIRE EXTINGUISHER ABC 4 KG CAPACITY.	1,166.00
5	FIRE EXTINGUISHER ABC 6 KG CAPACITY.	1,585.00
6	FIRE EXTINGUISHER CO2 CAP 4.5KG	1,514.00
7	FIRE EXTINGUISHER MECH FOAM 9 LTR	318.00
8	FIRE EXTINGUISHER MECH FOAM 50 LTR	15.00
9	2KG CLEANING AGENT	2.00
10	4 KG CLEANING AGENT	2.00
11	SAFETY BELT	1,500.00
12	HELMET SAFETY W/VOLT INDUCTION TESTER	1,000.00
13	HELMET SAFETY HDPE INDUSTRIAL	3,000.00
14	FIRST AID BOX (FS - 401)	300.00
15	SAFETY SHOE WITH STEEL TOE	3,500.00
16	GLOVES SOFT ELECT SAFETY 500 VOLTS	500.00
17	GLOVES RUBBER 16IN INSULATION GRADE 11KV	1,600.00
18	GLOVES RUBBER 16IN INSULATION GRADE 33KV	1,200.00
19	GLOVES RUBBER FOR BATTERY MAINT.	300.00
20	REFLECTIVE JACKET FOR SAFETY	2,000.00
21	LADDER FIBRE GLASS 3 FOLD 9 MTR HEIGHT	500.00
22	LADDER FIBRE GLASS FOLDING 12 MTR HEIGHT	200.00
23	MAT RUBBER 33KV 3 MM THICK	500.00

S No.	Item Description	Quantity
24	BATTERY OPERATED TELESCOPIC TREE PRUNER TWO NOS BATTERY AND ONE NO. CHARGER.MAKE- STIHL Model No: HTA 85	90.00
25	EMERGENCY LIGHT	300.00
26	TRAFFIC CONE HDPE REFLECTIVE	1,500.00
27	CAUTION TAPE DANGER HDPE 100MM WIDTH	30000
28	CAUTION TAPE DANGER HDPE 150X0.3MM	20000
29	INSULATION TESTER 2.5KV/5KV 50 OHMS	5
30	INSULATION TESTER DIGITAL 0-5KV	10
31	INSULATION TESTER DIGITAL 500V-1000V	10
32	OIL TEST SET 100KV MOTORIZED	10
33	EARTH TESTER DIGITAL	20
34	CONTACT RESISTANCE METER (CRM 100B)	5
35	DIGITAL LOW RESISTANCE OHMMETER TRM104	5
36	FULLY AUTO TAN DELTA & RESISTIVITY KIT	5
37	TRANSFORMER RATIO METER TRM-200	5
38	DIGITAL MULTIMETER AC/DC 40mA to 20A	50
39	POWER QUALITY METER	5
40	SECONDARY CURRENT INJECTION WITH TIMER	5
41	TOOLS BATTERY MAINTENANCE	5
42	METER DIGITAL CAPACITANCE	20
43	DISCHARGE ROD FOR 11-33-66KV	50
44	TOOL KIT HD COMPLETE WITH CANVAS BAG	50
45	DRILL M/C/HAMMER BATTERY OPERATED CRH	20
46	DRILLING MACHINE	50
47	CT ANALYZER MODEL CTERP-2000	5
48	NEON TESTER 11KV - 33KV - 66KV	20
49	CABLE CUTTER MECHANICAL	20
50	OIL MOISTURE TESTER	1
51	CLAMP ON EARTH RESISTANCE TESTER	10
52	TRANSF.WINDING RESISTANCE METER TRM 103	1
53	CAPACITANCE & TAN DELTA SET CTS-500	5
54	PRIMARY INJECTION TEST SET 0-2000A	1
55	CRIMPING TOOL HAND OPERATED 50-400 SQ MM	20
56	CHART SHOCK TREATMENT LAMINATED	300
57	Respirator	20
58	OIL PUMP HAND OPERATED	10
59	INFRARED THERMO - SCANNING CAMERA	5
60	ULTRASONIC INSPECTION KIT	1
61	PORTABLE TR OIL AND GAS DGA INSTRUMENT	1

Cost Estimate:

S No.	Item Description	Quantity	Unit	TPCODL/ CDB Rates	Amount (INR)
1	FIRE EXTINGUISHER DCP 25KG CAP.	313.00	EA	12,000	37,56,000
2	FIRE EXTINGUISHER DCP 50KG CAP.	313.00	EA	16,000	50,08,000
3	FIRE EXTINGUISHER ABC 9KG CAP.	1,457.00	EA	2,000	29,14,000
4	FIRE EXTINGUISHER ABC 4 KG CAPACITY.	1,166.00	EA	1,250	14,57,500
5	FIRE EXTINGUISHER ABC 6 KG CAPACITY.	1,585.00	EA	1,700	26,94,500
6	FIRE EXTINGUISHER CO2 CAP 4.5KG	1,514.00	EA	4,556	68,97,315
7	FIRE EXTINGUISHER MECH FOAM 9 LTR	318.00	EA	1,700	5,40,600
8	FIRE EXTINGUISHER MECH FOAM 50 LTR	15.00	EA	11,210	1,68,150
9	2KG CLEANING AGENT	2.00	EA	6,500	13,000
10	4 KG CLEANING AGENT	2.00	EA	11,000	22,000
11	SAFETY BELT	1,500.00	EA	2,317	34,74,900
12	HELMET SAFETY W/VOLT INDUCTION TESTER	1,000.00	EA	459	4,59,380
13	HELMET SAFETY HDPE INDUSTRIAL	3,000.00	EA	127	3,81,750
14	FIRST AID BOX (FS - 401)	300.00	EA	350	1,04,961
15	SAFETY SHOE WITH STEEL TOE	3,500.00	EA	976	34,15,090
16	GLOVES SOFT ELECT SAFETY 500 VOLTS	500.00	PAA	1,460	7,29,770
17	GLOVES RUBBER 16IN INSULATION GRADE 11KV	1,600.00	PAA	1,671	26,73,472
18	GLOVES RUBBER 16IN INSULATION GRADE 33KV	1,200.00	PAA	309	3,71,256
19	GLOVES RUBBER FOR BATTERY MAINT.	300.00	EA	68	20,460
20	REFLECTIVE JACKET FOR SAFETY	2,000.00	EA	125	2,50,000
21	LADDER FIBRE GLASS 3 FOLD 9 MTR HEIGHT	500.00	EA	17,270	86,35,000
22	LADDER FIBRE GLASS FOLDING 12 MTR HEIGHT	200.00	EA	23,001	46,00,200
23	MAT RUBBER 33KV 3 MM THICK	500.00	EA	2,940	14,70,000
24	BATTERY OPERATED TELESCOPIC TREE PRUNER TWO NOS BATTERY AND ONE NO. CHARGER.MAKE- STIHL Model No: HTA 85	90.00	EA	56,000	50,40,000
25	EMERGENCY LIGHT	300.00	EA	792	2,37,600
26	TRAFFIC CONE HDPE REFLECTIVE	1,500.00	EA	264	3,96,000
27	CAUTION TAPE DANGER HDPE 100MM WIDTH	30000	M	2	62,700
28	CAUTION TAPE DANGER HDPE 150X0.3MM	20000	M	15	3,08,000
29	INSULATION TESTER 2.5KV/5KV 50 OHMS	5	EA	32,051	1,60,254
30	INSULATION TESTER DIGITAL 0-5KV	10	EA	1,75,000	17,50,000
31	INSULATION TESTER DIGITAL 500V-1000V	10	EA	4,350	43,500
32	OIL TEST SET 100KV MOTORIZED	10	EA	35,640	3,56,404
33	EARTH TESTER DIGITAL	20	EA	18,563	3,71,250
34	CONTACT RESISTANCE METER (CRM 100B)	5	EA	3,50,000	17,50,000

S No.	Item Description	Quantity	Unit	TPCODL/ CDB Rates	Amount (INR)
35	DIGITAL LOW RESISTANCE OHMMETER TRM104	5	EA	1,39,700	6,98,500
36	FULLY AUTO TAN DELTA & RESISTIVITY KIT	5	EA	11,65,000	58,25,000
37	TRANSFORMER RATIO METER TRM-200	5	EA	4,84,000	24,20,000
38	DIGITAL MULTIMETER AC/DC 40mA to 20A	50	EA	80,000	40,00,000
39	POWER QUALITY METER	5	EA	4,00,000	20,00,000
40	SECONDARY CURRENT INJECTION WITH TIMER	5	EA	2,00,000	10,00,000
41	TOOLS BATTERY MAINTENANCE	5	EA	1,37,280	6,86,400
42	METER DIGITAL CAPACITANCE	20	EA	29,625	5,92,504
43	DISCHARGE ROD FOR 11-33-66KV	50	EA	11,550	5,77,500
44	TOOL KIT HD COMPLETE WITH CANVAS BAG	50	EA	20,000	10,00,000
45	DRILL M/C/HAMMER BATTERY OPERATED CRH	20	EA	42,500	8,50,000
46	DRILLING MACHINE	50	EA	5,000	2,50,000
47	CT ANALYZER MODEL CTERP-2000	5	EA	7,48,125	37,40,625
48	NEON TESTER 11KV - 33KV - 66KV	20	EA	15,620	3,12,400
49	CABLE CUTTER MECHANICAL	20	EA	48,461	9,69,220
50	OIL MOISTURE TESTER	1	EA	3,50,000	3,50,000
51	CLAMP ON EARTH RESISTANCE TESTER	10	EA	2,500	25,000
52	TRANSF.WINDING RESISTANCE METER TRM 103	1	EA	1,69,862	1,69,862
53	CAPACITANCE & TAN DELTA SET CTS-500	5	EA	1,17,500	5,87,500
54	PRIMARY INJECTION TEST SET 0-2000A	1	EA	3,50,000	3,50,000
55	CRIMPING TOOL HAND OPERATED 50-400 SQ MM	20	EA	5,940	1,18,800
56	CHART SHOCK TREATMENT LAMINATED	300	EA	53	15,930
57	Respirator	20	EA	41	816
58	OIL PUMP HAND OPERATED	10	EA	1,213	12,128
59	INFRARED THERMO - SCANNING CAMERA	5	EA	7,10,000	35,50,000
60	ULTRASONIC INSPECTION KIT	1	EA	12,00,000	12,00,000
61	PORTABLE TR OIL AND GAS DGA INSTRUMENT	1	EA	30,00,000	30,00,000
	Total				**9,48,35,196**

Benefits of the Project:

- Personal protective equipment and Safety and Testing Tools protects its user against any physical harm or hazards that the workplace environment may present.
- It is important because it exists as a preventative measure for industries that are known to be more hazardous, like manufacturing, mining and Electricity.

- An employee will be aware on which equipment is required of which tasks, and what it is meant to protect will help employee use of PPE that are provided to employee by the employer, which is the best way to ensure no or less injury or illness.
- Use of PPE also increases the quality of your workday and reduce the Man-hour lost due to any kind of injuries or illness

Annexure 7 DPR for Loss reduction initiative

Need of the Project:

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.

Meter Requirement for Loss reduction:

Count of meters under different fault category have been captured and an estimate has been prepared based on that. There are 1.06L No meters cases, 1.49 Defective meter cases which are already persisting. It is expected that additional 70 K meters will get defective per annum (2.5% of existing meters population) and in addition to this there are 6.25 mechanical meters in circuit. This DPR for three years targets to replace 10 Lac meters out of 10.25 Lac meters which are contributing to losses.

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

Type of meter	Reason for replacement	Year (20-21)	Meter Cost	Installation Cost Yr 1	Total Cost
Single Phase meters	No Meters	106000	7.21	3.48	10.68
	Old Defective Meters	93100	6.33	3.26	9.59
	New Defective Expected	0	0.00	0.00	0.00
	Electromechanical Meter		0.00	0.00	0.00
Three Phase Whole Current meters	No Meters	1100	0.24	0.05	0.29
	Defective Meters	7000	1.50	0.34	1.84
	Electromechanical Meter	800	0.17	0.04	0.21
Three Phase LT CT meters	No Meters	78	0.01	0.01	0.03
	Defective Meters	297	0.05	0.05	0.10
	Electromechanical Meter	50	0.01	0.01	0.02
Three Phase HT CT meters	No Meters	0	0.00	0.00	0.00
	Defective Meters	84	0.03	0.01	0.04
	Electromechanical Meter	0	0.00	0.00	0.00
Grand Total		208509	15.56	7.25	22.80

Plan for Replacement of meters

Type of meter	Reason for replacement	Year 1 (20-21)	Year 2 (21-22)	Year 3 (22-23)	Total
Single Phase meters	No Meters	106000	0	0	996000
	Old Defective Meters	150000	0	0	
	New Defective Expected	0	70000	70000	
	Electromechanical Meter	70000	270000	260000	
Three Phase Whole Current meters	No Meters	1100	0	0	16900
	Defective Meters	7000	4000	4000	
	Electromechanical Meter	800	0	0	
Three Phase LT CT meters	No Meters	78	0	0	1425
	Defective Meters	297	500	500	
	Electromechanical Meter	50	0	0	
Three Phase HT CT meters	No Meters	0	0	0	284
	Defective Meters	84	100	100	
	Electromechanical Meter	0	0	0	
Grand Total		71.20	344600	334600	1014609

Meter Boxes requirement:

For installation of meters, meter box will be required to give it protection from external environment and theft. These boxes also help in ensuring increased life of meters. Below table provide details of the expenditure for installation of meters.

Boxes	Year-1 (Count)	Cost per unit (Rs)	Year -1 Cost (Cr)
Single phase	199100	267.00	5.32
Poly Phase	8900	835.00	0.74
LTCT	425	5829.34	0.25
CTPT unit/Metering Cubical	84	53108.89	0.45
Total	208509		6.75

Cable Requirement:

In no meter and defective meter cases, it is expected that in 10% of cases will be there in which cable replacement will be required on account of defective or poor condition of cable:

Cable Size (Sq mm)	Year-1 (Cable length -km)	Cost per Meter (Rs)	Cost of Cable (In Cr)	Rate of Installation Rs / connection	Inst cost	Total Cost (Cr)
2*4	1194.6	49.11	5.87	650.00	3.11	8.97
2*10	358.38	67.86	2.43	700.00	0.84	3.27
4*10	22.3	90.27	0.20	950.00	0.07	0.27
4*25	44.6	150.45	0.67	950.00	.21	0.88
4*95	2.8	414.48	0.11	1850.05	0.01	0.13
4*150	1.8	631.30	0.12	2004.29	0.01	0.13
Grand Total			9.40		**4.25**	**13.65**

Note:

It has been estimated that in meter replacement cases, 30% cases will be there in which cable replacement will be required owing to damaged cable, short length of cable etc.

Rate of installation of cable of cable is rate for installation of one length of cable up 30 M.

Metering Accessories requirements:

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

Accessories	Year-1 (Count)	Cost per unit (Rs)	Material Cost Yr-1	Rate of Installation	Inst Cost Yr-1	Total Cost
Modem	**3565**	**4012.00**	**1.43**	**232.22**	**0.08**	**1.51**
Poly carbonate seals	**1146800**	**4.54**	**0.52**	**0.00**	**0.00**	**0.52**
Total			**1.95**		**0.08**	**2.03**

Energy Auditing at DT Level:

To leverage the latest metering technology in Energy auditing at DT level, it has been envisaged that Smart DT meters should be deployed. This will enable DT level energy auditing and in developing area specific strategy to reduce losses. Below table elaborates the requirement of smart meters in next 03 years:

DT Meter replacement					
Type of meter	**Reason for replacement**	**Count**	**Cost of Mat**	**Cost of Installation**	**Total CAPEX for FY 20-21**
		(20-21)	**(20-21)**	**(20-21)**	
DT Meters	New Meter Installation	4000	6.38	2.29	8.665
	Defective Meters	0	0	0	0
HES		3			3
MDM/Storage and IT accessories		3.7			3.7
Grand Total		15.36			15.36

To ensure DT level energy audit and thus area wise loss level calculation, energy audit report needs to be generated. Hence DT meter are to be installed on all the DTs ≥ 100 KVA transformer in next 3 years' time. Smart DT CT meters of 100/5 A ratings will be used. 30% DT are having meters already installed. So those DTs will not be considered here until they get faulty.

Benefits:

1. Area Specific Audit.
2. DT Phase balancing
3. Network Planning
4. New connection planning.

Meter Reading

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 Android Phone and Bluetooth Printer .Solution has ready to use Spot Billing Solution framework which can be easily customized and delivered quickly depending upon client requirement On Premise Deployment based on Preference .Integration with ERP (SAP etc.) System it has Source Code Ownership & Unlimited users/devices.

Activity	Sub - Activity	DPR Cost (In Cr)
Solution for Meter reading and Spot billing	Custom Solution Cost with Billing Module Calculation (Mobile App) 100% Offline	0.2
	On Premise Server Configuration - Production Environment Database Server	**2.8**
	On Premise Server Configuration - Production Environment Application Server (2X)	
	On Premise Server Configuration - Disaster Recovery / UAT Server Application Server (2X)	
Total		3.0

Benefits:

The given proposal for the designing of Android App/software if implemented will benefit the company via:

- Reduce the time and effort wasted while comparing the readings from the photo and that stored in the records.
- Enable us to cross check all the readings thus improving the efficiency of the whole process.
- Prevent any errors/wrong reading that might creep in while reading the meters
- Improved Cash Flow of the company
- Savings on Backend/Admin staff
- Savings on Per Meter Reading with 3rd Party Meter Readers due to single trip for meter reading and bill handover
- Saving on Stationary cost
- Increased Customer Satisfaction
- Reduction in Customer Complaints
- Reduction in Due and Disconnection date
- Increased efficiency and better decision systems.
- Instant access to MIS after billing information is fed into the server the same day.
- The overall cost of meter reading and bill distribution will be reduced up to 30% per meter reading.

Annexure 8 DPR for 11KV Feeder to optimize existing lengthy 11KV Feeders

Need of the Project

Some of the 11KV Feeders are lengthy and contributing to high technical loss and poor voltage regulation to the consumers fed from the equipment connected at the tail end of the feeder. Technical loss can be reduced and voltage regulation can be improved by reducing the length of the feeder and this can be done by introducing new 11KV feeder from other source and connected at the appropriate length thereby optimizing the existing length. In this DPR, approx. 55 ckt km considered to reduce the length of around 7 – 8 nos 11KV feeders where technical losses are high and voltage regulation is poor.

Cost estimate:

Cost estimate to lay 55 ckt Kms of 11KV ckt is mentioned below:

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	125 sqmm All Alloy Aluminum Conductor AAAC	165825	M	90.71	1,50,41,421.95
2	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	1650	EA	25817.22	4,25,98,413.00
3	Hexagonal Bolts with Nuts(GI)	1960	KG	96.76	1,89,668.95
4	Hexagonal Bolts with Nuts(GI)	414	KG	96.76	40,019.94
5	ISA-50*50*6 GI Angel (4.6KG/M)	17394	KG	121.10	21,06,383.13
	ISMC-75*40 GI Channel (7.24KG/M)	7975	KG	121.10	9,65,772.50
6	ISMC-100*50 GI Channel (9.76KG/M)	19800	KG	121.10	23,97,780.00
7	FLAT GI SIZE 50X6 MM	13200	KG	88.50	11,68,200.00
8	FLAT GI SIZE 25X6 MM	4070	KG	88.50	3,60,195.00
9	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	275	EA	1239.00	3,40,725.00
10	PIPE HDPE SIZE 25 MM	825	M	37.47	30,908.63
11	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1100	EA	7.93	8,722.56
12	WASHER MS SIZE 16MM DIA	320	KG	100.46	32,157.25

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
13	Danger Plate	1650	EA	94.40	1,55,760.00
14	ANTICLIMBING DEVICE FOR 11 M PCC POLE	1650	EA	241.90	3,99,135.00
15	HT STAY INSULATOR TYPE-C	2200	EA	59.00	1,29,800.00
16	PLATE BASE RCC SIZE 450X450X50MM	3850	EA	122.72	4,72,472.00
17	ANCHOR ROD SIZE 20MMX2100MM	2200	EA	454.30	9,99,460.00
18	TENSION SCREW GI SIZE 750X20MM	2200	EA	396.93	8,73,242.48
19	Disc Insulator(B&S) 70KN Polymer	1650	EA	1357.00	22,39,050.00
20	HW FITTING(B&S) 70KN 3 BOLT	1650	EA	413.00	6,81,450.00
21	11 KV V cross arm (10.2Kg each)	1100	EA	955.80	10,51,380.00
22	7/10 SWG G I stay wire, Grade -2	22000	KG	88.50	19,47,000.00
23	CLAMP TOP HAMPER FOR 11 KV PCC POLE.	1100	EA	237.77	2,61,547.00
24	WIRE GI 4 SWG	29568	KG	54.86	16,22,047.26
25	GUARD POLIPRO FOR OVERHEAD COND.	1650	M	348.68	5,75,319.03
26	11 KV PIN INSULATOR POLYMER	4950	EA	236.00	11,68,200.00
Subtotal Material					**7,78,56,230.66**
Contingency @ 3%					**23,35,686.92**
0.5 % of Mat as Misc. (in CDB Only)					**3,89,281.15**
Total Material					**8,05,81,198.73**
Part B (Services)					**1,61,16,239.75**
Grand Total					**9,66,97,438.48**

Annexure 9 DPR for Refurbishment of 33/11kV GSS for SCADA Operation

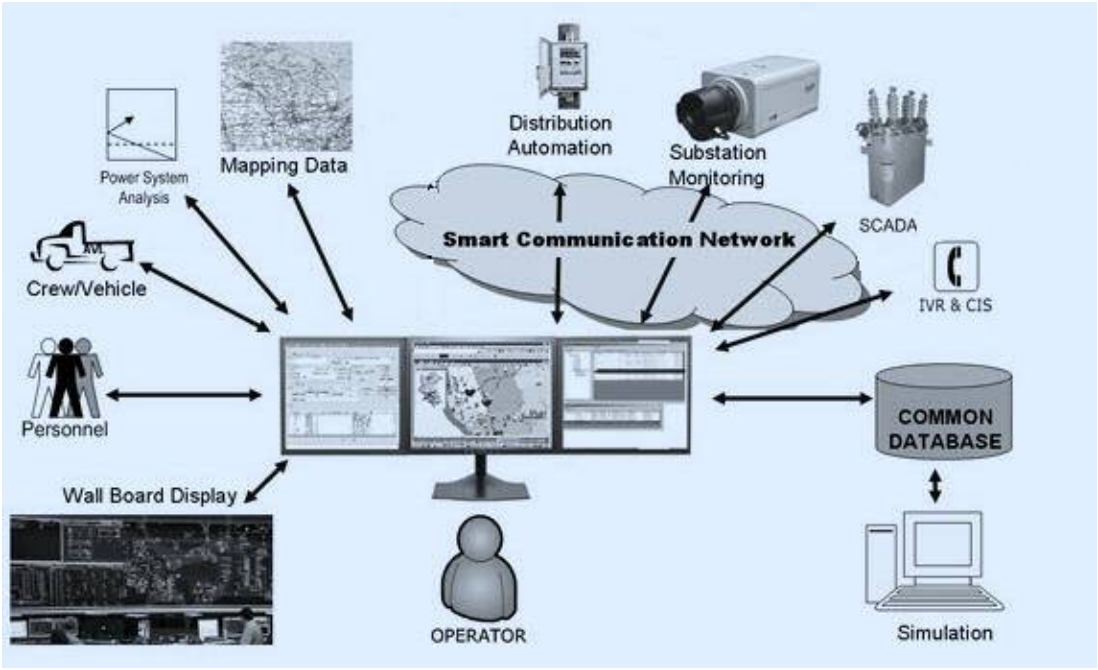
Need of the Project

All the grids in TPCODL are proposed to be automated for operation through SCADA system. To enable equipment operation through SCADA, control and relay panel at 33/11KV substation needs to be replaced with new panels fitted with state-of-art IEDs and data concentrator. These substations shall be equipped with devices to make all control, monitoring and protection signal available at remote control centre for efficient control and monitoring of electrical network

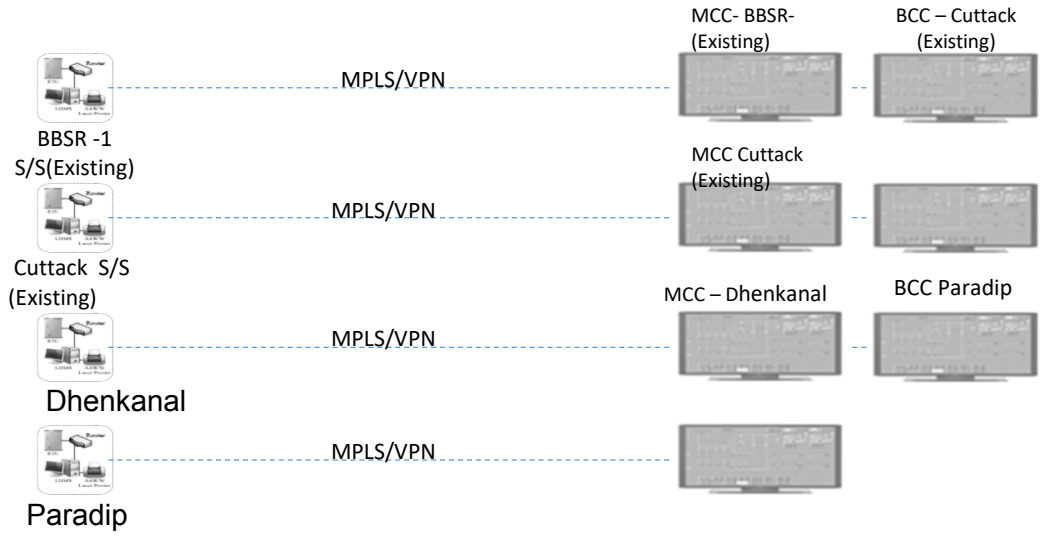
SCADA

TPCODL has 289 numbers of 33/11KV substations, Nearly 70 numbers of substations are under construction. New substation constructed under ODSSP & CRISP are equipped with latest substation automation system and capable for integration with SCADA. The old conventional substation would need huge investment for replacement of equipment, and installation of IEDs and data concentrator to make them SCADA compatible. A work plan for 3 years has been framed automation of conventional substations.

TPCODL is planning to construct control centres at Pradeep and Dhenkanal circles in addition to the existing control centres at Bhubaneswar, Cuttack, and Puri. The capacity of Bhubaneswar and Cuttack circles will be increased to integrate more substations. The substations shall be connected to control centres through leased line MPLS-VPN. In view of the climate challenges in the region, it is highly advised to establish backup control centres (BCC) and disaster recovery centres (DRC) for all control centres.



High level Architecture of SCADA control Centre:-



Scope of Projects:

1. 56 Grids (30 - BBSR; 22 - Cuttack & 4 - PURI) where SCADA was implemented under RAPDRP has been considered 100% irrespective of feeding to any rural area.
2. 54 Grids are currently commissioned out of 134 Grids under ODSSP. All these 54 nos. Grid substation shall be considered which are feeding supply to Industrial, Urban, Sub Urban and Rural in the priority given as per category.

All remaining substations as well as all prospective Grid substation shall be operationalised through SCADA in next five years.

RAPCRP Scheme	52 Nos. Urban Sub Stations
ODSSP Scheme	54 Nos. Urban, Industrial, Semi urban, Rural Sub Stations
Nabakalebar	4 Nos. Urban Sub Stations
Total Sub-Station Covered	110 Nos.

Following items, substations and activities considered under Phase-1

1. 52 Nos. of RAPDRP (52 Nos. S/s of Bhubaneswar & Cuttack) and 4 nos. of Puri S/s integration with Existing SCADA System at Bhubaneswar, Cuttack and Puri. All these substations are already communicating with respective control centre SCADA System. Point to point testing of these sub-station is planned under this phase.
2. 54 Nos. of ODSSP S/s (54 ODSSP S/s out of 134 S/s), integration with existing SCADA System at Bhubaneswar, Cuttack and Puri.
3. Procurement of Ethernet Switch, router etc. for integration of ODSSP S/s to existing SCADA System using Communication link of service provider (Airtel)
4. Procurement of most essential GSAS equipment to enhance the availability.

Equipment considered in phase-1 are as below.

1. 33KV Circuit Breakers. 2. 33KV Indoor Control & Relay Panel 3. 11KV 4W RMUs for feeder segregation. 4. Transformer monitoring units (TMU). 5. Battery and Battery Charger. 6. Retrofitting of DCDB for SCADA Compatibility (MU1000C) - 54 Nos. 7. Earthing System revamping 8. Switchyard Fencing 9. Relay to be replaced with BCPU 10. Master Trip Relay.	11. Ethernet Switch (12 Port). 12. Layer # 3 Switch - 1 No. 13. Router - 1 No. 14. Communication link establishment (2 MBPS) - 54 15. Communication System for SCADA Integration 16. Hardware + Software + Application for GIS

5. After completion of this phase 110 s/s will be available on existing SCADA System for monitoring and control.

6. With Phase-1 all RAPDRP s/s will be operational from respective SCADA System installed at Bhubaneswar, Cuttack and Puri.
7. It is also planned to set up the Operator workstation of the respective control Centre SCADA system at CPSCC, Kalyani complex. Cost to establish the communication link from these location is considered in the capex.

Annexure 10 DPR of 3 Way RMU, Auto-Recloser, Sectionaliser, FPI and AB switches at 33KV & 11KV Feeder

Need of the Project

At present, in case breakdown of long 11KV feeders / HVDS Network with multiple sections, the breakdown crew is required to physically patrol the feeder to identify the fault locations. Major concern raised by breakdown team was the identification of location of faults and then type of faults occurred, usually identification of fault locations takes somewhere around 4-10 hrs depending upon the length and type of feeder. Most of the time some kind of fault such as conductor snapping, birdage occurred during the day, villagers help line-men for identification of fault location but if it fault has occur during night time or not known by consumers breakdown crew must patrol the line physically to identify the fault location.(need to check the data for rural feeder). After identification of fault location and type of fault it takes only 1-2 Hrs. to rectify the fault. 80-90% of faults on any overhead line network are transient in nature. The remaining 10%-20% of faults are either semi-permanent or permanent. Most faults that occur on high-voltage or extra-high-voltage overhead lines are transient faults caused by lightning. The transient fault results in damage to insulators if allowed to remain connected for a long period of time. However, if the transient fault is removed immediately by operation of a protection relay, then insulator damage is avoided. Even the no. of tripping are so high that automation is required for identification of location, fault and segregation of fault from rest of the System.

Recommendation:

Installation of Autorecloser unit on trunk sections of the feeder along with sectionalizers in branches for faster fault clearance and restoration. Autorecloser is effective in automatic restoration of supply, reduction of outages and improvement of power system stability. Sectionalizer is a switch along with control unit. It is used in conjunction with an upstream “Recloser” or “circuit breaker”. It counts the interruption created by a recloser during a fault sequence & trips during the dead time of the upstream recloser isolates a faulty network section.

Installation of Overhead Fault Passage Indicators (O/H FPIs) for faster restoration of faults on long 11KV rural feeders / HVDS Network with multiple sections.

It is proposed to install 3Way RMUs at identified locations for making ring main distribution network which will help back feed the network so that by the time faulty system is rectified.

Moreover, it is also proposed to introduce AB switches in lengthy 33KV & 11KV feeders so as to support operation team to isolate the section in case of planned / unplanned outages to restrict the affected consumers limited to isolated section.

Scope of the Proposal:

In order to improve the reliability following equipment have considered for installation.

S.No.	Description	UOM	Qty
1	Supply and Installation of Auto-recloser	EA	40
2	Supply and Installation of Sectionaliser	EA	120
3	Supply and Installation of FPI	SET	1500
4	Supply and Installation of 3 Way RMU	EA	60
5	Installation of AB Switch on 33KV Feeder	EA	100
6	Installation of AB Switch on 11KV Feeder	EA	400

Circle wise proposal for Auto-recloser and sectionalier is mentioned in below table

Circle	Auto-recloser	Sectionalizer
Bhubaneswar No-I Circle	16	48
Bhubaneswar No-II Circle	8	24
Cuttack Circle	8	24
Dhenkanal Circle	8	24
Sub Total	**40**	**120**

Circle wise proposal for Fault Passage Indicator is mentioned in below table

Circle	9 Division	Remaining 11 Division	
	Feeder Qty.	Feeder Qty.	5 FPI Set /Feeder
Bhubaneswar No-I Circle	0	20	100
Bhubaneswar No-II Circle	40	60	500
Cuttack Circle	20	20	200
Dhenkanal Circle	40	50	450
Paradeep Circle	20	30	250
Sub Total	**120**	**180**	**1500**

Circle wise proposal for 3 Way RMU is mentioned in below table

Circle	Division	RMU Qty
Bhubaneswar No-I Circle	BCDD-I ,BBSR	10
	BCDD-II ,BBSR	12
	BED-BBSR	8
Bhubaneswar No-II Circle	KED-Khurda	8
Cuttack Circle	CDD-I- CTC	4
	CDD-II- CTC	4
	CED-CTC	4
Dhenkanal Circle	DED-Dhenkanal	5
	TED-Chainpal	5
Total Qty		**60**

Cost Estimate:

S.No.	Description	UOM	Rate	Qty	Amount in Lacs
1	Supply and Installation of Auto-recloser	EA	8.11	40	324.79
2	Supply and Installation of Sectionaliser	EA	7.45	120	894.73
3	Supply and Installation of FPI	SET	0.52	1500	782.13

4	Supply and Installation of 3 Way RMU	EA	6.47	60	386.42
5	Installation of AB Switch on 33KV Feeder	EA	3.23	100	322.87
6	Installation of AB Switch on 11KV Feeder	EA	2.49	400	995.10

Estimate for Supply and Installation of 11kV Auto-Recloser

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	11 kV Auto reclosure, with 400/1 amp CT with STC 25 kA/3 Sec	40	ST	5,66,884	2,26,75,352
2	LA 9KV 5KA FOR 11KV POLYMERIC	240	EA	1,156	2,77,536
3	BOLT & NUT GI 12MMX50MM HEX	40	KG	97	3,870
4	BOLT & NUT GI 16MMX75M HEX	120	KG	97	11,611
5	FLAT GI SIZE 50X6MM	400	KG	89	35,400
6	FLAT GI SIZE 25X6 MM	600	KG	89	53,100
7	150X 150mm RS joist (11 Mtr long)(30.6 kv Per meter)(Each 336.6kg)	80	EA	25,817	20,65,378
8	CHANNEL MS SIZE 75X40MM	1,000	KG	77	76,700
9	ANGLE MS SIZE 50X50X6MM	600	KG	77	46,020
10	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	80	EA	1,239	99,120
11	WIRE STAY GI 7/10 SWG	2,400	KG	89	2,12,400
12	LUG AL CRIMPING 95 SQ MM XLPE SINGLE HOLE	320	EA	9	2,944
13	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	240	EA	280	67,118
14	125 Sq mm All Alloys Aluminium Conductor AAAC	600	M	91	54,424
15	ANTICLIMBING DEVICE FOR 11 M PCC POLE	80	EA	242	19,352
16	BOARD DANGER 11KV SIZE 8X10 INCH	80	EA	94	7,552
17	PLATE BASE RCC SIZE 450X450X50MM	240	EA	123	29,453
18	INSULATOR STAY (GUY/EGG) 11KV	160	EA	59	9,440
19	ANCHOR ROD SIZE 20MMX2100MM	160	EA	454	72,688
20	TENSION SCREW GI SIZE 750X20MM	160	EA	397	63,509
21	BRACKET/STAY COLLAR FOR 11 M PCC POLES	160	EA	1,239	1,98,240
22	PIPE HDPE SIZE 25 MM	240	M	36	8,652

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
23	11KV PIN INSULATOR 5 KN COMPOSIT POLYMER	240	EA	236	56,640
Subtotal Material					**2,61,46,499**
Contingency @ 3%					**7,84,395**
0.5 % of Mat as Misc. (in CDB Only)					**1,34,654**
Total Material					**2,70,65,549**
Part B (Services)					**54,13,110**
Grand Total					**3,24,78,658**

Estimate for Supply and Installation of 11kV Sectionalizer

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	SECTIONALISER 11KV 3PH POLE MOUNTED	120	EA	5,48,493	6,58,19,206
2	LA 9KV 5KA FOR 11KV POLYMERIC	720	KG	1,156	8,32,608
3	BOLT & NUT GI 12MMX50MM HEX	120	KG	97	11,611
4	BOLT & NUT GI 16MMX75M HEX	360	KG	97	34,834
5	FLAT GI SIZE 50X6MM	1200	KG	89	1,06,200
6	FLAT GI SIZE 25X6 MM	1800	EA	89	1,59,300
7	CHANNEL MS SIZE 75X40MM	3000	KG	77	2,30,100
8	ANGLE MS SIZE 50X50X6MM	1800	KG	77	1,38,060
9	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	240	EA	1,239	2,97,360
10	WIRE STAY GI 7/10 SWG	7200	KG	89	6,37,200
11	LUG AL CRIMPING 95 SQ MM XLPE SINGLE HOLE	960	EA	9	8,832
12	BIRD CAP FOR 9KV 5KA SURGE ARRESTER	720	EA	280	2,01,355
13	125 Sq mm All Alloy Aluminium Conductor AAAC	1800	M	91	1,63,272
14	ANTICLIMBING DEVICE FOR 11 M PCC POLE	240	EA	242	58,056
15	BOARD DANGER 11KV SIZE 8X10 INCH	240	EA	94	22,656
16	PIPE HDPE SIZE 25 MM	720	EA	36	25,956
17	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	120	EA	25,817	30,98,066
18	PLATE BASE RCC SIZE 450X450X50MM	120	EA	123	14,726
19	11KV PIN INSULATOR 5 KN COMPOSIT POLYMER	720	EA	236	1,69,920
Subtotal Material					**7,20,29,318**
Contingency @ 3%					**21,60,880**

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
0.5 % of Mat as Misc. (in CDB Only)					3,70,951
Total Material					7,45,61,149
Part B (Services)					1,49,12,230
Grand Total					8,94,73,379

Estimate for Supply and Installation of Overhead Communicable FPI

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	Non-communicable FPI	4500	EA	9,328	4,19,76,000
2	cost to make in Communicable	4500	EA	4,664	2,09,88,000
Subtotal Material					62964000
Contingency @ 3%					1888920
0.5 % of Mat as Misc. (in CDB Only)					324265
Total Material					65177185
Part B (Services)					13035437
Grand Total					78212682

Estimate for Supply and Installation of 3 Way RMU

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	RMU 11KV 3 WAY 630A BKR O/D	60	EA	2,85,759	1,71,45,565
2	ISMC-75*40 GI Channel (7.24KG/M)	3000	KG	121	3,63,300
3	FLAT GI SIZE 50X6MM	3600	KG	89	3,18,600
4	FLAT GI SIZE 25X6 MM	600	KG	89	53,100
5	BOARD DANGER 11KV SIZE 8X10 INCH	300	EA	94	28,320
6	PIPE EARTH G.I. 40MMX 3 M 'C' CLASS	240	EA	1,239	2,97,360
7	BOLT & NUT GI 16MMX75M HEX	120	KG	97	11,611
8	BOLT & NUT GI 12MMX50MM HEX	120	KG	97	11,611
9	WASHER GI SIZE 16MM DIA	30	KG	118	3,540
10	WASHER GI SIZE 12MM DIA	30	KG	118	3,540
11	CABLE 11KV AL 3CX400 SQ MM XLPE ARM	2400	M	1,770	42,48,000
12	JT. KIT O/D 11KV XLPE 3CX400 HS	120	EA	16,407	19,68,806
13	JT. KIT I/D 11KV XLPE 3CX400 HS	120	EA	11,307	13,56,811
14	PIPE G.I.100MM DIA HEAVY CLASS PLAIN END	360	M	872	3,13,920
15	PIPE HDPE SIZE 25 MM	360	M	36	12,978
16	LUG AL CRIMPING 95 SQ MM XLPE SINGLE HOLE	240	EA	9	2,208
17	WIRE STAY GI 7/10 SWG	1200	KG	89	1,06,200
18	CONDUCTOR ACSR DOG	360	M	91	32,654

19	FRP Fencing (3x2.4x2.0)	1200	Sq.M	3,086	37,03,200
20	RMU Plinth	60	EA	18,782	11,26,900
Subtotal Material					3,11,08,226
Contingency @ 3%					**9,33,247**
0.5 % of Mat as Misc. (in CDB Only)					**1,60,207**
Total Material					**3,22,01,680**
Part B (Services)					64,40,336
Grand Total					3,86,42,016

Estimate for AB Switches at 33KV Feeder

S No	Item Description	Qty	Unit	TPCODL / CDB Rates	Amount (Incl. of Tax)
1	232 sqmm All Alloy Aluminum Conductor AAAC	3000	M	185	554010
2	150X 150mm RS joist (13 Mtr long)(34.6 ky Per meter)(Each 415.2kg)	200	EA	34500	6899932
3	AB SWITCH FOR 33 KV 200 AMPS	100	ST	17818	1781800
4	PIPE EARTH G.I. 40MMX 3 M 'C' CLASS	100	EA	1239	123900
5	PIPE HDPE SIZE 25 MM	300	M	37	11240
6	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	400	EA	8	3172
7	ISMC-75*40 GI Channel (7.24KG/M)	7000	KG	121	847700
8	ISMC-100*50 GI Channel (9.76KG/M)	7000	KG	121	847700
9	WIRE STAY GI 7/10 SWG	2000	KG	89	177000
10	FLAT GI SIZE 25X6 MM	900	KG	89	79650
11	FLAT GI SIZE 50X6MM	2211	KG	89	195716
12	ISA-50*50*6 GI Angel (4.6KG/M)	5000	KG	121	605500
13	ANGLE GI SIZE 75X75X6MM	5500	KG	121	666050
14	33 KV POLYMER DISC INSULATOR 120 KN	1200	EA	1605	1925760
15	INSULATOR POST 33KV	600	EA	1864	1118640
16	H/W FITTING S/T FOR ACSR PANTHER	600	EA	1735	1040866
17	P.G. CLAMP FOR 232 MM2 AAC CONDUCTOR	600	EA	1357	814200
18	BOARD DANGER 33KV SIZE 8X10 INCH	200	EA	94	18880
19	PLATE BASE RCC SIZE 450X450X75MM	200	EA	259	51800
20	ANTICLIMBING DEVICE FOR TOWER (BRACKET)	200	EA	507	101499
21	BOLT & NUT GI 12MMX50MM HEX	200	KG	97	19352
22	BOLT & NUT GI 16MMX100MM HEX	200	KG	97	19352
23	BOLT & NUT GI 16MMX150MM HEX	200	KG	97	19352
24	BOLT & NUT GI 16MMX50MM HEX	513	KG	97	49648
25	WASHER MS SIZE 16MM DIA	375	KG	100	37673
26	WASHER MS SIZE 12MM DIA	50	KG	100	5023
27	Civil works for Pole Foundation	100	L/S	15000	1500000
28	FRP Fencing	308600	M2	21	6480600

Subtotal Material	**2,59,96,013**
Contingency @ 3%	**7,79,880.39**
0.5 % of Mat as Mis (in CDB Only)	**1,29,980**
Total Material	**2,69,05,874**
Part B (Services)	**53,81,174.7**
Grand Total	**3,22,87,048**

Estimate for AB Switches at 11KV Feeder

S N	Item Description	Qty	Unit	TPCODL / CDB Rates	Amount (Incl. of Tax)
1	125 sqmm All Alloy Aluminum Conductor AAAC	12000	M	91	1088479
2	150X 150mm RS joist (11 Mtr long)(30.6 ky Per meter)(Each 336.6kg)	800	EA	25817	20653776
3	AB SWITCH FOR 11 KV 200 AMPS	400	ST	8673	3469200
4	PIPE EARTH G.I. 40MMX 3 M 'C' CLASS	400	EA	1239	495600
5	PIPE HDPE SIZE 25 MM	1200	M	37	44958
6	LUG AL 70 SQMM FOR 7/8 SWG WIRE/EARTHING	1600	EA	8	12687
7	ISMC-75*40 GI Channel (7.24KG/M)	24268	KG	121	2938913
8	ISMC-100*50 GI Channel (9.76KG/M)	24986	KG	121	3025756
9	WIRE STAY GI 7/10 SWG	8000	KG	89	708000
10	FLAT GI SIZE 25X6 MM	3600	KG	89	318600
11	FLAT GI SIZE 50X6MM	8846	KG	89	782864
12	ISA-50*50*6 GI Angel (4.6KG/M)	16354	KG	121	1980460
13	ANGLE GI SIZE 75X75X6MM	19149	KG	121	2318920
14	INSULATOR DISC 11KV 90KN	4800	EA	1357	6513600
15	H/W FITTING S/S FOR DOG	2400	EA	414	994032
16	P.G. CLAMP FOR 100 MM2 AAC CONDUCTOR	2400	EA	684	1642560
17	BOARD DANGER 11KV SIZE 8X10 INCH	800	EA	94	75520
18	PLATE BASE RCC SIZE 450X450X75MM	800	EA	259	207199
19	ANTICLIMBING DEVICE FOR 11 M PCC POLE	800	EA	242	193520
20	BOLT & NUT GI 12MMX50MM HEX	556	KG	97	53845
21	BOLT & NUT GI 16MMX100MM HEX	522	KG	97	50509
22	BOLT & NUT GI 16MMX150MM HEX	2689	KG	97	260207
23	BOLT & NUT GI 16MMX50MM HEX	2052	KG	97	198590
24	WASHER MS SIZE 16MM DIA	1500	KG	100	150690
25	WASHER MS SIZE 12MM DIA	200	KG	100	20092
26	Civil Foundation	400	L/S	15000	6000000
27	FRP Fencing	1234400	M2	21	25922400
Subtotal Material					**8,01,20,976**
Contingency @ 3%					**24,03,629.29**
0.5 % of Mat as Mis (in CDB Only)					**4,00,605**

Total Material	**8,29,25,211**
Part B (Services)	**1,65,85,042.1**
Grand Total	**9,95,10,253**

Benefits

FPI - Benefits

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

Auto-Recloser and Sectionaliser-Benefits

9. Continuity of power supply for the consumers resulting in less complaints from citizens.
10. Reduce the time of power supply disconnection in cases of transient faults.
11. Reduce the unsold energy due to faults.
12. Reduce the cost of manpower operating in managing disconnected lines.
13. Maximum utilization of the network components.
14. Event Log and Remote control.
15. Reduce cost of fault finding.

RMU- Benefits:

16. The major advantage of Ring Main Units is the safety they provide to the operators. Like the operation of switching devices with interlocking system requires less knowledge and effort.
17. Working with IEDs allows remote operation. SCADA implementation is easy with smart Ring main units.
18. The space occupied by RMUs is less as they are Gas Insulated Switchgear.

19. The time taken for installation and commissioning of RMUs is very less. RMUs require less maintenance.
20. Beautification in the network

AB Switch - Benefits:

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

Annexure 11 DPR of Supply and Installation of LT Protection

Need of the Project

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

Recommendation:

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

Scope of Work:

S.No.	Description	UOM	Qty
1	Supply and Installation of MCCB-100 KVA	EA	540
2	Supply and Installation of MCCB-250 KVA	EA	360

Cost Estimate:

S.No.	Description	UOM	Rate	Qty	Amount in Lacs
1	Supply and Installation of MCCB-100 KVA	EA	0.61	540	328.15
2	Supply and Installation of MCCB-250 KVA	EA	0.96	360	344.78

Estimate for Supply and Installation of MCCB for 100 kVA DT

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	BOX DIST.WITH 160A 35KA TP MCCB 6 O/G	540	EA	28,460	1,53,68,627
2	CABLE 1.1KV AL 4CX150 SQ MM ARM	8,100	M	636	51,53,139
3	GLAND FOR ARM CABLE 4X150 SQ.MM	2,160	EA	227	4,89,370
4	ISMC-75*40 GI Channel (7.24KG/M)	26,460	KG	121	32,04,306
5	FLAT GI SIZE 50X6MM	5,400	KG	89	4,77,900
6	FLAT GI SIZE 25X6 MM	2,700	KG	89	2,38,950

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
7	BOLT & NUT GI 12MMX50MM HEX	540	KG	97	52,250
8	BOLT & NUT GI 16MMX75M HEX	540	KG	97	52,250
9	WASHER GI SIZE 16MM DIA	135	KG	118	15,930
10	WASHER GI SIZE 12MM DIA	135	KG	118	15,930
11	LUG AL 70 SQ MM FOR 7/8 SWG WIRE/EARTHING	1,080	EA	8	8,564
12	LUG AL CRIMPING 150 SQ MM XLPE ONE HOLE	8,640	EA	16	1,34,438
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	540	EA	1,239	6,69,060
14	PIPE HDPE SIZE 25 MM	1,620	M	36	58,401
15	WIRE STAY GI 7/10 SWG	5,400	KG	89	4,77,900
Subtotal Material					**2,64,17,016**
Contingency @ 3%					**7,92,510.48**
0.5 % of Mat as Misc. (in CDB Only)					**1,36,048**
Total Material					**2,73,45,574**
Part B (Services)					**54,69,114.82**
Grand Total					**3,28,14,689**

Estimate for Supply and Installation of MCCB for 250 kVA DT

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
1	BOX DIST.WITH 500A 50KA TP MCCB 5 O/G	360	EA	56,640	2,03,90,400
2	CABLE 1.1KV AL 4CX150 SQ MM ARM	5,400	M	636	34,35,426
3	GLAND FOR ARM CABLE 4X150 SQ.MM	1,440	EA	227	3,26,246
4	ISMC-75*40 GI Channel (7.24KG/M)	17,640	KG	121	21,36,204
5	FLAT GI SIZE 50X6MM	3,600	KG	89	3,18,600
6	FLAT GI SIZE 25X6 MM	1,800	KG	89	1,59,300
7	BOLT & NUT GI 12MMX50MM HEX	360	KG	97	34,834
8	BOLT & NUT GI 16MMX75M HEX	360	KG	97	34,834
9	WASHER GI SIZE 16MM DIA	90	KG	118	10,620
10	WASHER GI SIZE 12MM DIA	90	KG	118	10,620
11	LUG AL 70 SQ MM FOR 7/8 SWG WIRE/EARTHING	720	EA	8	5,710

S No.	Item Description	Quantity	Unit	Unit Rates	Amount (INR)
12	LUG AL CRIMPING 150 SQ MM XLPE ONE HOLE	5,760	EA	16	89,626
13	40mm nominal bore GI pipe (medium gauge) earthing device with 3 mtr .Long	360	EA	1,239	4,46,040
14	PIPE HDPE SIZE 25 MM	1,080	M	36	38,934
15	WIRE STAY GI 7/10 SWG	3,600	KG	89	3,18,600
Subtotal Material					**2,77,55,993**
Contingency @ 3%					**8,32,679.78**
0.5 % of Mat as Misc. (in CDB Only)					**1,42,943**
Total Material					**2,87,31,616**
Part B (Services)					**57,46,323.19**
Grand Total					**3,44,77,939**

Benefits of Projects:

1. Increased reliability and reduction in SAIFI and SAIDI.

2. Consumer will experience less power cut and thus reduction in consumer complaint.

Annexure 12 DPR of Supply and Installation of Battery & Battery Charger

Need of the Project

During site visit it was observed that Battery & Battery chargers at some 33/11KV Grid Substations are in very bad condition and thus DC system available for protection system is not in reliable condition. Due to poor protection system, sometimes Relays are not operating to arrest the fault current from the source end and resulting into escalation of tripping to upstream network. Such tripping in the system in turn reduces the reliability of the system.

Recommendation:

In order to strengthen the DC system in the 33/11KV Grid substation it is recommended to replace faulty or non-functional Batteries and Battery charger. In this year, 43 sets of Battery & Battery chargers (18 nos 48 V and 25 nos 24 V DC) are proposed to be replaced.

Estimate for Supply and Installation of Battery Bank and Battery Charger				
Item Description	**Quantity**	**Unit**	**TPCODL/ CDB Rates**	**Amount (INR)**
24V/100AH, Lead acid Tubular GEL Battery	25	EA	33,920	8,48,000
24V/50A, SMPS Battery Charger with n+1 module & Integral DCDB	25	EA	3,29,220	82,30,500
48V/100AH, Lead acid Tubular GEL Battery	18	EA	67,840	12,21,120
48V/50A, SMPS Battery Charger with n+1 module & Integral DCDB	18	EA	3,38,660	60,95,880
Control Cable 2Cx 50 Sq mm	2650	EA	684	18,12,600
Subtotal Material				**1,82,08,100**
Contingency @ 3%				**5,46,243**
0.5 % of Mat as Misc (in CDB Only)				**93,772**
Total Material				**1,88,48,115**
Part B (Services)				**37,69,623**
Grand Total				**2,26,17,738**

Annexure 13 DPR for Release of New Connection

Need of the Project

As the business is progressing it is expected that new connection will come. Following table enumerates the requirements of meters and accessories which are envisaged against new connections in different categories:

Meter	Qty	Cost per unit (Rs)	Rate of installation (Rs)	Cost of Material (Cr)	Cost of installation (Cr)	Total Amount (Cr)
Single Phase	42000*	680.00	360.00	1.50	1.51	3.01
Poly Phase	5000**	2150.00	483.80	0.77	0.24	1.02
LTCT	500***	1735.00	1612.99	0.06	0.08	0.14
HTCT -11kV/110V	80	3800.00	1261.29	0.03	0.01	0.04
HTCT -33kV/110V	5	11903.84	1261.29	0.01	0.00	0.01
Interface Meter	5	61317.52	1261.29	0.03	0.00	0.03
Net Meter- Single Phase	400	1504.50	430.05	0.06	0.02	0.08
Net Meter- Poly Phase	100	3170.28	430.05	0.03	0.00	0.04
Net Meter - LTCT	100	5000.00	1597.17	0.05	0.02	0.07
Net Meter- HTCT	50	6172.58	1612.99	0.03	0.01	0.04
Grand total	48240			2.57	1.89	**4.46**

*Available in Stock – 20000

**Available in stock – 1400

***Available in Stock - 150

- Available in Stock - 20000

Existing System of processing File for New connection

In the existing practice, after receiving customer request for New Connection and Attribute Change, Junior Engineer (JE) posted at section level visits the site and collect the information pertaining to proximity to network, connection feasibility and completion of internal wiring etc. Thereafter, customer application is processed based on site report.

Key Concern

Currently, the time take for visit the site and capture the basic detail by JE is taking is more than the specified time limit due to his involvement in operation activity and other commercial activities like meter reading, recovery, collection etc.

Proposal

To reduce the cycle time for capturing basic information from applied site and also submit the file at division level for processing the application, performance based contract for Site Visit through Field Service Executive is prepared and submitted.

Cost of processing files for single Phase connections.

S. No.	Activity Name	Qty (Nos.) for 1st year	Rate	Total Cost
1	Site Verification Case (New Connection)	90,000	150	1.35

Meter Boxes requirement:

For installation of meters, meter box will be required to give it protection from external environment and theft. AS the meters will be installed outside the homes, they will be subjected to all environmental conditions including rain, so meter box of IP-65 protection level will be installed. Below mentioned table provide details of the expenditure for installation of meters.

Boxes	Year-1 (Count)	Cost per Piece (Rs)	Cost Year 1 (Cr)
Single phase	50500	267.00	1.35
Poly Phase	3700	2150.00	0.80
LTCT	550	5829.34	0.32
CTPT unit/Metering Cubical	130	55544.98	0.72
Total			3.19

Cable requirement:

For installation of new connection, cable would be required to be installed for extending supply to the consumer premises. Seven different size of cables have been envisaged.

- For Single Phase connections in rural area, cable of size 2C X 4 sq mm has been considered, for Urban and semi urban area considering existing load and load growth, 2C 10 sq mm cable has been considered.
- For 3 Phase connections up to 20 KW, 4C X 10 sq mm cable has been considered in rural area and in Urban and Semi Urban area, 4C X 25 sq mm cable has been decided.

- For connections from 20-50 KW 4C 95 sq mm cable will be installed and from 50-70 KW 4C 150 Sq mm cable will be drawn.
- DPR has not considered converting of connections from LT to HT which have already been installed on loads > 70 KW.

Below Table elaborated the requirement of the cable for providing new connection.

Cable Size (Sq mm)	Cable length (km)	Cost per unit (Rs)	Rate of installation (Rs)	Cost of Mat (Cr)	Cost of Inst (Cr)	Total Cost (Rs Cr)
2*4	840	49.11	600.00	4.13	2.02	6.14
2*10	252	67.86	700.00	1.71	0.59	2.30
4*10	37.5	90.27	896.16	0.34	0.11	0.45
4*25	75	150.45	896.16	1.13	0.34	1.46
4*95	7.2	414.48	1850.05	0.30	0.07	0.37
4*150	3.6	631.30	2004.29	0.23	0.02	0.25
2*10	1.8	205.00	0	0.04		0.04
Grand Total				7.86	3.15	11.01

Metering Accessories requirements:

To install the meters, accessories like Modems, Bus-Bars and Distribution boxes are required which are used to extend supply and take reading of the meters to ensure Quality of Meter reading and safety while extending supply to end users.

Below table elucidated the requirement of accessories.

Accessories	Qty	Cost per unit (Rs)	Rate of Installation per unit	Mat. Cost (Cr)	Inst Cost (Cr)	Total Cost
Modem	3435	4012.00	232.22	1.38	0.08	1.46
Bus Bar -Single Phase	10000	891.76	284.42	0.89	0.28	1.18
Bus Bar -Three Phase	8000	1471.12	342.98	1.18	0.27	1.45
Bus Bar -LT Distribution	2000	1279.99	342.98	0.26	0.07	0.32

Poly carbonate seals	420420	4.54	0.00	0.19	0.00	0.19
Total				3.89	0.71	4.60

Smart Tools Requirement for Meter installation with proper quality:

Currently, the Meter Management Group of TPCODL is looking after the metering activities of 4 lakh/ annum. Given the high quantum of meters deployment, and to achieved desired level of safety & quality standards, Smart Tool will be required. The Smart tools primarily comprises of Cordless Box Battery Operated Spanner cum Impact Wrench, Cordless Battery Operated Driver cum Drill, Hammer Battery operated CRH Drill Machine etc. These Smart tools being battery operated, will reduce the physical human work thereby improving the meter installation cycle time and quality of workmanship. The cost of such Smart tools will be approx. 0.21 Crores. These Smart Tools will be kept for training of BA and hence help in implementing these tools in service.

S.No.	Material	Per item cost	Requirement (count)	Amount in Cr.
			FY 20-21	
1	Cordless Box Battery Operated Spanner cum Impact Wrench	39810	20	0.08
2	Cordless Battery Operated Driver cum Drill	16320	20	0.03
3	Hammer Battery operated CRH Drill Machine	46865	20	0.09
	Total			0.21

Annexure 14 DPR for Call Centre

Existing System

TP Central Odisha Distribution Limited's customers are interacting for payment, registering request like New Connection, Attribute Change etc, complaint registration for commercial or supply related issue and query resolution. Following avenues are currently available for interaction:

1. Division (20) /Sub Division (65) /Section Office (251): Customers are visiting the mentioned office for payment, Query resolution, registering complaint/request and Follow up.
2. Call Centre: One Call Centres with 4 lines is available for handling commercial and supply related call for 10 division. Further, distribution franchisees are maintaining separate call centre with 3 to 4 seats each.
3. Customer Care Centre (CCC): One customer care centre is operating for BED, BCCD1 and BCDD2 without basic amenities.

Key Concern

Limited customer touch points are leading to following customer dissatisfaction:

1. Customer has to spend time, money and effort in visiting the office for registering basic complaint like No Power Supply, Billing error or asking queries like new connection document, attribute change etc.
2. Customers are not able to connect to Call Centre as limited lines are available for registering supply related complaints, commercial request/complaints. Further, customer has to remember the call centre number as per the locations.
3. In Division/Sub-Division/Section Officer, no designated official are available for handling the customer complaints or answering customer queries. Therefore, customer has to visit from one desk to another for resolution of his query/complaint.

Proposal

To improve the customer experience, customer touch points need to be augmented for providing ease of connectivity and single touch point at offices. Accordingly, following are proposed:

1. **Establishing 50 seat Call Centre at Bhubaneswar and Cuttack**:

Call Centre is a convenient mode for Query Resolution, Complaint/Request Registration and Follow up as service is available on 24X7 basis and customer need not to visit the office. In order to provide the services to customer base of 26 Lakh, 50 seat Call Centre is proposed at Bhubaneswar. Further, Call Centre number will be advertised through Bill, Website and other medium for enhancing the call inflow.

Initially, Call Centre will have 20-25 seats per shift and with the increase in customer calls, seats will be enhanced to 50 seats in a shift. Call Centre is expected to become the preferred mode as has been happed in different industries like Telecom, Travel, E-Commerce etc. after experience convenient service over the call through Call Centre.

In addition to above, after reviewing the call inflow, Call Centre at Cuttack will be proposed in next financial year for catering the increased calls and it will also work as a part of Business Continuity Plan (BCP) in case of disaster situation at Bhubaneswar or vice-versa.

2. **Opening of Payment cum Customer Care Centre at Division and Sub-Division Office:**

Currently, customers visit the office and stand in big queues for making the payment during due date as no basic facility like Seating space, water etc. is available at Division, Sub-Division and Section Level.

Thus, Payment cum Customer Care Centre is proposed at Division, Sub-Division, Section office with amenities like QMS, water dispenser etc. for enhancing the customer experience. Additionally, designated customer care officials will be deputed for interacting with customer for complaint registration, answering queries etc. in order to provide single window solution instead of visiting different desk within Division, Sub-Division or Section office.

In the current proposal, one workstation is proposed at section level. However, numerous initiatives pertaining to faulty meter replacement, Billing, Payment and Recovery will be taken which will lead to increase in footfall at Section office. Accordingly, footfall analysis will be done and manpower deputation at Section level will be reviewed in next financial year.

Cost Estimate

S.no	Item Description	Total Budget FY 21 (Rs In Crs)
1.	Call Centre @ Bhubaneswar *	0.97
2.	Payment Cum Customer Care Centre @ Division (20 Nos) ^	2.82
3.	Payment Cum Customer Care Centre @ Sub-Division (16 Nos out of 65) **	0.90
4.	Payment Cum Customer Care Centre @ Section (35 Nos out of 252) **	1.67
Total		**6.36**

Note:

* Call Centre Cost consist of Workstation Cost, Civil and IT infrastructure like Desktop, LAN etc.
^ Cost include refurbishment, workstation, IT infrastructure, QMS, E-kiosk, and Customer Waiting Area.
** Cost include refurbishment, workstation, IT infrastructure and Customer Waiting Area.

Benefits

Establishing Call Centre and Payment Cum Customer Care Centre will have following benefits:

- Improved customer connectivity at Call Centre and multiple Centre will ensure Call Centre availability during disasters.
- Enhanced customer convenience during bill payment, complaint registration at Payment cum Customer Care Centre.
- Single window solution to customer at Payment cum Customer Care Centre.

Annexure 15 DPR for Information Technology (IT)

1 ERP, MBC, CIS and Business Intelligence Systems

In order to provide quality customer services, manage revenue cycle processes for reduction of AT&C losses and efficiently manage enterprise business processes, TPCODL is planning to implement uniform, centralized and integrated Core IT applications including ERP, MBC &CIS and Business Intelligence for all consumers, employees, management and offices.

Existing IT Applications

IT experts from Tata Power carried out a study of IT applications of CESU to evaluate the As - Is condition and identification of gaps w.r.t. requirements of the To be Core IT Application. Following are the key findings of the study

a) **Bespoke and In-house Applications Managed by CESU IT Team** – These mainly include a Foxpro based system by billing along with Java and .Net based applications for New connection and complaints management. These systems work for around 14 Lakh consumers. These customized solutions are not designed as Enterprise Level Solutions to fully cater the needs of Discom and are interoperable and ready for integration with upcoming Other Standard IT/OT Solutions. These application are not integrated with each other in real time and data is updated

b) **R-APDRP Implementation** – IT applications with modules under Scope of R-APDRP are being implemented by ITIA (L&T). The Core system is SAP which is a COTS solution and covers MBC and CIS, modules for 19 Lakh consumers. The system is currently under parallel run for limited functionality of billing, being done in parallel to the Foxpro based system for a limited set of consumers. For Call Center, Aspect solution is being implemented for five number of licenses. Limited functionalities of Asset Management and Maintenance Management modules are also in scope as per R-APDRP requirements

   Following is existing licenses availability for SAP application

Product	License Metric	Blocks of (Units)	Current License Quantity
SAP ERP Foundation Starter	SAP ERP Foundation Starter	1	1
SAP Professional User	SAP Professional User	1	2100
SAP Development User	SAP Developer User	1	1
SAP Meter Administration of Operations for Energy Utilities	Points of Delivery	1000	1900
SAP Energy Data Management for Energy Utilities	Points of Delivery	1000	1900
SAP Bill-to-Cash Management for Energy Utilities	Contracts	1000	1900
SAP Sales Management and Customer Service for Energy Utilities	Contracts	1000	1900
SAP Process Orchestration	Core	1	8
SAP Contract Center, voice channel	Users	1	15
SAP BusinessObjects Enterprise, professional edition (CS)	Concurrent Sessions	10	1
SAP BusinessObjects Enterprise, professional edition (USER)	UserS	1	10
Database	SAP ASE Runtime Edition	1	1

c) **Franchisee Area** – Two distribution franchisee (FEDCO and ENZEN) manage the operations of a total set of Approx. 13 Lakh consumers. IT application used by these franchisee are separate and CESU is having no control over the applications

Key Concerns / Issues in Current IT Setup:

- High AT&C loss levels – greater than 30%
- Standalone, disintegrated and diverse Solution Landscape
- Non Standard Processes
- Less focus on customer experience
- Extensive manual working – leaves scope of errors which can affect revenue
- Vulnerable cash collection and reconciliation process
- Challenging Data Reconciliation mechanism
- Absence of a strong ERP solution for efficient and effective enterprise processes
- SAP ISU implementation is only for 5 lakh customer base under RAPDRP which is yet to be deployed full scale with all functionalities
- Most of the hardware is either out of warranty or end of life

Proposed Solution and Requirement

TPCODL proposes to implement SAP as the Core IT application for meeting the requirements of critical business functions. Following are the key considerations in the decision:

a) SAP is a COTS solution with suitable for enterprise wide operation
b) As per existing scenario, 19 Lakh consumer licenses and 2100 User licenses are already available under R-APDRP. Additional consumer (11 Lakh) and user licenses would be procured to enable PAN area implementation of SAP
c) Tata Power is running SAP for its existing distribution license and franchisee operations. Tata Power has also implemented SAP as an ITIA for R-APDRP project at Goa. Hence, it has the in house capability to implement and sustain the SAP application and minimizing the total cost of ownership

For call center, existing R-APDRP solution would be scaled up to meet requirement of 120 Agents.

Following matrix lists the proposed requirement of licenses:

S.No	Product Description	Quantity	Sales Unit
1	SAP Developer User	9	1 SAP Developer User
2	SAP Professional User	300	1 SAP Professional User
3	SAP Employee User	2,000	1 SAP Employee User
4	SAP Payroll Processing	12	500 Employees
5	SAP Meter Admin a. Oper. f. En. Utilit.	1,100	1.000 Points of delivery
6	SAP Energy Data Mgmt for Energy Util.	1,100	1.000 Points of delivery
7	SAP Bill-To-Cash Mgmt f. Energy Utilit.	1,100	1.000 Contracts
8	SAP Sales Mgmt a. Cust. Serv. En. Util.	1,100	1.000 Contracts
9	SAP Adv. Metering Infstr. f. En. Utilit.	10	1.000 Points of delivery
10	SAP Multichannel Foundation f. Utilities	100	1.000 Active User
11	SAP Self–Svc Acc. for Utilities by SEW	100,000	1 Contracts
12	SAP Treasury and Risk Management	5	8.235.000.000 INR Revenues
13	SAP Interactive Forms by Adobe	2,000	1 Users
14	SAP Treasury and Risk Management	5	8.235.000.000 INR Revenues
15	SAP Extended Procurement	25	82.350.000 INR Spend Volumes
16	SAP Extend Procur, PS a.Regul Indstr ext	25	82.350.000 INR Spend Volumes
17	SAP Linear Asset Management	50	1 Users
18	SAP Digital Acc. up to 1K units	1,000	1.000 Documents
19	SAP Ext Warehouse Mgmt, up to 5 units	3	5.000 Items
20	SAP HANA, RT ed Applic & BW-new/subsq	1	HSAV

The Core IT applications would include the following business critical modules / functionalities:

a) MBC and CIS

- New Connection
- Disconnection and Dismantling
- Metering
- Billing
- Collection
- Customer Relationship Management
- Centralized Call Center

- Energy Audit

b) Enterprise Resource Planning (ERP)

- Asset Management
- Inventory Management
- Procurement
- Finance and Accounting
- Human Resource Management and Payroll
- Employee Self Service
- Document Management System

c) Business Intelligence

- Data Warehousing
- Management Information System
- Dashboards

Cost Estimate

TPCODL has explored the Cost of Implementation of SAP for 30 Lakh consumers and Call Center Solution for 120 Agents. Total Budgetary requirement is 37.18 Cr.

S No.	Item	Year -1 Cost (Crs.)	Year -2 Cost (Crs.)	Total (Crs.)
1	SAP Licenses	19	-	19
2	SAP Hardware	5.98	5.36	11.34
3	SAP Implementation	5.5	-	5.5
4	Call Center Solution (Including Implementation, Software and Hardware)	3	-	3
	Total	**33.48**	**5.36**	**38.84**

Note:

- *Application licenses are warranted for two years and hardware components warranted for Seven years*
- *Cost of Call Center Solution is estimated based on the implementation cost of similar solution being implemented at Tata Power Delhi Distribution Ltd.*

Benefits

Following are the key benefits of the Proposed Solution:

- Logical scale up and strengthening of RAPDRP solution landscape
- Adoption of very strong integrated application landscape for enterprise wide implementation
- Stringent data integrity to avoid any revenue leakage
- Increased Billing and collection efficiency
- Enhanced user experience with extensive standard features & functionalities
- Standardized process workflow
- Enhanced integration and automation capabilities with Non SAP applications
- Using SAP standard capabilities combined with customer presentment platforms for a delightful customer experience

2 Application Software

Existing Application System

TPCODL is going to leverage the power of Information Technology to provide best in class services to consumers, earn consumer delight, and improve satisfaction among other stakeholders. The existing website of rebranded TP Central Odisha Distribution Limited is hosted on the domain service provider's environment and this needs to be migrated to the Datacentres of the utility for security and integration needs. The current site is a static site and for enhancing customer satisfaction and engagement, the same needs to be made responsive dynamic website which can be opened on any device or mobile. Apparently the employees in CESU are using GMAIL as their internal communication mailing platform which is being migrated to Microsoft Outlook for security and integrity needs. Hence, integration and establishing single sign on and enabling authentication using windows login in all applications is required and thus active directory web services would need to be in place.

Proposed Application System:

The following application software's are required for enablement of dynamic Website and transformation from GMAIL to Microsoft outlook etc.

- IIS Application Server 8.5 (already part of Windows Server license)
- Visual Studio 2013 or above

- .Net framework 4.5 (already part of Windows Server license)
- Microsoft Office 2013

These software would also be used in setting up back office application for Payment Gateway of the Utility, Enable Mobile apps like Reading and Collection mobile app, CESU Connect for customers to enable them to utilize the services from mobile for ease of use and satisfaction.

Cost Estimate

Approximate CAPEX Budget of INR 0.1272 Crs is required for procuring the above said software.

Item Description	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)	Budgetary Quote
Microsoft Visual Studio 2013 or above	81625	15	12,24,375	0.122	Microsoft Enterprise Agreement
Microsoft Office 2013 or above	8000	6	48,000	0.0048	
Total Amount			**12,72,375**	**0.1272**	

Benefits

- Secured, reliable and sustainable applications for utilities branding such as Website, Payment gateway and mobile app.
- Increase customer satisfaction with engaging platforms for bill payments and other services
- Effective revenue collection impacting reduction in AT & C losses of the utility

3 Database Software

Existing Database Software: In present CESU utility is using flat file information record system, there is no centralize database for payment collection and Mobile app to keep track of billing and collection.

Purposed Database Software: To ensure that the Company's Website, Payment Gateway , CESU Connect Mobile App, Billing and Revenue collection App and additional user centric applications work seamlessly and the information exchanged using these are applications are stored in a secured and reliable database, need for the following databases is required.

- Oracle Standard Edition
- Microsoft SQL Server 2012 or above

As per best practice all the internal apps for employees will be interacting with SQL Server and Oracle would be used for all complex customer centric or publically hosted application to ensure security, load and performance of the system is up to the mark

Cost Estimate

It is proposed to procure the following database software for the above mentioned applications. The approx. Capex budget requirement to procure database software is INR 4.71 Crs.

Item Description	Unit Cost	Estimated Nos	Amount (INR)	Amount (Crs.)	Budgetary Quote
Oracle 12c Standard Edition with 5 year ATS (22%)	5,72,000 per 2 core	12 Cores on 2 servers	34,32,000	0.34	Existing Oracle & Microsoft Agreement with TPDDL
Microsoft SQL Server 2012 Enterprise with 5 year support	48,51,344 per 2 core	18 Cores on 4 servers	4,36,62,102	4.37	
Total Amount			**4,70,94,102**	**4.71**	

Benefits

- Most secured. Get layers of protection for applications data at rest and in motion.
- Highest performance for applications
- In-database advanced analytics at no extra cost.
- Consistent experience for on-premises applications as smooth upgrades and sustenance of system assured.

ANNEXURE ON DATABASE SERVERS DETAILS

S.No	Database Name	Name of the Application	Server Details	Software required
1	**ORACLE STANDARD EDITION**	OraPROD Server	8 Core RAM – 32 GB HDD - 500 GB	**Oracle 12c Standard Edition**
2		OraTest Server	4 Core RAM – 16 GB HDD - 500 GB	**Oracle 12c Standard Edition**
3.	**MICROSOFT SQLSERVER ENTERPRISE EDITION**	Job Server (Production Only)	4 Core	Oracle Client 11g or above .Net Framework 4.5 **SQLServer 2012 or above**
4		SQLServer Production	8 Core RAM – 16 GB HDD - 500 GB	**SQLServer 2012 Enterprise** Oracle Client 11g or above Jet OLEDB Drivers
5.		SQLServer Test or QA	4 Core RAM – 8 GB HDD - 500 GB	**SQLServer 2012 Enterprise** Oracle Client 11g or above Jet OLEDB Drivers
6.		Active Directory Server (Production Only)	2 Core	Windows Server 2012 .Net 4.5 Framework Visual Studio 2013 **SQL Server 2012 or above** IIS Server

4. Servers

Existing Servers:

CESU utility having existing data centre at Bhubaneshwar location hosted approx 30 servers to provide billing and collection processing for 5 L consumers of Bhubaneshwar and Cuttack under RAPDRP scheme.

Purposed Servers:

TPCODL is going to leverage the power of Information Technology to provide best in class services to consumers, earn consumer delight, and improve satisfaction among other stakeholders. IT systems will be implemented to provide end-to-end solutions for important

business functions viz Commercial, Operations, Finance, HR and Administration etc. This IT system will have multiple applications like Email System, SAP, website, database & other home grown applications running to support the requirements of the organization as well as the consumers.

Some of the major IT initiatives which TPCODL is planning to implement are to increase Metering, billing, collection function and Mobility based Meter Reading and digital payment option for all consumers of central Odisha location. In digital utility there is need to strengthen cyber security while increasing digital coverage. To enable employees to work on automated systems, various type of servers would be required for running the applications.

It is required to procure additional servers in data centre for running various business critical application to provide services to balance consumers of central Odisha as per following details.

First Year Production, Test and Development servers (Please refer below table).

Production Servers Requirement For First Year			
S.No	**Data Centre Server/application**	**QTY**	**Remarks / Assumptions**
1	Backup Server	1	Backup Servers
2	Antivirus Server	2	Additional Antivirus server for covering
3	AD / LDAP servers/DNS	2	DC needs additional Domain controller for integration with various other services and standby
4	Email System	4	Email Management System
5	DHCP server	1	For IP allocation
6	SCOM / SCCM / other operations server/ Non MS patch management	2	For systems patching
7	BO Production	1	For Analytics and Reporting
8	SAP Mobile Platform Production	1	Mobile Application for Consumers
9	Gateway/MCF Production	1	Gateway for Mobile Application
10	Solution Manager	1	Monitoring Tool for application
11	Reverse Proxy Prod	1	Security Integration Server
12	Payment Gateway Prod	1	Oracle Server

13	SMRD Server Prod	1	SMRD
14	Website Servers Prod	1	Additional capacity enhancement for 1.8 million consumers
15	Mobility Server Prod	1	Mobility Server
16	Job Server Prod	1	Job Server
17	SQL server Prod`	1	Sql Server
18	HR Application Server Prod	1	HR Application/AD
19	Call Centre Servers	3	For Call routing and recording
Total Server 27			

DEV/TEST/QUALITY Servers Requirement For First Year			
S.No	**Data Centre Server/application**	**QTY**	**Remarks / Assumptions**
1	BO Production/Test/Quality	2	For Analytics and Reporting
2	SAP Mobile Platform/Test/Quality	2	Mobile Application for Consumers
3	Gateway/MCF/Test/Quality	2	Gateway for Mobile Application
4	Reverse Proxy Dev	1	Security Integration Server
5	Payment Gateway Dev	1	Oracle Server
6	SMRD Server Dev	1	SMRD
7	Website Servers DEV	1	Additional capacity enhancement for 1.8 million consumers
8	Mobility Server DEV	1	Mobility Server
9	SQL server DEV	1	Sql Server
Total Server 12			

DR Servers Requirement For Second Year			
S.No	**Data Centre Server/application**	**QTY**	**Remarks / Assumptions**
1	Backup Server	1	Backup Servers
2	Antivirus Server	2	Additional Antivirus server for covering
3	AD / LDAP servers/DNS	2	DC needs additional Domain controller for integration with various other services and standby
4	Email System	4	Email Management System
5	DHCP server	1	For IP allocation
6	SCOM / SCCM / other operations server/ Non MS patch management	2	For systems patching

7	BO Production	1	For Analytics and Reporting
8	SAP Mobile Platform Production	1	Mobile Application for Consumers
9	Gateway/MCF Production	1	Gateway for Mobile Application
10	Solution Manager	1	Monitoring Tool for application
11	Reverse Proxy Prod	1	Security Integration Server
12	Payment Gateway Prod	1	Oracle Server
13	SMRD Server Prod	1	SMRD
14	Website Servers Prod	1	Additional capacity enhancement for 1.8 million consumers
15	Mobility Server Prod	1	Mobility Server
16	Job Server Prod	1	Job Server
17	SQL server Prod`	1	Sql Server
18	HR Application Server Prod	1	HR Application/AD
19	Call Centre Servers	3	For Call routing and recording
Total Server 27			

Cost Estimate

The total estimated budget for different types of Servers is INR 8.67 Cr.

Item Description	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)	Budgetary Quote
Type 1 Rack Mount* server	15,00,000	25	3,75,00,000	3.75	Budgetary Quote.pdf
Type 2 Rack Mount* server	12,00,000	25	3,00,00,000	3.00	
Type 3 Rack Mount* server	12,00,000	16	1,92,00,000	1.92	
Total Amount			**8,67,00,000**	**8.67**	

Year 1 Cost

Item Description	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)
Type 1 Rack Mount* server	15,00,000	20	30000000	3.0
Type 2 Rack Mount* server	12,00,000	10	1200000	1.20
Type 3 Rack Mount* server	12,00,000	9	10800000	1.08

Total Amount	52800000	5.28

Year 2 Cost

Item Description	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)
Type 1 Rack Mount* server	15,00,000	5	7500000	0.75
Type 2 Rack Mount* server	12,00,000	15	18000000	1.8
Type 2 Rack Mount* server	12,00000	7	8400000	0.84
Total Amount			**33900000**	**3.39**

Benefits

- Efficiency in performing critical business processes
- Meeting PA timelines leading to consumer satisfaction
- Less processing times

4 Laptops / Desktops

Existing Laptops / Desktops:

CESU has implemented IT function for 5 L consumers under RAPDRP scheme. Under this scheme offices of Bhubaneswar and Cuttack locations were equipped with approximate 200 No's desktops for sub division and other office locations.

Purposed Laptop / Desktop's:

Apart from existing locations of Bhubaneswar and Cuttack, all other locations offices of Central Odisha need to be enabled with IT system to provide best in class services to consumers. Hence, it is proposed to procure 1200 Laptops, 600 Desktops with 3 years warranty & 600 UPS with 2 years warranty to cater to these new requirement.

Cost Estimate

The approx. Capex budget requirement to procure laptops / desktops along with UPS is INR 10.6 Crs.

Item Description	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)	Budgetary Quote
Laptop	60000	1200	7,20,00,000	7.20	Budgetary Quote.pdf
Desktop	52000	600	3,12,00,000	3.12	
Type 1 UPS for Desktop	3200	300	9,60,000	0.10	Budgetary_UPS_1.doc
Type 2 UPS for Desktop	5700	300	17,10,000	0.18	
Total Amount			**10,58,70,000**	**10.6**	

Year 1 (FY 20 – 21) Cost

Item	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)	Budgetary Quote
Laptop	60000	600	3,60,00,000	3.60	Budgetary Quote.pdf
Desktop	52000	300	1,56,00,000	1.56	
Type 1 UPS for Desktop	3200	150	4,80,000	0.05	Budgetary_UPS_1.doc
Type 2 UPS for Desktop	5700	150	8,55,000	0.09	
Total Amount			**5,29,35,000**	**5.30**	

Year 2 (FY 21 – 22) Cost

Item	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)	Budgetary Quote
Laptop	60000	600	3,60,00,000	3.60	Budgetary Quote.pdf
Desktop	52000	300	1,56,00,000	1.56	
Type 1 UPS for Desktop	3200	150	4,80,000	0.05	

Type 2 UPS for Desktop	5700	150	8,55,000	0.09	Budgetary_UPS_1.doc
Total Amount			**5,29,35,000**	**5.30**	

Benefits

- Performing automated business processes
- Office automation
- Improved employee productivity
- Managing mobility
- Faster communication

5 Printers & Scanners

Existing Printers and Scanners:

CESU has implemented IT function for 5 Lacs consumers under RAPDRP scheme. Under this scheme offices of Bhubaneswar and Cuttack locations were equipped with approximate No's 190 Printers under different type such as Dot Matrix, Laser Jet and Desktop Printers in Sub division and other office locations. . .

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Purposed Printers and Scanners:

Apart from existing locations of Bhubaneswar and Cuttack, all other locations offices of Central Odisha need to be enabled with IT system, Printing and Scanning facility to provide best in class services to consumers.

Hence TPCODL is required to procure approx. 280 numbers of printers to cater for new locations. .

Budgetary Requirement

Approximate CAPEX Budget of INR 3.10 Crs is required for procuring the printers / scanners.

Item Description	Unit Cost	Estimated Nos.	Amount (INR)	Amount (Crs.)	Budgetary Quote
Type 1 Printer (Network)	2,75,000	80	220,00,000	2.20	Adobe Acrobat Document
Type 2 Printer (Desktop)	55,000	100	55,00,000	0.55	
Type 3 Printer (Thermal)	35,500	100	35,50,000	0.35	
Total Amount			**31050000**	**3.10**	

Year 1 Cost

Item Description	Unit Cost	Estimated Nos	Amount (INR)	Amount (Crs.)	Budgetary Quote
Type 1 Printer (Network)	2,75,000	40	110,00,000	1.10	Adobe Acrobat Document
Type 2 Printer (Desktop)	55,000	50	27,50,000	0.27	
Type 3 Printer (Thermal)	35,500	50	17,75,000	0.17	
Total Amount			**15525000**	**1.55**	

Year 2 Cost.

Item Description	Unit Cost	Estimated Nos	Amount (INR)	Amount (Crs.)	Budgetary Quote
Type 1 Printer (Network)	2,75,000	40	110,00,000	1.10	Adobe Acrobat Document
Type 2 Printer (Desktop)	55,000	50	27,50,000	0.27	
Type 3 Printer (Thermal)	35,500	50	17,75,000	0.17	
Total Amount			**15525000**	**1.55**	

Benefits

Functioning of important business processes and meeting the PA timelines.

- Duplicate Bill and other important document print at Customer Care.
- Official document print.
- Record keeping.
- Door step Bill print and delivery.
- Scanning of official document.
- Copy of official/important documents.
- Payment receipt printing.
- Cheque printing for Business Associates.
- Printing of various reports for Regulator and other stake holders
- Scanning of documents related to PA timelines for sending to Regulator.
- Printing of Finance data.
- Other official work.

6 Network Equipment for Locations

Existing Network Locations:

CESU has implemented network connectivity to sub division offices and other offices of Bhubaneswar and Cuttack location for 5 L consumers under RAPDRP scheme. Under this scheme offices of Bhubaneswar and Cuttack locations were equipped with 70 No's network switches to connect network. Apart from existing location, we also need to make connectivity of balance locations of central Odisha with centralize IT system.

Purposed Network Locations:

To support business growth, multiple offices have been opened up at various locations of TPCODL. Users are also expected to increase at existing locations due to automation of business processes which is in planning phase. Network connectivity at these locations is required to enable employees to perform business critical processes like metering, billing, collection, power outage management and meeting performance assurance timelines. Unavailability of network will increase the restoration time of power outage and delay in providing other critical services to consumers thereby impacting the consumer satisfaction. Hence network connectivity to 150 locations are required to be enabled through network equipment like Routers and Switches.

Hence, It is required to procure network equipment Routers, Switches, etc. to provide robust and secure network connectivity at new locations as per following details.

Year 1 – 2020 - 2021

Item Description	Unit Cost (INR)	Quantity	Amount (INR)	Amount (Crs.)	Budgetary Quote
24 port network Switch	2,80,000	200	5,60,00,000	5.6	Budgetary Quote.pdf
Enterprise Router with 2 WAN ports	1,60,000	150	2,40,00,000	2.4	
48 Port 10G Switches	6,50,000	4	26,00000	0.26	Budgetary Quote 48 Port Switch.pdf
UPS 3 KVA	1,65,000	125	2,06,25,000	2.06	Budgetary_UPS_2.pdf
UPS 5 KVA	2,80,000	25	70,00,000	0.7	
Total Amount			**11,02,25000**	**11.02**	

Total Amount for Switches, Routers & UPS is INR 11.02 Cr

Year 2 – 2021 - 2022

Item Description	Unit Cost (INR)	Quantity	Amount (INR)	Amount (Crs.)	Budgetary Quote
24 port network Switch	2,80,000	125	3,50,00,000	3.5	Budgetary Quote.pdf
Enterprise Router with 2 WAN ports	1,60,000	125	2,00,00,000	2.0	
UPS 3 KVA	1,65,000	125	2,06,25,000	2.06	Budgetary_UPS_2.pdf
Total Amount			7,56,25,000	7.56	

Year 3 – 2022 -2023

Item Description	Unit Cost (INR)	Quantity	Amount (INR)	Amount (Crs.)	Budgetary Quote
24 port network Switch	2,80,000	67	1,87,60,000	1.87	Budgetary Quote.pdf
Enterprise Router with 2 WAN ports	1,60,000	67	1,07,20,000	1.07	
UPS 3 KVA	1,65,000	67	1,10,55,000	1.10	Budgetary_UPS_2.pdf
Total Amount			4,05,35,000	4.05	

Benefits

- Robust and secure IT network connectivity at various locations
- Meeting PA timelines leading to consumer satisfaction
- Efficiency in performing critical business processes

7 Communication Network

Existing Communication Network:

CESU has implemented leased communication network for 5 L consumers under RAPDRP scheme. Under this scheme offices of Bhubaneswar and Cuttack locations were equipped with lease network. These lease links are under capacity (only 2 Mbps/4 Mbps) which is insufficient to carry out multiple high bandwidth applications planned to be implemented in CESU. Also these links are deployed only for Cuttack and Bhubaneshwar circle and last mile is connected through UBR which is not reliable.

We need to increase bandwidth of existing link and also connect balance locations of central Odisha.

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Proposed Communication Network:

It is proposed to develop a robust, reliable, resilient, scalable and Secure Communication system in a phased wise manner as when drive for running of various mission critical IT & OT applications and data traffic between (Grids/Offices) is required then technology

selection becomes inert to handle the required complexity with simplified performance. That is where need for efficient communication technology arises through IP/MPLS VPN system.

Communication network support various mission critical applications on 24×7 basis. These services are classified as:

- Operational applications - ADMS, GIS, Communication for relay Protection system, Energy Auditing etc.
- Commercial and Billing applications – Smart Metering, Payment gateways
- Enterprise applications –CRM for Customer Relationship Management, Call Centre, ERP for Enterprise Resource Planning, e-mail, knowledge management etc.
- Security applications: Integrated security system for unmanned grids and critical locations

Also Communication network need continuous upgradation and expansions considering upcoming applications under Smart Grid scenario like:

- Smart metering Infrastructure roll-out
- SCADA connectivity for new Grids substations added per year
- Field applications like Distribution Automation Infrastructure , Street light Automation
- Power Quality metering for Solar systems
- LV Automation system for ACB'S, Feeder Pillar, Service Pillar
- Sub transmission Protection requirements
- Net metering for roof top Solar
- E-charging: Remote metering etc.

Selected communication technology platform should be interoperable to form an Integrated Communication network.

In first phase (FY 20-21) , Communication connectivity will be provisioned to connect

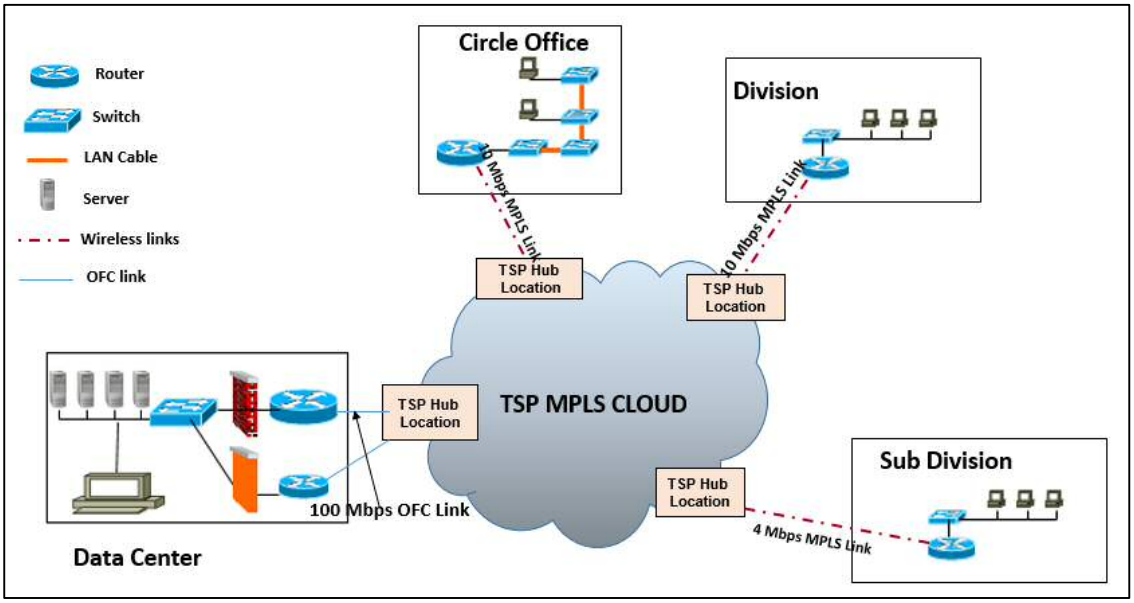
primarily Circles offices, Division Offices and Data Centers) primarily to meet the enterprise and business requirements.

In second phase (FY 20-21), Communication connectivity will be provisioned to connect next 125 nos. of locations for extension of enterprise services and 175 nos. of locations / Primary sub-stations for Operational services/ SCADA.

In 3rd phase (FY 21-22), **Phase 3:** Communication network is to be deployed for next 175 nos. of locations for Operational services/ SCADA.

Proposed technical architecture:

It is proposed to connect these location through MPLS VPN links, Leased through Telecom service provider (TSP). Data Center links will be installed in redundant mode via MPLS VPN links of two different TSP.



Bandwidth provisioned for different locations is as follows:

S. No.	Office Type	Bandwidth Required
1	Data Center	100 - 200 Mbps
2	Circle office	4- 10 Mbps
3	Divisions	2- 10 Mbps
4	33/11KV Primary Substations	2 Mbps

Scope:

Locations identified for extending Enterprise and Operational services:

Location	
Grids Sub stations	**370**
Circle Offices	5
Divisional Offices	20
Sub divisional Offices	67
Section offices and Commercial Offices	250

Budgetary Requirement

The approx. Capex budget requirement to implement communication Network is **INR 3.71 Cr**.

Cost Estimate for FY 20 - 21:

Item Description	Unit Cost	Estimated Nos. Required	Amount (INR)	Amount (Crs.)
One time Installation Charges 200 Mbps(Access Link Hardware/Software/Mast etc.) for Data Center -2 links per Data Center	50000	4	200000	0.02
One time Installation Charges for Internet Lease Line Charges 100 Mbps (Access Link Hardware/Software/Mast etc.) for Data Center	50000	2	100000	0.01
One time Installation Charges 10 Mbps (Access Link Hardware/Software/Mast etc.)(Div. & circles)	10000	25	250000	0.025
ARC (Per Annum/Per Location) 200Mbps	1250000	4	5000000	0.5
ARC (Per Annum/Per Location) for Internet Lease Line	680000	2	1360000	0.136
ARC (Per Annum/Per Location) 10Mbps	140000	25	3500000	0.35
Equipment ARC	20000	31	620000	0.062
Total Amount (A)			**1,10,30,000**	1.103

Item Description	Unit Cost	Estimated Nos. Required	Amount (INR)	Amount (Crs.)
One time Installation Charges 4 Mbps(Access Link Hardware/Software/Mast etc)(Office Locations)	10000	125	1250000	0.125
ARC (Per Annum/Per Location) 4 Mbps	110000	125	13750000	1.375
Equipment ARC	20000	125	2500000	0.25
Total Amount(B)			**1,75,00,000**	1.75
Item Description	**Unit Cost**	**Estimated Nos. Required**	**Amount (INR)**	**Amount (Crs.)**
One time Installation Charges 2Mbps(Access Link Hardware/Software/Mast etc)(Grids)	10000	50	500000	0.05
ARC (Per Annum/Per Location) 2 Mbps	60000	100	6000000	0.6
Equipment ARC	20000	100	2000000	0.2
Total Amount©			**85,00,000**	0.85
Total Cost for 200 Locations (in Cr.)	**3.703**			

Benefits

- Communication backbone network for business critical applications.
- Providing reliable power supply to consumers through availability of IT & OT services
- Ease in monitoring and control of network
- Meeting PA timelines leading to consumer satisfaction
- Efficiency in performing critical business processes.

8. Data Centre Extension

Existing Data Centre:

CESU has implemented Data Centre in Bhubaneswar location for 5 L consumers under RAPDRP scheme. In existing data centre approximate 15 No's of IT Racks are installed to cater IT application load of 5 L consumers. Apart from this existing data centre has 4 No's of Precision AC to provide cooling and maintain optimum temperature inside the Data Centre. In existing data centre Fire safety measures already available for 15 No's of IT Racks and 2 No's of 100 KVA UPS installed to provide power backup of 30 minutes to 15 No's of IT Racks.

Purposed Data Centre:

TPCODL is planning to extend existing data centre to augment additional 17 No's of IT Rack in the same building to host servers for existing and new applications. Data Centre extensions require to make arrangement for Fire Safety, Power Backup, Water Leakage Protection and cooling for IT Systems. Following are the Data Centre Enablers which need to be consider for Data Centre Extension.

S.No	Data Centre Enablers	Unit	QTY	Unit Cost	Total (Cr.)	Budgetary Quote
1	IT Server Racks	No's	17	86375	0.146	Quoterackwithkvm.pdf
2	Precision AC's	No's	2	1230000	0.24	VERTIV TATA POWER BOQ PAC.pc
3	Water Leakage system	Sqft	1500	214	0.032	RE Budgetary Quote Required for
4	Cold Containment in Data Centre	No's	2	495000	0.1	RE Budgetary Quote Required for
5	Fire safety system	Sqft	1000	3200	0.32	RE Budget Quote for FM 200 and relat
6	***Data centre UPS with UPS panel	No's	2	6062500	1.21	FW Quotation for UPS 120KVA with in
				Total	2.048	

** Prices are exclusive of taxes

** *Warranty for Data centre UPS batteries is 2 Years.

Benefits

- Data Centre Extension to provide coverage for balance consumers of central Odisha.
- Data Centre enablers provide reliable power, safe environment, Protection and optimum temperature for IT Servers.

Scheme Period: 1 Year from date of commission approval.

Cyber Security Initiatives for Second Year (FY 2021-2022):

Apart from above mentioned IT Initiatives, additional security measure should be adopted to ensure data protection, traffic filtration, and vulnerability assessment of deployed additional IT applications in the existing data centre

Following IT security equipment's and their tentative cost mentioned below to be considered for second year.

Item Description	Unit Cost (Cr.)	Quantity	Amount (Cr.)
Backup System (Enterprise Applications) 50 TB Capacity based License	1.48	2	2.96
Backup System (End User Devices) 1000 Laptop / Desktop + Email Archival	2.03	1	2.03
Gateway Firewall	1.07	2	2.14
Email SPAM Protection	1.0	2	2.0
Internet Proxy Security	1.0	2	2.0
Antivirus Security -1000 devices	0.15	2	0.30
Total			11.43

All security devices / software cost is with 7 year warranty

DPR 16 Security System of Stores.

1. **High Mast lighting System 16 Meters (12 Nos.)** - High mast lighting are commonly used to illuminate large areas from a very high mounting height for storage, It is an efficient lighting solution & most preferred way of illumination because it can achieve a high space to height ratio. As stores & scrap stores are vulnerable to theft it is important to have optimum illumination to safeguard the materials kept in the premise. Choudwar Store has got a very big area of 10 acres, Power House Store has got an area of 2.50 acres and Jagatpur Scrap Store has area of 1.30 acres. Also, from operational point of view appropriate & efficient lighting arrangement is required to support loading, unloading & movement of materials inside the premises. Accordingly, the requirement of High Mast Lighting System is given below ,

    i. Choudwar Central Store, Cuttack - 07 Nos.
    ii. Power House Store, Bhubaneswar- 03 Nos.
    iii. Jagatpur Scrap Store – 02 Nos.

Expected Cost for 12 Nos High Mast Light : 12 Nos

    i. Material Cost = 04 Lakhs
    ii. Installation Cost =01 Lakh

2. **Water Hydrant System against Major fire protection (01 Nos.)** - Fire breakout is a major risk for stores leading to loss of public assets & property. There has been occurrences of fire incidence in past where cable worth 3.50 crores have been destroyed in Choudwar Store. Accordingly, there is need for establishment of Water Hydrant System for safety & avoid any eventuality of fire in and around. We have to safe guard an inventory of Rs.95 Crores. For safety against fire we have got only 10 fire extinguishers and a few sand buckets. In emergency we have to depend on State Fire Brigade. In view of this we are proposing a Water Hydrant System for Choudwar Central Store, Cuttack which is spread in an area of 10 acres.

Water Hydrant System at Choudwar Central Store , Cuttack : Rs. 2 Cr.(Approx.)

Currently this system is being installed at Keshavpuram Central Store- TPDDL at the cost of Rs. 98 Lakhs by M/S MYC Infra Pvt. Ltd. Since the Choudwar store is approximately 2.5 times in size than Keshavpuram Store, hence accordingly the estimate is propped.

3. **Fire Extinguishers – (43 Nos)**. - Fire extinguishers are extremely important as they are the most commonly used **fire** protection. In many cases, they are first line of defence and often contain or extinguish **fire** without any damage to assets or materials. In addition to other fixed form of water suppression system a suitable numbers of appropriate portable fire extinguishers are required to counter fire. There are hardly only 10 Fire extinguishers in Choudwar Store and only 6 Fire extinguishers in Power house Store.

Expected Cost & Quantity of required Fire Extinguishers: 12.25 Lakhs.

Various types of Fire Extinguishers required are given below,

i. **Choudwar Central Store – 27 nos.**
   a. DCP (50 KG) Type – 10 Nos
   b. ABC (9 KG) Type - 10 Nos.
   c. Foam Type – 05 Nos.
   d. Water Mist Type – 02 Nos

ii. **Power House Store – 16 Nos**
   e. DCP (50 KG) Type – 07 Nos
   f. ABC (9 KG) Type - 05 Nos.
   g. Foam Type – 03 Nos.
   h. Water Mist Type – 01 Nos

Total Cost

a) DCP (50 KG) Type – 17 nos. (@ Rs.17936) = Rs. 304912.
b) ABC (9 KG) Type - 15 nos. (@ Rs.3027) = Rs. 45400.
c) Foam Type – 08 nos. (@ Rs.10650) = Rs. 85196.
d) Water Mist Type – 03 nos. (@ Rs.263435) = Rs. 790305.

4. **CC TV Camera System (03 Nos) –** CCTV is an important requirement for surveillance of storage & warehouse facility. It helps to protect and secure large spread out area on a 24/7 basis. CCTV installation makes possible remote monitoring possibilities, cuts insurance cost, quality control & monitoring of store operations and is a theft deterrent.

The total cost of Rs.40 Lakhs is estimated.

1. Choudwar Store – 20 Lakhs. Area – 10 acres.
2. Power house Store – 10 Lakhs. Area – 2.50 acres.
3. Jagatpur Scrap Store – 10 Lakhs. Area – 1.30 acres.

5. **Intrusion Detection Laser Alarm system (03 Nos)** – Intrusion detection system is a security control measure for a secured premise. It allows only authorized entry & immediately informs over the network to the control room about unauthorized access on real time basis. It is an important tool to prevent any malicious activity or theft attempt by any outsider in stores or scrap stores.

Total Cost =Rs.35 Lakhs (Approx.)

Considering the size of TPCODL stores and the appreciation of cost, the following price is estimated.

1. Choudwar Store – Rs. 15 lakhs.
2. Power House Store – Rs.10 Lakhs.
3. Jagatpur Scrap store – Rs. 10 Lakhs.

Annexure 17 DPR for GIS

Tata Power has always been an early implementer of latest technology in India and has perhaps most number of standalone and integrated technology platforms in use. These technologies have been instrumental in improving the overall performance of the company and also been able to deliver business benefit in terms of lowering losses and improving reliability. Tata Power's competence in adaptation of latest technology makes it very appropriate to take initiative to lead conceptualization and implementation of state of the art automation technologies in TPCODL.

TPCODL has always the quest for adapting new technologies to provide quality customer services, manage revenue cycle processes for reduction of AT&C losses and efficiently manage to deliver highly reliable and improved quality supply in safe manner to its consumers by meeting various standards of operation.

In line with adoption of technology, TPCODL implemented under RAPDRP the Geospatial technology (GIS System) to simplifies records management for the key assets of the organization, thus leading to a decrease in operational costs. Linking the customer and asset data to a geographic location on a map allows the operation team to look at the bigger picture and thus makes for a powerful decision-making tool.

GIS is an enterprise software application that maintains the locational and physical attributes of electric infrastructure overlaid on the geographic, political, property and other real-world features. The system is used throughout the Utility as the source of infrastructure information. The system keeps track of electric delivery networks and all of the elements that comprise those networks.

For operating personnel, GIS is the essential source of information about assets—what and where they are and what is around them. Combined with customer information, GIS becomes an essential tool for providing customer service and planning the maintenance and expansion of infrastructure.

Item Description	Unit Cost	Phase -1 (FY20-21)	
		Qty	Total Cost
Hardware			
A0 Size Plotter	1000000	1	1000000
High End PC	100000	5	500000
Total Hardware Cost			1500000
Software and Applications			
Procurement of Satellite Imagery having 0.5 m or less resolution (Extension to the existing 12 town as well as other smaller settlements	3500	200	700000

Item Description	Unit Cost	Phase -1 (FY20-21)	
		Qty	Total Cost
Creation of Base Map by using High Resolution Satellite Imagery	5500	200	1100000
Procurement of SOI Topo sheets - Digital Data	5000	100	500000
Mobile Data Collection App, Database & Server	10000	100	1000000
Google Earth Plugin	50000	4	200000
Total Software Cost			3500000
Services			
Locating co-ordinates (Latitude-Longitude) using DGPS, collection/updation of attribute database of following electrical network assets through field survey and codification & indexing with their upstream source of supply:	177592500	1	12952250
Collection/updation of consumer attribute database through door-to-door field survey and codification & indexing of the consumers with respective upstream source of supply (poles/feeder pillar boxes).	35	50000	1750000
Preparation of digitized electrical network on the base map in the pre-defined scale with features and attributes of assets and consumers collected through DGPS/door-to-door survey for GIS application.	3750	200	750000
Total Services Cost			15452250
Total Cost			**20452250**

Benefits of GIS Applications

- Master Repository of Asset & Network with its Topology
- Provides accurate Network hierarchy for Energy Audit
- Consumer Indexing from Connected Pole/ FP to its Source S/S
- Incremental updation of data for processes effectiveness
- Enhance the efficiency in Distribution.

Annexure 18 DPR for Civil Works

Existing Infrastructure

TPCODL currently have offices in all the five circles and subdivisions. Some of them are owned and others are on rented property. Currently the Offices in Bhubaneswar circle I and II are accommodating office and associated services staff.

Offices at IDCO Tower: 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.. Also, the Office space at 9th floor is mostly vacant (approx. 300 m2). In view of more people joining the office it will be difficult to accommodate the extra manpower in the same arrangement.

Office at Power House: The existing building is a two storey building (2000 sqft) constructed in 1970 and is in dilapidated condition. Currently building accommodates to 60 employees and most of the space is utilised for record keeping. The roof of building is damaged at many places and needs rehabilitation. At many places termite infestation has been observed. Water leakage & seepage is observed from roof and floors. The existing building requires urgent repairs to enhance its structural strength by guniting and internal modification to accommodate 100 employees.

Store Shed: Currently the stores is located centrally at Choudwar, Cuttack. All the materials required by 5 circles, Divisions and sub-divisions are provided from this location. Currently, the shed are in dilapidated condition especially in the aftermath of Cyclone. These sheds remain unutilised since long and require urgent roofing &civil repairs. There are no sheds to store documents & manual records at any location and all the documents are presently with the employees, there by congesting office space. In view of the above, some of unutilized sheds have been identified (dilapidated condition) for storage of Consumable materials and indoor items after repairs.

Furniture: The furniture available at offices are nearly 10- 15 years old and are in non-serviceable condition. New furniture are to be procured for various offices, Customer Care Centres, Call Centres, etc. and also to cater to new incoming employees.

Need of the Project:

The challenges exists in TPCODL using current buildings and infrastructure to accommodate more employees and providing a hygienic, well ventilated and spacious working environment with minimum expenditure. It may also be noted that no annual repairs or refurbishment in all office buildings have been made in recent times, hence, immediate rehabilitation of the said buildings is the need of the hour.

Recommendation:

Office at IDCO Tower: Taking into consideration, the existing open unused space on the 9th floor of IDCO tower. It is proposed to redesign and renovate offices to accommodate around 25 employees with basic amenities.

Office at Power House: The existing building shall be re-conditioned by carrying out guniting, plastering, anti-termite treatment, water proofing of terraces, flooring, canteen facility, wash rooms and renovating of offices to accommodate around 100 employees. Also it is planned to provide face lifting of the building along with parking space.

Store shed: The roofs of existing sheds at various locations (15 no) are badly damaged and beyond repairs due to cyclone effect. Also, due to zero maintenance of the sheds, the flooring and walls have developed cracks which needs urgent repairs and painting, with replacement of doors and windows. It is also envisaged that for smooth operation and maintenance we need to have decentralised stores at all five electrical circles. We need to construct two new sheds at Dhenkanal and Pradeep Circle to resolve logistics problem.

Furniture: Work- station, Conference Table, Meeting Table etc. which are bare necessity for day to day operation in offices are proposed. The furniture proposed are Modular in nature and can be dismembered and refixed at any other location. Such Items can be subsequently, shifted to Divisional/sub-div offices.

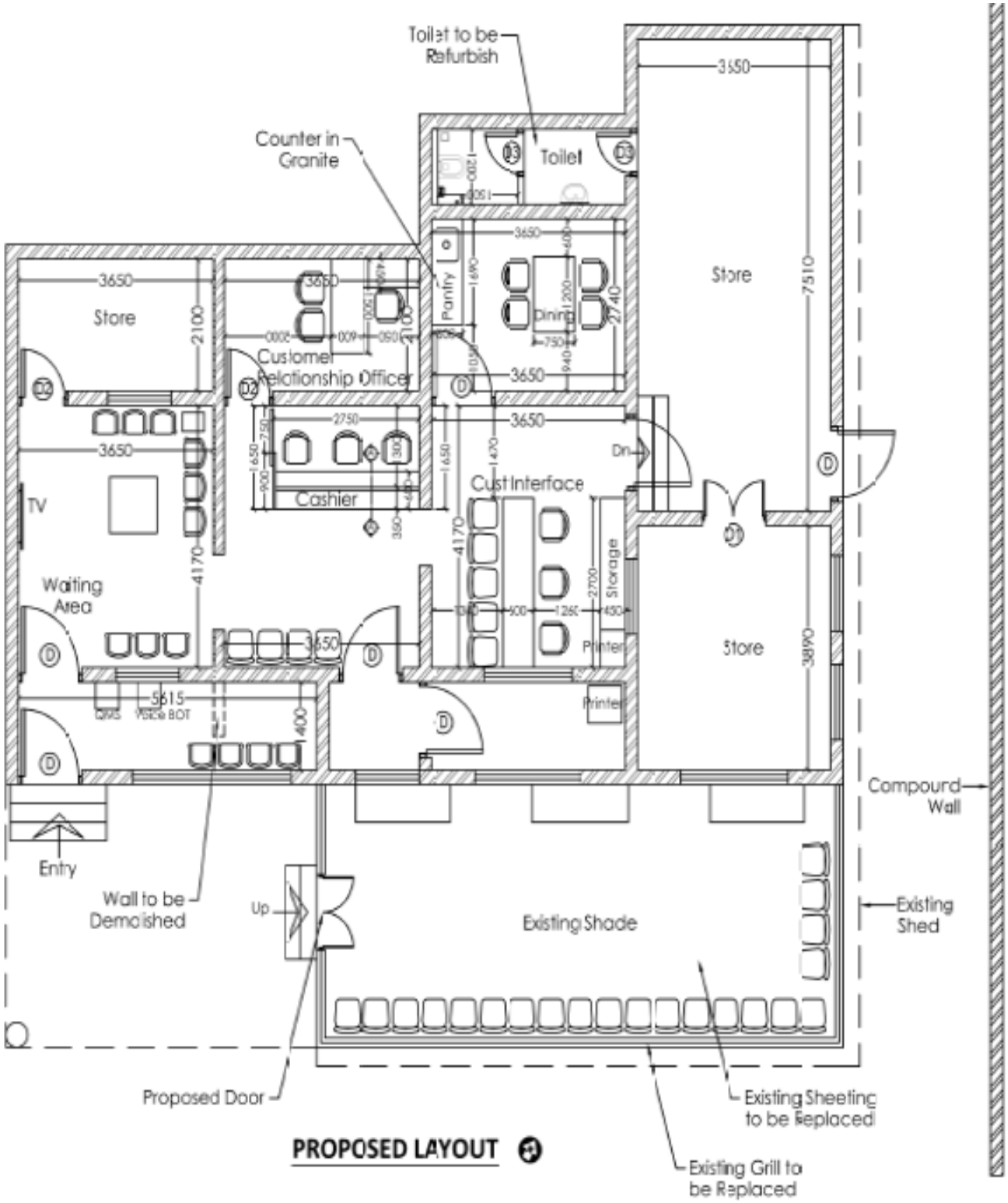
Cost Estimate:

S. No.	Activity	DPR Amount (in Cr)
1	Creation of office space at 9th floor of IDCO Tower	0.25
2	Structural Strengthening and remodelling of Power House(Corporate office)	2.95
3	Customer care centres at BBSR I, Puri, Cuttack	0.60
4	Structural strengthening of existing Central Store Sheds BBSR 1	0.45
5	Structural strengthening of existing Central Store Sheds at Choudwar	0.90
6	Structural strengthening of existing store Sheds 2 nos.(Khorda) & 3 no's at Puri	0.60
7	New sub-store at Banarpal and Scrap store at Jagatpur	0.60
8	Renovation for additional office space in 2nd floor Corporate Office	0.75
9	Furniture (Office Furniture, Workstation, Chairs etc. in Circle office /Division / sub-Division)	0.85
	Total Amount	**7.95**

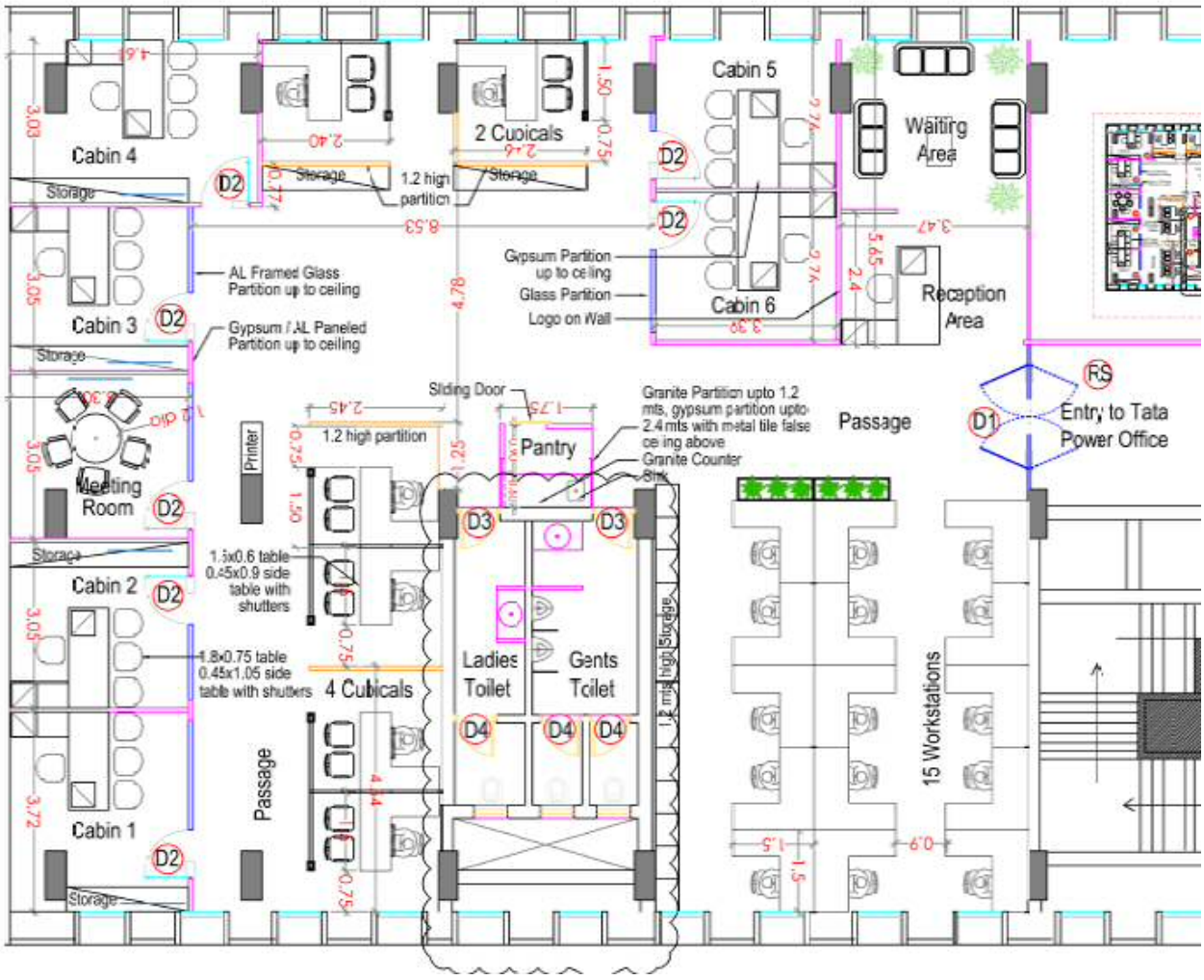
Benefits of Proposal:

S.No	CAPEX Description	Objective
a	Creation of office space at 9th floor of IDCO Tower	To provide additional seating space for employees.
b	Structural Strengthening and remodelling of Power House(Corporate office)	To enhance structural strength to old 1970 building and remodel it so as to have added seating space.
c	Structural strengthening of existing store Sheds.	To increase the utility of badly damaged roofs of sheds and make them serviceable, Currently, they are lying abandoned & can be used for indoor material.
d	Construction of new Store Shed	Puri & Paradeep Circle do not have sheds for storage. Also, proposed to have new sub-store at Banarpal in Dhenkanal Circle for reducing logistic costs and facilitate in quicker delivery.
e	Furniture	Work station, conference table, meeting tables etc. for providing employee friendly environment.

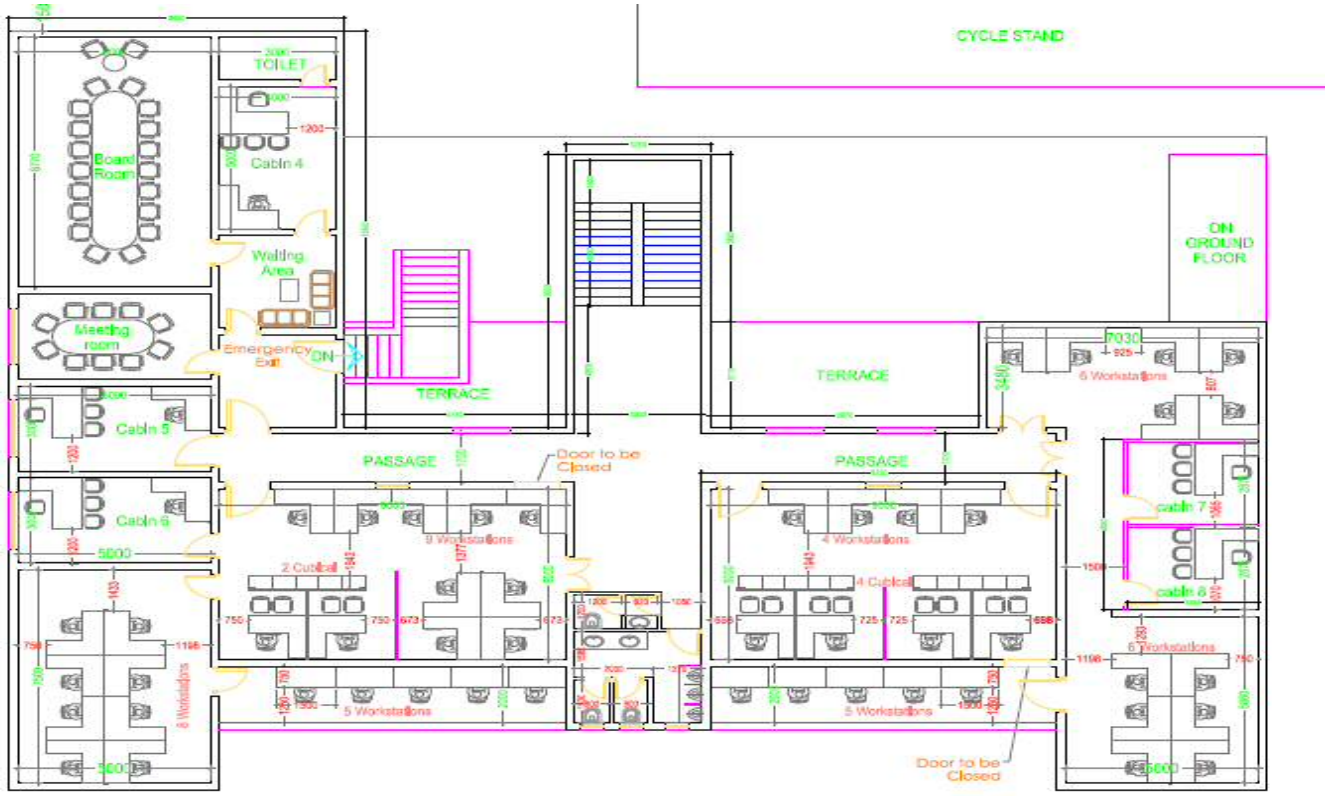
Proposed modification/Renovation Drawings

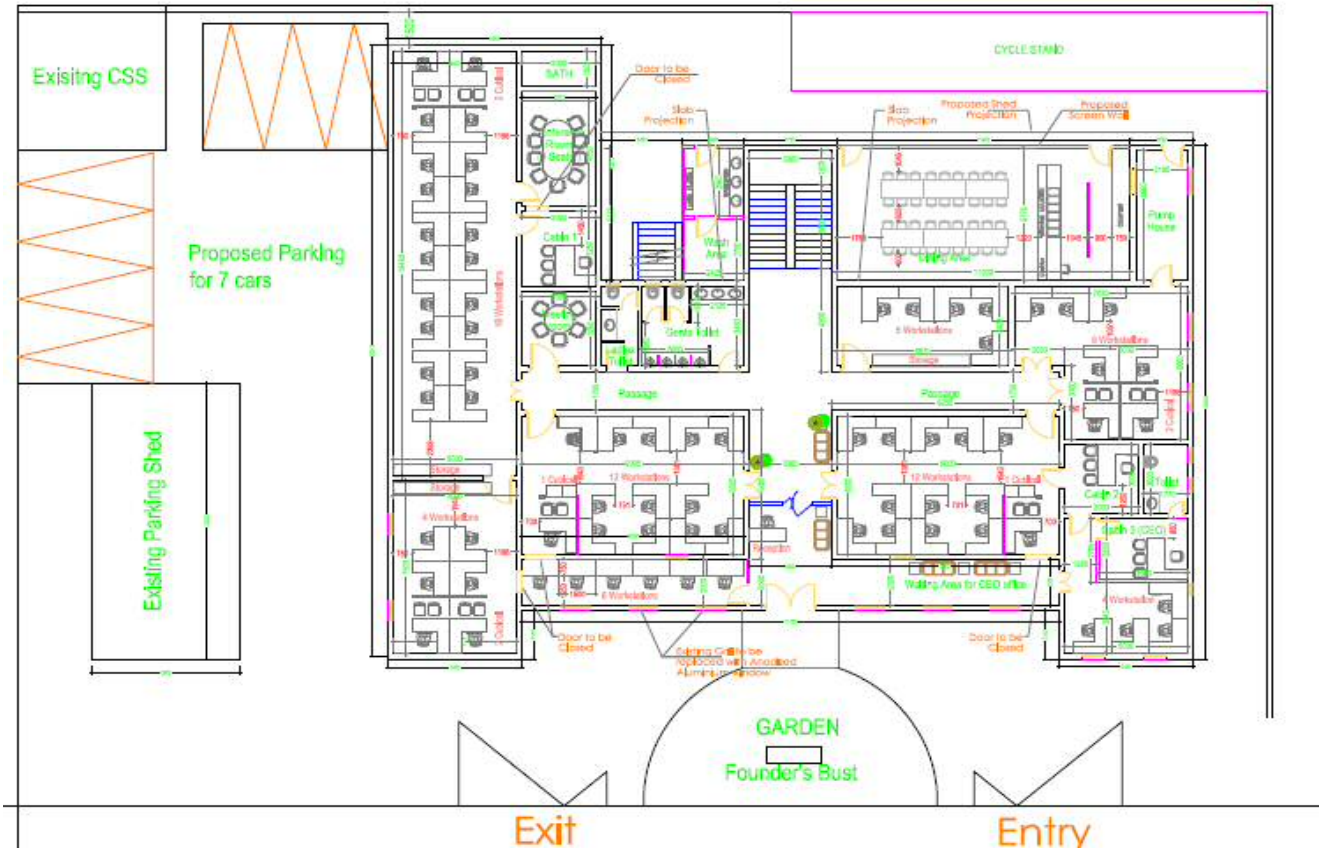


Proposed Customer Care Centre



Proposed 9th Floor IDCO Tower





Proposed Renovation of Power House - Corporate Office