BUSINESS PLAN FOR THE CONTROL PERIOD FY 2022-23 TO FY 2024-25

OF

ELECTRICITY DEPARTMENT, GOVERNMENT OF GOA

SUBMITTED TO

JOINT ELECTRICITY REGULATORY COMMISSION

GURGAON

NOVEMBER ___, 2021

BEFORE THE JOINT ELECTRICITY REGULATORY COMMISSION FOR THE STATE OF GOA, & UNION TERRITORIES, GURGAON

Filing No……

Case No……

IN THE MATTER OF: Petition for approval of the Business Plan for control period from FY 2022-23 to FY 2024-25 for the Electricity Department of Goa as per Regulation 8 and 17 of JERC (Generation, Transmission and Distribution Multi Year Tariff) Regulations, 2021.

AND

IN THE MATTER OF: Electricity Department, Government of Goa

Vidyut Bhavan, Panaji, Goa

.....Petitioner

Electricity Department, Government of Goa (hereinafter referred to as "ED-Goa"), files petition for approval of the Business Plan for FY 2022-23 to FY 2024-25 as per Regulation 8 and 17 of JERC (Generation, Transmission and Distribution Multi Year Tariff) Regulations, 2021.

Electricity Department, Government of Goa

Petitioner

Place: Panaji

Dated: ___ November 2021

BEFORE THE JOINT ELECTRICITY REGULATORY COMMISSION FOR THE STATE OF GOA, & UNION TERRITORIES, GURUGRAM

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Vidyut Bhavan, Panaji, Goa

.....Petitioner

AFFIDAVIT VERIFYING THE PETITION

I, Shri. **Raghuvir Keni**, son of Shri. **Giridhar Keni** aged **61** years, the deponent named above do hereby solemnly affirm and state on oath as under:

1. That I am Chief Electrical Engineer and Head of Electricity Department, Government of Goa and am authorised to sign and submit the said petition and am acquainted with the facts deposed below.

2. I say that on behalf of EDG, I am now filing this Petition for approval of the Business Plan for control period from FY 2022-23 to FY 2024-25 for the Electricity Department of Goa as per Regulation 8 and 17 of JERC (Generation, Transmission and Distribution Multi Year Tariff) Regulations, 2021.

3. I further say that the statements made, and financial data presented in the aforesaid Petition are as per records of the Department and believe that to be true to the best of my knowledge.

4. Further, to my knowledge and belief, no material information has been concealed in the aforesaid Petition.

The Electricity Department,

Government of Goa

DEPONENT

Place: Panaji, Goa

Dated: __th November 2021

VERIFICATION

I, Shri _____ Advocate and Notary having office at Panaji-Goa, do hereby declare that the person making this affidavit is known to me through the perusal of records and I am satisfied that he is the same person alleging to be deponent himself.

Advocate

Solemnly affirmed before me on this **__th day of November 2021** by the deponent who has been identified by the aforesaid Advocate. I have satisfied myself by examining the deponent that he understood the contents of the affidavit which has been read over and explained to him. He has also been explained about section 193 of Indian Penal Code that whoever intentionally gives false evidence in any of the proceedings of the Commission or fabricates evidence for purpose of being used in any of the proceedings shall be liable for punishment as per law.

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List of Abbreviations

S. No	Abbreviations	Descriptions
1.	A&G	Administrative and General
2.	AC	Auxiliary Consumption
3.	ABR	Average Billing Rate
4.	APR	Annual Performance Review
5.	ARR	Aggregate Revenue Requirement
6.	CAGR	Compound Annual Growth Rate
7.	CAPEX	Capital Expenditure
8.	CERC	Central Electricity Regulatory Commission
9.	JERC	Joint Electricity Regulatory Commission
10.	CGS	Central Generating Station
11.	CoS	Cost of Supply/ Service
12.	CPPs	Captive Power Plants
13.	Crs	Crores
14.	CWIP	Capital Work in Progress
15.	DF	Distribution Franchisee
16.	Discom	Distribution Companies
17.	DPC	Delayed Payment Charges
18.	DSM	Demand Side Management
19.	DTC	Distribution Transformer
20.	EA/The Act	The Electricity Act 2003
21.	EDG/ED-Goa	Electricity Department-Goa
22.	FY	Financial Year
23.	GFA	Gross Fixed Assets
24.	G.O.G	Government Of Goa
25.	GoI	Government of India
26.	HR	Human Resource
27.	HT	High Tension
28.	IPP	Independent Power Producers
29.	KV	Kilo Volt
30.	kVA	Kilo Volt Ampere
31.	kVAh	Kilo Volt Ampere Hour
32.	kW	Kilo Watt
33.	kWh	Kilo Watt Hour
34.	LF	Load Factor
35.	LT	Low Tension
36.	MD	Maximum Demand
37.	MOD	Merit Order Despatch
38.	MoP	Ministry of Power

S. No	Abbreviations	Descriptions
39.	MOU	Memorandum of Understanding
40.	MU	Million Units (Million kWh)
41.	MVA	Mega Volt Ampere
42.	MW	Mega Watt
43.	MYT	Multi Year Tariff
44.	NEP	National Electricity Policy
45.	NTP	National Tariff Policy
46.	NTPC	National Thermal Power Corporation
47.	O&M	Operation & Maintenance
48.	PAF	Plant Availability Factor
49.	PF	Provident Fund
50.	PFC	Power Finance Corporation
51.	PLF	Plant Load Factor
52.	PLR	Prime Lending Rate
53.	PPA	Power Purchase Agreement
54.	R-APDRP	Restructured-Accelerated Power Development and Reform Programme
55.	REC	Rural Electrification Corporation
56.	R&M	Repair and Maintenance
57.	ROE	Return on Equity
58.	RPO	Renewable Purchase Obligation
59.	Rs	Rupees
60.	SBI	State Bank of India
61.	T&D	Transmission and Distribution
62.	w.e.f	With effect from
63.	Y-o-Y	Year on Year

1 INTRODUCTION

1.1 Background

1.1.1 The Electricity Department was formed in January 1963 under the Government of Goa, Daman & Diu. It is the only licensee operating in the State of Goa for transmission and distribution of Electrical Energy.

1.1.2 The Electricity department (ED-Goa) does not own any generation plant. The majority of the power requirement for the State of Goa is met through its share from Central Sector Power Stations of the National Thermal Power Corporation as allocated by the Central Government. ED-Goa has arrangement of power purchase from three Co-generation Power Plants in the State:

- Goa Energy Private Limited for 14-21 MW
- Goa Sponge and Power Limited for 3 MW
- Sesa Sterlite for minimum 2 MW

1.1.3 ED-Goa came into regulatory regime wef FY 2011-12 i.e. the first tariff filing year. The Electricity Department is a deemed Distribution Licensee within the meaning of Section 2 (17) of Electricity Act 2003 and pursuant to the Section 14 of the Electricity Act. Further, Section 42 and 43 of the Electricity Act 2003 prescribes the following duties of the deemed Distribution Licensee:

- To develop and maintain an efficient, co-ordinated and economical distribution system;
- To supply electricity on an application of the consumer in accordance with the provisions specified in the Electricity Act 2003;
- To provide non-discriminatory open access to the consumers;
- To establish a forum for redressal of grievances of the consumers.

1.1.4 The Main purpose is to undertake the transmission, distribution and retail supply of electricity in its license area and for this purpose to plan, acquire, establish, construct, erect, lay, operate, run, manage, maintain, enlarge, alter, renovate, modernize, automate, work and use a power system network in all its aspects and also to carry on the business of purchasing, selling, importing, exporting, wheeling, trading of electrical energy, including formulation of tariff, billing and collection thereof and then to study,

investigate, collect information and data, review operations, plan, research, design and prepare project reports, diagnose operational difficulties and weaknesses and advise on the remedial measures to improve and modernize existing sub-transmission and supply lines and sub-stations.

1.1.5 ED-Goa submitted its first Business Plan for the period starting from April 2015 to March 2018 (3 year control period) on 01.10.2014 under Regulation 12.1 of the MYT Regulation, 2014. As per provisions in clause 5.1 (as per amendment dated 10th August 2015) and 12.1 of the JERC Multi Year Distribution Tariff Regulations, 2014, the Petitioner has filed for approval of its Business Plan for three years control period i.e. from FY 2016-17 to FY 2018-19 with details for each year of the control period before the Commission. The Commission has approved the Business Plan for three years control period FY 2016-17 to FY 2018-19 vide order dated 22.12.2015.

1.1.6 ED-Goa submitted its second Business Plan for the period starting from April 2019 to March 2022 (3 year control period) on 27.09.2018 under Regulation 8 of the (Generation, Transmission and Distribution Multi Year Tariff Regulation, 2018. The Commission approved the Business Plan for three years control period FY 2019-20 to FY 2021-22 vide order dated 16.11.2018.

1.1.7 The Commission has come with the new MYT Regulations 2021 and as per Regulation 8 of the new MYT Regulations 2021, ED-Goa is filing the third Business Plan for the Control Period FY 2022-23 to FY 2024-25 in the instant Petition.

1.2 Objective of Business Plan

1.2.1 A business plan is conventionally defined as:

"Business Plan is a formal statement of a set of business goals, the reasons why they are believed attainable, and the plan for reaching those goals. It may also contain background information about the organization or team attempting to reach those goals."

1.2.2 Accordingly, the business plan for ED-Goa is developed keeping in mind the growth plan for the control period after considering the strengths and weaknesses of the department and evaluating its business environment. The business environment has evolved considerably in a number of ways that affects ED-Goa's strategic planning.

1.2.3 The business plan is intended to give a comprehensive and up-to-date representation of the department, its market, the impact of new regulations, and the strategies that has been developed by ED-Goa to achieve the same. *However, as mentioned above, there are number of internal and external factors which affect the planning of the department and thus, it makes this a very dynamic document and which calls for regular reviews of the*

plan with a view to introduce any corrections.

1.2.4 The Commission has come with the new MYT Regulations 2021 and as per Regulation 8 of the new MYT Regulations 2021 for the Control Period FY 2022-23 to FY 2024-25, the Business Plan shall cover as under:

Quote

"8 Business Plan
8.1 The Transmission Licensee and Distribution Licensee shall file a petition, duly approved by the competent authority, for approval of Business Plan by the Commission for the entire Control Period, latest by May 15, 2021:
Provided that the Generation Company shall not be required to file a Business Plan for the Control Period.
8.2 The Business Plan filed by the Distribution Licensee shall contain separate sections on Distribution Wires Business and Retail Supply Business.
8.3 The Business Plan filed by the Transmission Licensee shall inter-alia contain:
a) Projections for the growth of load in the transmission network;
b) Capital Investment Plan for each Year of the Control Period commensurate with load growth, transmission loss reduction trajectory and quality improvement measures proposed in the Business Plan in accordance with Regulation 8.5;
c) Capital structure of each scheme proposed and the cost of financing (interest on debt and return on equity), terms of the existing loan agreements, etc.;
d) Performance targets items such as transmission loss, availability of transmission system, transformer failure rate, and any other parameters for quality of supply for each year of the Control Period, consistent with the Capital Investment Plan proposed by the Transmission Licensee;
e) Projections for number of employees during each Year of the Control Period based on proposed recruitments and retirement;
f) Proposals in respect of income from Other Business for each Year of the Control Period.
8.4 The Business Plan filed by Distribution Licensee shall inter-alia contain:
a) Capital Investment Plan for each Year of the Control Period commensurate with load growth, distribution loss reduction trajectory and quality improvement measures proposed in the Business Plan in accordance with Regulation 8.5;
b) Capital Structure of each scheme proposed and the cost of financing (interest on debt and return on equity), terms of the existing loan agreements, etc.;
c) Sales Forecast for each Consumer category and sub-categories for each Year of the Control Period in accordance with Regulation 8.6;
d) Power Procurement Plan based on the Sales Forecast and distribution loss trajectory for each Year of the Control Period in accordance with the Regulation 8.7;
e) Targets for distribution loss for each Year of the Control Period consistent with the Capital Investment Plan proposed by the Licensee;
f) Projections for number of employees during each Year of the Control Period based on proposed recruitments and retirement;

g) Proposals in respect of income from Other Business for each Year of the Control Period."
Unquote

1.2.5 The Business Plan of ED-Goa does not include the forecast of Aggregate Revenue Requirement for the control period as the same has to be submitted based on the Business Plan as approved by the Hon'ble Commission by order. The relevant extracts, Regulation 5.2, of the MYT regulations 2021 are mentioned below:

Quote

"5.2 The Multi Year Tariff framework for determination of Aggregate Revenue Requirement and Expected Revenue from Tariff and Charges for Generating Company, Transmission Licensee, Distribution Wires Business and Retail Supply Business shall include the following:
a) Business Plan for the Licensee, for the entire Control Period as submitted to the Commission for approval, prior to the start of the Control Period;
b) A detailed Multi Year tariff application comprising of the year-wise forecast of Aggregate Revenue Requirement for the entire Control Period and determination of Expected Revenue from Tariff and Charges for the first Year of the Control Period submitted by the Applicant, in formats specified by the Commission from time to time:
Provided that the performance parameters, whose trajectories have been specified in these Regulations or the Business Plan or the Multi Year Tariff Order approved by the Commission, shall form the basis for projection of these performance parameters in the Aggregate Revenue Requirement for the entire Control Period:
c) Determination of year-wise Aggregate Revenue Requirement by the Commission for the entire Control Period and the tariff for the first Year of the Control Period for the Generating Company, Transmission Licensee, Distribution Wires Business and Retail Supply Business;
d) Annual review of performance which shall be conducted vis-à-vis the approved forecast and categorisation of variations in performance into controllable and uncontrollable factors;
e) Annual determination of tariff for the Generating Company, Transmission Licensee, Distribution Wires Business and Retail Supply Business, for each Financial Year within the Control Period, based on the approved forecast, the annual performance review, Mid-term Review and truing up exercise;
f) Truing up of previous Year/(s) expenses and revenue by the Commission based on audited accounts vis-à-vis the approved forecast and categorisation of variation in performance as those caused by factors within the control of the Applicant (controllable factors) and those caused by factors beyond the control of the Applicant (uncontrollable factors);
g) The mechanism for pass-through of approved gains or losses on account of uncontrollable factors as specified by the Commission in these Regulations;
h) The mechanism for sharing of approved gains or losses on account of controllable

factors as specified by the Commission in these Regulations.

Unquote

1.3 Approach to Business Plan

1.3.1 ED-Goa has prepared the Business Plan taking cognizance of the existing internal factors and external business environment affecting the business. ED-Goa submits that the Business Plan being a dynamic document may need to be updated at periodic intervals taking into account the changes in the internal and external environment and these changes would be intimated to the Hon'ble Commission from time to time.

1.3.2 In line with clause 8.4 of the MYT Regulations 2021, the Business Plan comprises of the category-wise sales and demand projections, power procurement plan, capital investment plan, financing plan and targets of distribution loss for the control period starting from FY 2022-23 to FY 2024-25. The significant key elements of a Business Plan are as follows:

- Review of Previous Control Period
- Sales Forecast
- Power Procurement Plan
- Capital Investment Plan
- No. of Employees
- Income from Other Business
- Allocation Statement for Wires & Supply business.

1.3.3 The projections are based on the CAGR of provisional actual figures of FY 2017-18, FY 2018-19, FY 2019-20 and FY 2020-21 and upcoming projects, pending connections coming up in the control period. The figures of FY 2021-22 i.e. the base year have been considered as revised projections on the basis of actuals of half yearly (H1) figures of FY 2021-22. Therefore, the basic principles considered while preparing the Business Plan is keeping in mind the requisites to address the initiatives to enhance the performance of power sector viz. network development, tariff management, efficient operation and customer service.

1.4 Review of previous Control Period (FY 2019-20 to FY 2021-22)

1.4.1 This section elucidates briefly of business plan filed in the earlier control periods providing the highlights of the targets vs. achievement on various parameters discussed as under:

1.4.2 The Commission in the business plan for the control period FY 2019-20 to FY 2021-22

approved the capital expenditure after detailed scrutiny of the justifications provided by Electricity Department, Goa.

1.4.3 ED-Goa submits that the previous control period was completely filled with lots of hurdles for utilities across the Country. With advent of the coronavirus, the Covid-19 pandemic hit the country and there were lockdowns from March 2020 till recently. Further the lockdowns and enhanced protocols in terms of hygiene, social distancing, etc led to complete off-roading of the capital investment plans of ED-Goa. Further, all the governments funds were diverted towards relief works. Accordingly, ED-Goa submits that the capital investment and capitalization plan maybe different from that approved by the Hon`ble Commission and certain schemes may spillover to the current control period and have been appropriately dealt with.

1.4.4 Further, ED-Goa also submits that for the Business Plan for the Control Period FY 2019-20 – FY 2021-22, the capital expenditure proposals submitted to the Hon'ble JERC included the new works to be taken up and executed during the control period. However, at the time of submission of the proposals during the last control period, the DPRs / Government approval and sanctions accorded to the different projects could not be submitted since the same were not available at that point of time. Accordingly, the Hon`ble Commission did not deem fit to approve any of the capital expenditure and capitalisation proposed for the schemes for which the ED-Goa failed to submit the DPRs / Technical Clearance letters or the submitted proofs/details were missing for the required information for any of the proposed scheme.

Subsequently, the detailed estimates were prepared and Government sanction was accorded to these Projects. These Projects were then taken up for execution in the control period, although devoid of Hon'ble Commission approval. During the Petition for the Annual performance review and Tariff petition for the year FY 2020-21 & FY 2021-22, the Government sanctions were submitted to the Hon'ble JERC vis-à-vis the approved and actually taken up. The works were thus taken up for execution during the control period and will be partly executed in the last year of the present control period i.e 2021-22. The balance works will spill over to the Business Plan period FY 2022-23 – FY 2024-25.

1.4.5 The status of targets vs. achievement is provided in the table below:

Table 1-1: Capital Expenditure for previous Control Period (Rs. Crore)

S.No	Project Details			Capital Expenditure					
	Name of scheme	Estimated Cost (Rs. Crs)	Approved by the Commission (YES/NO)	Approved			Actuals		Revised projections
				FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
A1	**Scheduled Tribe Development Scheme**	379.08		21.50	0	0	5.20	26.90	38.60
A2	**Infrastructure development through Electricity Duty**	1,913.77		294.41	122.27	0.00	155.99	87.15	176.39
(i)	Conversion of overhead 11 KV HT network to Aerial Bunched Cabling in North and South Goa	N/A	NO	0	0	0	49.79	17.43	
(ii)	Work of New 50 MVA, 220/33 KV transformer & associated works at 220KV receiving station at Ponda and erection of 220/33/11KV GIS Substation at Tuem & 220KV double circuit transmission line from PGCIL Colvale to Tuem Goa	122.27	YES	90.00	32.27	0	-	-	-
(iii)	Work of 2x10 MVA, 33/11KV (indoor type) sub-station at Badem & Mandrem	N/A	NO	0	0	0	-	-	-
(iv)	Design, Supply, installation, Testing and Commissioning of 33/11KV Gas insulated Substation 2x16/20MVA along with associated equipment at Patto Plaza Panaji	25.33	YES	10.00	-	-	1.62	-	14
(v)	Work of 2x10 MVA, 33/11KV Indoor type substation along with associated equipment at Karaswado Mapusa.	9.77	YES	5.00	-	-	0.69	5.17	4.00
(vi)	Work of laying of underground 33KV double circuit 3Cx400 sq mm cable from Porvorim Substation to Saligao Substation.	8.97	YES	3.00	-	-	2.13	-	-
(vii)	Work of 2x10 MVA, 33/11KV Indoor type substation along with associated equipment's at Sal in the jurisdiction of V.P Sal in Bicholim	15.75	YES	8.50	-	-	3.39	4.56	7.00
(viii)	Work of conversion of existing O/H 11KV & LT line to U/G cabling system at Cacora Curchorem Municipal area in Curchorem constituency	29.47	YES	7.00	-	-	12.16	1.26	6.00

S.No	Project Details			Capital Expenditure					
	Name of scheme	Estimated Cost (Rs. Crs)	Approved by the Commission (YES/NO)	Approved			Actuals		Revised projections
				FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
(ix)	Work for conversion of 11KV and LT overhead lines to underground network in the left out parts of Margao Municipal areas in Margao & Fatorda	N/A	NO	0.00	-	-	5.41	5.59	0.50
(x)	Work of erection of 33 kV O/H line tapping from Mapusa II Circuit at Verla Canca to Nagoa Substation.	1.37	YES	1.00	-	-	0.47	-	-
(xi)	Work of S.E.T & C for replacement of 5 Nos of 110 KV SF6 Circuit breakers (MOCB) on the existing foundations with new gang operated spring.	1.46	YES	0.20	-	-	0.66	0.1	-
(xii)	Work of Development of V.P Ibrambur as Model Village under Sansad Adarsh Gram Yojana (SAGY)	N/A	NO	0.00	-	-	0.34	0.19	-
(xiii)	Work of laying of 11 KV XLPE underground cable from Candolim church to Saipem village	1.98	YES	0.00	-	-	1.28	-	-
(xiv)	Work of conversion of existing overhead 11 KV line to underground system of feeders namely 11 KV Torda, 11KV Housing Board, 11 KV Pundalik Nagar feeder and associated LT network on transformer of said feeders and bifurcation of 11KV Torda feeder and Chogum road feeder emanating from 33/11KV Porvorim Sub-Station covering major portion of Porvorim Plateau area in Porvorim constituency.	45.72	YES	13.00	-	-	8.67	8.18	4.00
(xv)	Work of laying of 33KV S/C 3 core 400 Sq mm. XLPE underground cable from Naveli Amona 220/33KV Sub-substation to Marcel for a distance of 8.4 kms	4.78	YES	1.22	0	0	0.56	-	0.80
(xvi)	Work of linking of 33KV Velim, Canacona & MES DC feeder to 220/33KV Cuncolim Sub-Station.	3.08	YES	2.00	-	-	0.34	-	-

S.No	Project Details			Capital Expenditure					
	Name of scheme	Estimated Cost (Rs. Crs)	Approved by the Commission (YES/NO)	Approved			Actuals		Revised projections
				FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
(xvii)	Work of conversion of HT/LT overhead network to underground HT & LT network in Cuncolim Industrial Estate	12.73	YES	3.00	-	-	3.67	0.95	-
(xviii)	Work of survey, design, supply, erection and commissioning of 3x63 MVA, 220/33 KV GIS Sub-Station at Saligao along with associated interconnecting 220 KV D/C line from 400/220 KV PGCIL Colvale Sub-Station to Saligao Sub-Station.	181.29	YES	80.00	75.00	-	-	-	-
(xix)	Work of conversion of existing overhead 11 KV feeders to underground system, erection of new DTCs, augmentation of DTC, erection of additional feeders, conversion single phase to three phase, replacement of conductor, providing guarding, DP renovation etc. under Section Office Saligao and Britona	13.44	YES	8.57	-	-	2.25	6.72	4.5
(xx)	Work of providing 33 KV underground feeder from 110/33 KV Sub-Station to 33/11 KV Sub-Station at Nachinola	12.43	YES	8.42	-	-	-	-	-
(xxi)	Change of conductor of 110 KV Ponda -Verna and Ponda -Xeldem with higher current capacity HTLS conductor.		YES	40.00	15.00		36.81	16.11	8.18
(xxii)	Change of conductor of 33 KV Verna Sancoale line with higher current carrying capacity HTLS conductor.	165.96	YES	13.50	-	-	-	-	-
(xxiii)	Work of conversion of overhead network to Underground cabling in the balance areas of Porvorim constituency (Phase II)	N/A	NO	0	-	-	-	-	-
(xxiv)	Conversion of the overhead HT/LT network to underground cabling in the important town of Vasco, Navelim etc.	N/A	NO	0	-	-	-	-	-

S.No	Project Details			Capital Expenditure					
	Name of scheme	Estimated Cost (Rs. Crs)	Approved by the Commission (YES/NO)	Approved			Actuals		Revised projections
				FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
(xxv)	Erection of 33/11 KV Sub-Stations at Navelim, Calangute, Colva.	N/A	NO	0	-	-	-	-	-
(xxvi)	Conversion of overhead HT network to Aerial Bunched Cabling (Phase II)	N/A	NO	-	-	-	-	-	-
(xxvii)	Street Light EESL Payment			-	-	-	21.53	3.45	48.24
(xxviii)	Other than approved works undertaken			-	-	-	4.22	17.44	79.17
A3	**Erection and Augmentation of 33/11 KV S/S line**	59.00		1.37	0	0	0.46	4.14	10.88
A4	**Normal Development Schemes**	145.32		15	14.62		2.04	2.94	5.00
A5	**System Improvement Schemes**	58.11					18.78	21.60	33.79
A6	**Construction of staff quarters and office buildings**	19.79		2	1.24	0	0.38	0.25	2.00
A7	**Strengthening of 220 KV Transmission Network**	20.65		0	0	0	0	1.39	10.02
A8	**Erection of 220/110/33/11 KV Sub-Station at Verna**	343.00		76	0	0	-	-	-
A9	**R-APDRP Part A**	163.13		0	0	0	2.64	11.40	23.00
A10	**Underground Cabling**	391.86		50	42.3	0	0.00	7.04	105.31
A11	**R-APDRP Part B / IPDS**	563.57		115	150	200	25.08	9.93	41.83
A12	**EHV new Transmission / Sub-Station / Capacitor banks schemes**	827.50		0	0	25	0.37	0.33	0.00
B1	**Smart grid Development of existing network**	252.00		0	0	0	-	-	-
B2	**Sub-transmission and distribution improvement scheme**	1,155.00		0	0	0	0.00	0.00	50.00
				-	-	-	-	-	-
	Other Schemes			-	-	-	-	-	-
	Public Lighting Scheme			-	-	-	0.10	0.16	0.20
	APDRP (State Schemes)			-	-	-	0.00	1.59	0.00

S.No	Project Details			Capital Expenditure					
	Name of scheme	Estimated Cost (Rs. Crs)	Approved by the Commission (YES/NO)	Approved			Actuals		Revised projections
				FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
	Underground Cabling of Anjuna Feeder (World Bank Funding)			-	-	-	-	20.75	13.43
	Additional Central Assistance to Tribal Sub-Scheme			-	-	-	7.43	3.00	6.28
	Total			**575.28**	**330.43**	**225**	**218.47**	**198.57**	**516.74**

Capitalisation:

1.4.6 The Capitalisation schedule as planned earlier during the last control period has thus been pushed forward to the next control period since the proposed Capital Projects could not be executed. The capitalisation has also been considered upon completion of the Projects. Most of the Capital-intensive Projects will be completed during the new control period and thus there is huge Capitalisation proposed during the new control period. It is pertinent to mention here that a number of works have already been tendered and the major execution and expenditure incurred will happen during the new control period, thus Capitalisation

Table 1-2: Capitalisation for previous Control Period (Rs.Crore)

S.No	Project Details	Capitalisation					
	Name of scheme	Approved			Actuals		Revised projections
		FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
A1	Scheduled Tribe Development Scheme	21.50	0	0	3.16	5.32	44.18
A2	Infrastructure development through Electricity Duty	154.20	137.27	120	158.08	130.31	159.07
(i)	Conversion of overhead 11 KV HT network to Aerial Bunched Cabling in North and South Goa	-	-	-	49.79	40.00	-
(ii)	Work of New 50 MVA, 220/33 KV transformer & associated works at 220KV receiving station at Ponda and erection of 220/33/11KV GIS Substation at Tuem & 220KV double circuit transmission line from PGCIL Colvale to Tuem Goa	-	122.27	-	-	-	-
(iii)	Work of 2x10 MVA, 33/11KV (indoor type) sub-station at Badem & Mandrem	-	-	-	-	-	-
(iv)	Design, Supply, installation, Testing and Commissioning of 33/11KV Gas insulated Substation 2x16/20MVA along with associated equipment at Patto Plaza Panaji	15	-	-	-	-	15.79
(v)	Work of 2x10MVA, 33/11KV Indoor type substation along with associated equipment at Karaswado Mapusa.	9.77	-	-	-	-	9.80
(vi)	Work of laying of underground 33KV double circuit 3Cx400 sq mm cable from Porvorim Substation to Saligao Substation.	7.43	-	-	7.50	-	-

S.No	Project Details	Capitalisation					
	Name of scheme	Approved			Actuals		Revised projections
		FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
(vii)	Work of 2x10MVA, 33/11KV Indoor type substation along with associated equipment's at Sal in the jurisdiction of V.P Sal in Bicholim	15.00	-	-	-	-	15.00
(viii)	Work of conversion of existing O/H 11KV & LT line to U/G cabling system at Cacora Curchorem Municipal area in Curchorem constituency	12.00	-	-	17.00	2.00	7.00
(ix)	Work for conversion of 11KV and LT overhead lines to underground network in the left out parts of Margao Municipal areas in Margao & Fatorda	-	-	-	8.00	6.00	3.50
(x)	Work of erection of 33KV O/H line tapping from Mapusa II Circuit at Verla Canca to Nagoa Substation.	1	-	-	1.57	-	-
(xi)	Work of S.E.T & C for replacement of 5 Nos of 110 KV SF6 Circuit breakers (MOCB) on the existing foundations with new gang operated spring.	0	-	-	0.66	0.45	-
(xii)	Work of Development of V.P Ibrambur as Model Village under Sansad Adarsh Gram Yojana (SAGY)	-	-	-		0.91	-
(xiii)	Work of laying of 11 KV XLPE underground cable from Candolim church to Saipem village	-	-	-	1.28	-	-
(xiv)	Work of conversion of existing overhead 11KV line to underground system of feeders namely 11KV Torda, 11KV Housing Board, 11KV Pundalik Nagar feeder and associated LT network on transformer of said feeders and bifurcation of 11KV Torda feeder and Chogum road feeder emanating from 33/11KV Porvorim Sub-Station covering major portion of Porvorim Plateau area in Porvorim constituency.	18	-	-	20.00	12.00	9.00
(xv)	Work of laying of 33KV S/C 3 core 400 Sq mm. XLPE underground cable from Naveli Amona 220/33KV Sub-substation to Marcel for a distance of 8.4kms	3	-	-	-	-	3.80

S.No	Project Details	Capitalisation					
	Name of scheme	Approved			Actuals		Revised projections
		FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
(xvi)	Work of linking of 33KV Velim, Canacona & MES DC feeder to 220/33KV Cuncolim Sub-Station.	2	-	-	2.72	-	-
(xvii)	Work of conversion of HT/LT overhead network to underground HT &LT network in Cuncolim Industrial Estate	5	-	-	8.94	0.95	-
(xviii)	Work of survey, design, supply, erection and commissioning of 3x63 MVA, 220/33 KV GIS Sub-Station at Saligao along with associated interconnecting 220 KV D/C line from 400/220 KV PGCIL Colvale Sub-Station to Saligao Sub-Station.	-	-	120	-	-	-
(xix)	Work of conversion of existing overhead 11 KV feeders to underground system, erection of new DTCs, augmentation of DTC, erection of additional feeders, conversion single phase to three phase, replacement of conductor, providing guarding, DP renovation etc. under Section Office Saligao and Britona	11	-	-	2.25	5.00	6.00
(xx)	Work of providing 33 KV underground feeder from 110/33 KV Sub-Station to 33/11 KV Sub-Station at Nachinola	12	-	-	-	-	-
(xxi)	Change of conductor of 110 KV Ponda - Verna and Ponda -Xeldem with higher current capacity HTLS conductor.	35	15		36.81	16.11	8.18
(xxii)	Change of conductor of 33 KV Verna Sancoale line with higher current carrying capacity HTLS conductor.	8	-	-	-	-	-
(xxiii)	Work of conversion of overhead network to Underground cabling in the balance areas of Porvorim constituency (Phase II)	-	-	-	-	-	-
(xxiv)	Conversion of the overhead HT/LT network to underground cabling in the important town of Vasco, Navelim etc.	-	-	-	-	-	-
(xxv)	Erection of 33/11 KV Sub-Stations at Navelim, Calangute, Colva.	-	-	-	-	-	-
(xxvi)	Conversion of overhead HT network to Aerial Bunched Cabling (Phase II)	-	-	-	-	-	-

S.No	Project Details	Capitalisation					
	Name of scheme	Approved			Actuals		Revised projections
		FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
(xxvii)	Street Light EESL Payment	-	-	-	-	28.49	48.24
(xxviii)	Other than approved works undertaken	-	-	-	1.56	18.40	32.76
A3	Erection and Augmentation of 33/11 KV S/S line	3.49	-	-	1.32	0.38	14.64
A4	Normal Development Schemes	15	14.62		2.04	2.94	5.00
A5	System Improvement Schemes	0.00	0.00	0.00	11.00	22.26	32.52
A6	Construction of staff quarters and office buildings	1.50	1.24	0.00	0.37	0.25	2.00
A7	Strengthening of 220 KV Transmission Network	0.00	0.00	0.00	0	1.36	5.02
A8	Erection of 220/110/33/11 KV Sub-Station at Verna	90.00	-	-	-	-	-
A9	R-APDRP Part A	0.00	-	-	2.64	11.40	23.00
A10	Underground Cabling	42.30	0.00	0.00	0.00	6.90	15.45
A11	R-APDRP Part B / IPDS	115	150	200	25.08	9.34	34.83
A12	EHV new Transmission / Sub-Station / Capacitor banks schemes	0	0	25	0.37	0.33	0.20
B1	Smart grid Development of existing network	0	0	0	-	-	-
B2	Sub-transmission and distribution improvement scheme	0	0	0	0	0	35.00
	Other Schemes						
	Public Lighting Scheme	-	-	-	0.10	0.16	0.20
	APDRP (State Schemes)	-	-	-	0.00	1.59	0.00
	Underground Cabling of Anjuna Feeder (World Bank Funding)	-	-	-	-	-	33.00
	Additional Central Assistance to Tribal Sub-Scheme	-	-	-	-	10.42	6.28
	Total	**442.99**	**303.13**	**345.00**	**204.16**	**202.96**	**410.39**

Distribution loss trajectory:

1.4.7 Earlier, there were a lot of billing and collection issues in the department. After implementation of SAP, in the FY 2017-18, lot of billing, metering issues have been resolved. Accordingly, with proper accounting, the provisional the actual losses for FY 2019-20 have been observed to be 11.59%.

1.4.8 Further, due to COVID-19 Lockdowns, the HT consumption especially the industrial consumption decreased considerable, and the lockdown led to a change in the consumption pattern where the LT Consumption increased. Accordingly, the department has observed an increase in the provisional actual distribution losses for FY 2020-21 to 11.90%. However, the for the purpose of the Business Plan, ED-Goa has considered 10.25 % distribution loss for FY 2021-22, which was approved by the Hon`ble Commission in the Tariff Order.

Table 1-3: Distribution losses in previous Control Period (%)

Approved			Provisional Actuals		
FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22 (Revised Projections)
10.75%	10.50%	10.25%	11.59%	11.90%	10.25%

Sales and No. of Consumers:

1.4.9 Since FY 2020-21 is considered as Pandemic period, there was a great shift in the consumption pattern of the consumers where the industrial and commercial activities was halted for several months owing to a considerable dip in sales.

Table 1-4: Energy sales in previous control period (MUs)

Sales	Approved			Actuals		Revised projections
Consumer Category	FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
Tariff LTD/Domestic	1206.08	1256.86	1309.77	1,202.3	1,263.83	1273.99
Tariff LTIG/Low Income Group	1.76	1.76	1.76	1.4	1.33	1.27
Tariff LTC/Commercial	491.97	536.2	584.4	436.6	335.45	406.99
Tariff LTI/Industry	101.12	104.63	108.26	80.9	72.22	78.23
Tariff LTP/Mixed (Hotel Industries)	5.62	5.78	5.95	4.5	2.61	3.67
Tariff LTAG/Agriculture (Pump sets / Irrigation)	17.03	17.37	17.71	17.3	16.44	15.19
Tariff LTAG/Agriculture (Allied Activities)	0.89	0.91	0.93	0.8	0.89	0.99
Tariff LTPL/ Public Lighting	20.51	20.51	20.51	29.6	26.18	48.01
Tariff LTH/ Hoarding and Signboards	0.29	0.29	0.29	0.16	0.11	0.16
Tariff-LTTS/ Temporary Supply	119.05	127.11	135.72	9.77	2.94	3.18
Tariff-HTI/ Industrial	1527.76	1620.19	1718.21	1,413.05	1,277.43	1454.39
Tariff HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	442.64	442.64	442.64	484.69	439.42	484.34
Tariff HTC/ Commercial	4.85	4.85	4.85	115.7	89.11	111.19

Sales	Approved			Actuals		Revised projections
Consumer Category	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**
Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	4.52	4.52	4.52	4.8	4.94	5.30
Tariff HTAG/ Agriculture (allied activity)	27.01	27.07	27.13	6.9	8.98	8.91
Tariff HTD/ Domestic	2.66	2.66	2.66	0.4	0.52	0.41
Tariff HTMES/ Defence Establishment	0.24	0.24	0.24	26.1	27.30	27.86
Tariff HTTS/ Temporary Supply	0.3	0.3	0.3	2.3	2.69	3.34
Single Point Supply	5.46	5.46	5.46	5.6	3.24	4.27
Total	**3979.76**	**4179.35**	**4391.31**	**3,842.74**	**3,575.63**	**3931.70**

Table 1-5: No. of consumers in previous Control Period (Nos)

No. of Consumers	Approved			Actuals		Revised projections
Consumer Category	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**	**FY 2019-20**	**FY 2020-21**	**FY 2021-22**
Tariff LTD/Domestic	530554	547213	564396	5,22,090.0	5,25,260.00	5,36,227.00
Tariff LTIG/Low Income Group	1835	1835	1835	1,314.0	1,240.00	877.00
Tariff LTC/Commercial	99524	101972	104480	99,918.0	1,00,301.00	1,01,893.00
Tariff LTI/Industry	5963	5963	5963	5,799.0	5,723.00	5,649.00
Tariff LTP/Mixed (Hotel Industries)	147	151	156	125.0	116.00	116.00
Tariff LTAG/Agriculture (Pump sets / Irrigation)	11736	11970	12210	11,735.0	11,799.00	12,100.00
Tariff LTAG/Agriculture (Allied Activities)	192	196	200	216.0	220.00	244.00
Tariff LTPL/ Public Lighting	5181	5181	5181	1,097.0	2,887.00	5,453.00
Tariff LTH/ Hoarding and Signboards	3	3	3	47.0	44.00	61.00
Tariff-LTTS/ Temporary Supply	229	240	251	2,609.0	2,747.00	2,726.00
Tariff-HTI/ Industrial	802	864	930	748.0	754.00	782.00
Tariff HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	29	29	29	26.0	26.00	22.00
Tariff HTC/ Commercial	41	41	41	252.0	262.00	275.00
Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	3	3	3	41.0	41.00	42.00
Tariff HTAG/ Agriculture (allied activity)	12	12	12	3.0	3.00	3.00
Tariff HTD/ Domestic	215	215	215	3.0	4.00	4.00
Tariff HTMES/ Defence Establishment	63	63	63	13.0	13.00	14.00
Tariff HTTS/ Temporary Supply	1	1	1	11.0	12.00	15.00
Single Point Supply	1	1	1	1.0	1.00	1.00

No. of Consumers	Approved			Actuals		Revised projections
Consumer Category	FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
Total	**656531**	**675954**	**695970**	**6,46,048.00**	**6,51,453.00**	**6,66,504.00**

Table 1-6: Connected Load in previous Control Period (kW)

No.of Consumers	Approved			Actuals		Revised projections
Consumer Category	FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22
Tariff LTD/Domestic	1,501,232	1,564,434	1,630,297	15,38,770.0	15,63,985.00	16,59,217.00
Tariff LTIG/Low Income Group	231	231	231	117.0	115.00	85.00
Tariff LTC/Commercial	329,846	340,731	351,975	3,54,176.0	3,60,138.00	3,73,956.00
Tariff LTI/Industry	140,551	140,551	140,551	1,40,170.0	1,39,224.00	1,45,096.00
Tariff LTP/Mixed (Hotel Industries)	2,868	2,868	2,868	2,757.0	2,284.00	2,295.00
Tariff LTAG/Agriculture (Pump sets / Irrigation)	46,043	46,964	47,903	45,684.0	45,825.00	46,815.00
Tariff LTAG/Agriculture (Allied Activities)	1,597	1,629	1,662	1,786.0	1,799.00	2,199.00
Tariff LTPL/ Public Lighting	1,600	1,600	1,600	3,212.0	7,232.00	11,611.67
Tariff LTH/ Hoarding and Signboards	619	619	619	567.0	558.00	514.00
Tariff-LTTS/ Temporary Supply	20,684	20,684	20,684	9,107.0	10,707.00	9,248.00
Tariff-HTI/ Industrial	520,370	551,853	585,240	5,33,850.0	5,28,085.00	5,60,918.00
Tariff HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	98,700	98,700	98,700	95,340.0	1,00,820.00	93,250.00
Tariff HTC/ Commercial	72,650	73,507	74,374	83,425.0	91,998.00	1,03,442.00
Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	8,240	8,240	8,240	9,085.0	9,085.00	9,260.00
Tariff HTAG/ Agriculture (allied activity)	1,310	1,310	1,310	2,200.0	2,200.00	2,200.00
Tariff HTD/ Domestic	300	300	300	300.0	400.00	400.00
Tariff HTMES/ Defence Establishment	7,025	7,060	7,095	7,675.0	7,675.00	8,295.00
Tariff HTTS/ Temporary Supply	350	350	350	2,468.0	2,444.00	5,394.00
Single Point Supply	4,035	4,035	4,035	4,035.0	4,035.00	4,035.00
Total	**27,58,250**	**28,65,665**	**29,78,033**	**28,34,724.00**	**28,78,609.00**	**30,38,230.67**

Power Procurement Plan:

1.4.10 Based on actual sales and energy requirement in FY 2019-20 and FY 2021-22, and revised projections in FY 2021-22, power procurement has been scheduled.

Table 1-7: Power Purchase for FY 2019-20 (MYT Approved, ARR Approved and Actual)

Particulars	FY 2019-20						
	Approved in Business Plan	Approved in ARR			Actual		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
NTPC							
KSTPS	1,561.91	1,510.99	305.46	2.02	1,550.92	333.21	2.15
VSTPS – I	258.91	250.47	62.2	2.48	256.99	72.02	2.80
VSTPS – II	107.06	103.57	22.38	2.16	107.38	27.37	2.55
VSTPS -III	93.76	90.71	22.54	2.48	103.60	28.91	2.79
VSTPS-IV	113.05	109.36	32.1	2.94	122.65	39.99	3.26
VSTPS-V	53.86	52.11	15.75	3.02	60.27	20.25	3.36
KGPP	40.58	39.25	18.29	4.66	26.01	14.88	5.72
GGPP	49.76	48.14	21.86	4.54	6.61	11.71	17.72
SIPAT- I	215.11	208.1	50.66	2.43	215.74	61.57	2.85
KSTPS-VII	53.49	51.74	13.04	2.52	51.05	14.27	2.80
RSTPS	705.75	636.09	215.48	3.39	694.07	232.95	3.36
SIPAT- II	94.97	91.88	22.85	2.49	102.34	28.41	2.78
Solapur	38.46	37.21	33.28	8.94	13.58	31.17	22.95
Gadarwara					13.27	17.74	13.37
Lara					23.57	11.72	4.97
Khargone					7.76	4.55	5.86
Mouda I	53.46	51.69	35.36	6.84	83.07	50.46	6.07
Mouda II	35.96	34.78	25.37	7.29	94.82	56.07	5.91
Add/ Less: Other Adjustments						-10.91	
Total	**3,476.09**	**3,316.09**	**896.62**	**2.70**	**3,533.70**	**1,046.34**	**2.96**
NPCIL							
KAPS	0	0	0	0	116.20	29.05	2.50
TAPS	82.95	80.25	26.44	3.29	116.21	36.27	3.12
Total	**82.95**	**80.25**	**26.44**	**3.29**	**232.41**	**65.32**	**2.81**
Traders					205.00	82.48	4.02
a)IEX PURCHASEAND SALES					205.00	82.48	4.02
b) Traders					0	0	

Particulars	FY 2019-20						
	Approved in Business Plan	Approved in ARR			Actual		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
OVER DRAWAL					-73.82	-4.45	0.60
Banking					8	1.09	1.36
Within State Generations							
CO- GENERATION							
Vedanta Plant-1	92.9	92.90	22.30	2.40	94.6	22.68	2.40
Vedanta Plant -2	69.89	69.89	16.77	2.40	5.56	1.33	2.39
Goa Sponge and private limited	5.40	5.40	1.30	2.41	69.43	16.54	2.38
Total	**168.19**	**168.19**	**40.37**	**2.40**	**169.59**	**40.55**	**2.39**
RPO							
Non Solar (SECI+STOA)	153.3	148.3	51.91	3.50	227.23	91.14	4.01
NTPC Solar							
NVVNL Solar	11.6	11.22	9.83	8.76	12.27	7.95	6.48
SECI Solar	51.1	49.43	28.87	5.84	46.37	25.5	5.50
Solar STOA					128.09	64.05	5.00
Hindustan Waste Treatment Plant	2	2.00	1.10	5.50	0.9	0.45	5.00
Soalr Net Metering							
Convergence Solar							
REC Certificates							
Solar			12.59				
Non-Solar			11.97				
Sub-Total Renewable Sources (D)	**218.00**	**210.95**	**116.27**	**5.51**	**414.86**	**189.09**	**4.56**
New Stations							
Kameng HEP	11.25	10.88	5.44	5.00			
Lara STPP- I & II	25.79	24.95	12.47	5.00			
Khargone STPP	41.45	40.10	20.05	5.00			
Gadarwara STPP	51.33	49.65	24.83	5.00			
Sub-Total New Stations (E)	129.82	125.58	62.79	20.00			
Open Market (F)		558.04	217.64	3.90			

Particulars	FY 2019-20						
	Approved in Business Plan	Approved in ARR			Actual		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
Total (A + B + C + D + E+ F)	4,075.05	4,459.10	1,360.13	3.05	4,489.74	1,420.43	3.16
OTHER CHARGES						**221.93**	
PGCIL Transmission Charges, Wheeling & Other Charges			195.04			221.93	
Total	**4,075.05**	**4,459.10**	**1,555.17**	**3.49**	**4489.75**	**1642.36**	**3.66**

Table 1-8: Power Purchase for FY 2020-21 (MYT Approved, ARR Approved and Actual)

Particulars	FY 2020-21						
	Approved in MYT	Approved in ARR			Actual FY 2020-21		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
NTPC							
KSTPS	1561.91	1510.99	323.86	2.14	1,627.27	353.16	2.17
VSTPS – I	258.91	250.47	69.73	2.78	261.6	67.63	2.59
VSTPS - II	107.06	103.57	25.74	2.49	110.31	25.81	2.34
VSTPS -III	93.76	90.71	25.46	2.81	104.32	27.2	2.61
VSTPS-IV	113.05	109.36	35.41	3.24	112.18	35.89	3.20
VSTPS-V	53.86	52.11	17.48	3.35	56.39	18.47	3.28
KGPP	40.58	39.25	19.94	5.08	17.74	11.63	6.56
GGPP	49.76	48.14	24.82	5.16	13.45	13.12	9.75
SIPAT- I	215.11	208.10	54.90	2.64	223.04	61.48	2.76
KSTPS-VII	53.49	51.74	13.73	2.65	57.24	15.62	2.73
RSTPS	705.75	636.09	249.90	3.93	612.22	195.28	3.19
SIPAT- II	94.97	91.88	24.72	2.69	94.59	25.99	2.75
Solapur	38.46	37.21	32.31	8.68	59.6	44.44	7.46
Gadarwara		77.61	45.87	5.91	61.3	33.07	5.39
Lara					53.61	24.22	4.52
Khargone					65.92	41.47	6.29
Mouda I	53.46	51.69	37.43	7.24	54.85	36.79	6.71
Mouda II	35.96	34.78	30.74	8.84	46.86	36.22	7.73
Add/ Less: Other Adjustments						-1.14	
Total	3476.09	3393.70	1032.04	3.04	3632.49	1066.35	2.94

Particulars	FY 2020-21						
	Approved in MYT	Approved in ARR			Actual FY 2020-21		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
NPCIL							
KAPS	0.00	105.86	28.83	2.72	123.48	17.45	1.41
TAPS	82.95	80.25	27.53	3.43	99.15	48.85	4.93
Total	82.95	186.11	56.36	3.03	222.63	66.31	2.98
Traders					-297.27	-64.07	2.16
a)IEX PURCHASEAND SALES					-297.27	-64.07	2.16
b) Traders							
OVER DRAWAL					-3.82	3.07	-8.04
Banking					18.17	0.17	0.09
Within State Generations							
CO- GENERATION							
Vedanta Plant-1	92.90	92.90	22.30	2.40	90.88	21.66	2.38
Vedanta Plant -2	69.89	69.89	16.77	2.40	5.81	1.39	2.39
Goa Sponge and private limited	5.40	5.40	1.30	2.41	53.1	12.45	2.34
Total	168.19	168.19	40.37	2.40	149.79	35.51	2.37
RPO							
Non Solar (SECI+STOA)	306.60	296.60	80.68	2.72	357.55	155.33	4.34
NTPC Solar	136.88	132.42	62.90	4.75			
NVVNL Solar	0.00	11.22	8.97	7.99	12.97	7.13	5.50
SECI Solar	51.10	49.43	27.19	5.50	49.48	27.21	5.50
Solar STOA					73.28	34.44	4.70
Hindustan Waste Treatment Plant	2.00	2.00	1.00	5.00	0.96	0.48	5.00
Solar Net Metering		6.25	0.00	0.00			
Convergence Solar							
REC Certificates							
Solar			5.50				
Non-Solar			3.50				
Sub-Total Renewable Sources (D)	496.58	497.92	189.74	3.81	494.23	224.6	4.54
New Stations							

Particulars	FY 2020-21						
	Approved in MYT	Approved in ARR			Actual FY 2020-21		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
Kameng HEP	11.25	10.88	5.44	5.00			
Lara STPP- I & II	51.57	49.89	24.95	5.00			
Khargone STPP	82.9	80.19	40.1	5.00			
Gadarwara STPP	102.65						
Sub-Total New Stations (E)	248.37	140.96	70.49	5.00			
Open Market (F)		282.75	87.65	3.10			
Total (A + B + C + D + E + F)	4,472.18	4,669.63	1,476.65	3.16	4,216.24	1,331.92	3.16
OTHER CHARGES			151.26			188.32	
PGCIL Transmission Charges, Wheeling & Other Charges			151.26			188.32	
Total	**4,472.18**	**4,669.63**	**1,627.91**	**3.49**	**4216.24**	**1520.25**	**3.61**

Table 1-9: Power Purchase for FY 2021-22 (MYT Approved, ARR Approved and Actual)

Particulars	FY 2021-22						
	Approved in MYT	Approved in ARR			Revised FY 2021-22		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
NTPC							
KSTPS	1561.91	1561.91	328.89	2.11	1,627.27	322.98	1.98
VSTPS – I	258.91	258.91	68.41	2.64	261.6	62.61	2.39
VSTPS - II	107.06	107.06	25.28	2.36	110.31	23.49	2.13
VSTPS -III	93.76	93.76	24.94	2.66	104.32	24.72	2.37
VSTPS-IV	113.05	113.05	34.90	3.09	112.18	33.64	3.00
VSTPS-V	53.86	53.86	17.24	3.20	56.39	17.12	3.04
KGPP	40.58	40.58	16.96	4.18	17.74	10.15	5.72
GGPP	49.76	49.76	20.78	4.18	13.45	11.89	8.84
SIPAT- I	215.11	215.11	57.19	2.66	223.04	57.74	2.59
KSTPS-VII	53.49	53.49	13.87	2.59	57.24	14.3	2.50
RSTPS	705.75	705.75	237.78	3.37	612.22	190.92	3.12
SIPAT- II	94.97	94.97	25.81	2.72	94.59	25.02	2.65
Solapur	38.46	38.46	29.74	7.73	59.6	45.56	7.64
Gadarwara					61.3	48.54	7.92

Particulars	FY 2021-22						
	Approved in MYT	Approved in ARR			Revised FY 2021-22		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
Lara					53.61	28.57	5.33
Khargone					65.92	40.24	6.10
Mouda I	53.46	53.43	35.83	6.71	54.85	35.63	6.50
Mouda II	35.96	35.96	30.02	8.35	46.86	34.94	7.46
Add/ Less: Other Adjustments							
Total	3476.09	3476.06	967.64	2.78	3632.49	1028.06	2.83
NPCIL							
KAPS	0.00	107.04	28.20	2.63	123.48	27.33	2.21
TAPS	82.95	82.95	52.04	6.27	99.15	32.22	3.25
Total	82.95	189.99	80.24	4.22	222.63	59.55	2.67
Traders					-145.48	-13.57	0.93
a) IEX PURCHASEAND SALES					-145.48	-13.57	0.93
b) Traders					-		
OVER DRAWAL					-3.82	-0.34	0.89
Banking					18.17	-0.04	-0.02
Within State Generations							
CO- GENERATION							
Vedanta Plant-1	92.90	92.90	22.30	2.40	90.88	21.84	2.40
Vedanta Plant -2	69.89	69.89	16.77	2.40	53.10	12.57	2.37
Goa Sponge and private limited	5.40	5.40	1.30	2.41	5.81	1.39	2.39
Total	168.19	168.19	40.37	2.40	149.79	35.80	2.39
						-	
RPO							
Non Solar (SECI+STOA)	306.60	306.60	80.68	2.63	352.89	143.86	4.08
NTPC Solar	273.75						
NVVNL Solar	0.00	12.40	6.17	4.98	12.00	6.6	5.50
SECI Solar	51.10	51.10	27.19	5.32	48.00	26.4	5.50
Solar STOA					238.74	111.00	4.65
Hindustan Waste Treatment Plant	2.00	2.00	1.00	5.00	0.96	0.48	5.00

Particulars	FY 2021-22						
	Approved in MYT	Approved in ARR			Revised FY 2021-22		
	Purchase	Purchase	Total Cost	Rate	Purchase	Total Cost	Rate
	MUs	MUs	Rs. Crs	Rs./unit	MUs	Rs. Crs	Rs./unit
Solar Net Metering					12.65	3.63	2.87
Convergence Solar					3.15	1.14	3.60
REC Certificates							
Solar			26.34				
Non-Solar			5.91				
Sub-Total Renewable Sources (D)	633.45	372.10	147.29	3.96	668.39	293.11	4.39
New Stations							
Kameng HEP	11.25						
Lara STPP- I & II	51.57	51.57	16.85	3.27			
Khargone STPP	82.9	82.90	26.15	3.15			
Gadarwara STPP	102.65	102.65	43.24	4.21			
Sub-Total New Stations (E)	248.37	237.12	86.24	3.64			
Open Market (F)		305.61	83.03	2.72			
Total (A + B + C + D + E + F)	4,609.05	4,749.07	1,404.81	2.96	4,542.17	1,402.57	3.09
OTHER CHARGES						213.23	
PGCIL Transmission Charges, Wheeling & Other Charges			185.60			213.23	
Total	**4,609.05**	**4,749.07**	**1,590.41**	**3.35**	**4,542.17**	**1,615.79**	**3.56**

Renewable Purchase Obligation

1.4.11 The Solar and Non-Solar RPO Targets and the respective achievements.

Table 1-10: RPO Targets and Achievements (MUs)

S.No	Renewable Purchase Obligation	RPO Target			RPO Achieved		
		FY 2019-20	FY 2020-21	FY 2021-22	FY 2019-20	FY 2020-21	FY 2021-22 (H1)
1	Solar	186.59	226.10	326.86	188.39	151.17	94.13
2	Non-Solar	269.96	296.52	367.72	230.24	362.53	258.69
3	Total	456.55	522.61	694.58	418.64	513.71	352.82

Operation and Maintenance Expenses

1.4.12 The Approved O&M expenses of the MYT Control Period FY 2019-20 to FY 2021-22 in the respective ARR are provided in the following:

Table 1-11: Approved O&M Expenses of FY 2019-20, FY 2020-21 and FY 2021-22 (Rs. Crore)

S.No	Particulars	Approved FY 2019-20	Approved FY 2020-21	Approved FY 2021-22
1	Employee Expenses	294.08	300.81	311.98
2	Administrative & General Expenses (A&G)	27.10	28.24	31.02
3	Repair & Maintenance Expenses	42.55	73.65	86.58
	Total Operation & Maintenance Expenses	**363.72**	**402.70**	**429.58**

Employee Expenses

1.4.13 The Actual Employee expenses of the MYT Control Period FY 2019-20 to FY 2021-22 are provided in the following:

Table 1-12: Actual Employee expenses of the MYT Control Period FY 2019-20 to FY 2021-22 (Rs. Crore)

S.No	Particulars	Actual FY 2019-20	Actual FY 2020-21	Projection FY 2021-22 (H1)	Actual FY 2021-22 (H2)	Revised projections FY 2021-22
	Salaries& Allowances					
1	Salary	336.59	321.21	154.50	161.61	316.11
2	Wages	-	-	0.01	0.35	0.36
3	Stipend	0.08	0.08	0.05	0.45	0.50
4	Transport Allowance				-	-
5	Overtime allowance				-	-
6	Total	336.67	321.29	154.56	162.41	316.97
7	Less: Add/Deduct share of others					
8	Total	336.67	321.29	154.56	162.41	316.97
9	Less: Amount capitalized					
10	Net amount	336.67	321.29	154.56	162.41	316.97
11	Add: Pension/ DA and other Provision					
12	**Total Employee Expenses**	**336.67**	**321.29**	**154.56**	**162.41**	**316.97**

A&G Expenses

1.4.14 The Actual Employee expenses of the MYT Control Period FY 2019-20 to FY 2021-22 are provided in the following:

Table 1-13: Actual A&G expenses of the MYT Control Period FY 2019-20 to FY 2021-22 (Rs. Crore)

S. No.	Particulars	Actual	Actual	Actual	Projection	Revised projections
		FY 2019-20	FY 2020-21	FY 2021-22 (H1)	FY 2021-22 (H2)	FY 2021-22
1	Travelling Expenses	0.38	0.20	0.10	0.13	0.23
2	Office Expenses	16.61	15.25	5.65	30.75	36.40
3	Regulatory Expenses (License + Petition Fees)				-	
4	Petrol, Oil, Lubricant (P.O.L)	0.01	0.01	0.00	0.01	0.02
5	Rent, Rates & Taxes	0.58	0.61	0.20	0.65	0.85
6	Advertisement & Publicity	0.20	-	0.10	0.15	0.25
7	Professional & Special Services				-	
8	Other A&G Charges				-	
9	Overtime Allowance				-	
10	Minor Works	0.67	0.64	0.15	0.86	1.01
11	Legal, Professional & Special Service Charges	0.68	0.57	0.17	0.78	0.95
12	Other material related expenses (Other charges)	3.90	4.19	1.67	12.97	14.64
13	Total	23.03	21.47	8.04	46.31	54.35
14	Add/Deduct share of others (to be specified)					
15	Total expenses	23.03	21.47	8.04	46.31	54.35
16	Less: Capitalized					
17	Net expenses	23.03	21.47	8.04	46.31	54.35
18	Add: Prior period					
19	**Total A&G Expenses charged to revenue**	**23.03**	**21.47**	**8.04**	**46.31**	**54.35**

R&M Expenses

1.4.15 The Actual Employee expenses of the MYT Control Period FY 2019-20 to FY 2021-22 are

provided in the following:

Table 1-14: Actual R&M expenses of the MYT Control Period FY 2019-20 to FY 2021-22 (Rs. Crore)

S. No	Particulars	Actual	Actual	Actual	Projection	Revised projections
		FY 2019-20	FY 2020-21	FY 2021-22 (H1)	FY 2021-22 (H2)	FY 2021-22
1	Plant & machinery	17.64	25.40	11.12	16.38	27.50
2	Building	2.23	1.94	1.28	1.03	2.30
3	Hydraulic works & civil works				-	
4	Line cable & network	13.36	21.09	14.42	33.58	48.00
5	Vehicles	9.20	10.42	6.56	2.35	8.91
6	Furnitures & Fixtures				-	
7	Office Equipments				-	
8	Operating Expenses				-	
9	Minor R&M works	0.78	0.76	0.23	1.05	1.28
10	Total	**43.21**	**59.61**	**33.62**	**54.37**	**87.99**
11	Add/Deduct share of others (To be specified)					
12	Total expenses	43.21	59.61	33.62	54.37	87.99
13	Less : Capitalized					
14	Net expenses	43.21	59.61	33.62	54.37	87.99
15	Add: prior period					
16	**Total expenses charged to revenue as R&M expenses**	**43.21**	**59.61**	**33.62**	**54.37**	**87.99**

2 POWER BUSINESS IN GOA

2.1 Goa Power Sector

2.1.1 Goa, a tiny emerald land on the west coast of India, the 25th State in the Union of States of India, was liberated from Portuguese rule in 1961. It was part of Union territory of Goa, Daman & Diu till 30th May 1987 when it was carved out to form a separate State. Goa covers an area of 3702 square kilometres and comprises two Revenue district viz North Goa and South Goa. Boundaries of Goa State are defined in the North Terekhol River which separates it from Maharashtra, in the East and South by Karnataka State and West by Arabian Sea.

Figure 1: Goa Map

Source: goa.gov.in

2.1.2 Goa, for the purpose of revenue administration is divided into district viz. North and South Goa with headquarters at Panaji and Margao respectively. The entire State comprises 11 talukas. For the purpose of implementation of development programmes, the State is divided into 12 community development blocks. As per 2011 census, the population of the State is 14,59,000. Administratively the State is organised into two districts North Goa comprising six talukas with a total area of 1736 sq. kms. and South Goa comprising five talukas with an area of 1966 sq. kilometres. In all there are 334

villages of which 224 are in North Goa district and 110 in South Goa district.

2.1.3 Every society has its peculiarity and that has to be understood individually for the society. The Goan society has very high expectations from its governing bodies. Also, Goa is one of the tourism capitals of India and a lot of foreign and domestic tourists visit Goa frequently on various festive occasions; hence, the basic facilities have to be on world class level especially domestic electricity availability and services. There are so many events being organized in Goa such as International Live Concerts, International Film Festival, Huge Christmas and New Year Celebrations etc. Hence, these events and the society impose stringent challenges to the governing bodies owing to high public expectations on maintaining un-interrupted supply.

2.1.4 As the Electricity Department is the only licensee in the state of Goa for transmission and distribution of electrical energy, ED-Goa takes up efficient measures to provide world class services to the consumers and hence utilizes more capital investment on the system, more number of employees for better operation and maintenance facilities and efficient redressal of consumer complaints.

Figure 2: Goa Statistics

STATISTICS	
Area	3702 Sq Km (Source: Goa Economic Survey 2020-21)
No.of Villages	191 (Source: Economic Survey 2021)
Households	3,43,611 (Source: 2011 Census)
Population	14.59 Lakhs (Source: 2011 Census)
Electrification	Fully Electrified (Source: Goa Economy 2016)
Per Capita Consumption (kWh)	2396 (as on FY 2019-20) (Source: Lok Sabha questions)
Number of Industrial Estates	20 (Source: GIDC)
Port	1 Major (Mormugao) and 5 Minor
Tourists visited	876358 Domestic & 282022 Foreign (Goa Tourism Department)
Power Demand & Sales	625 MW for FY 2019-20 (Source: CEA LGBR-2020-21) & 3840 MU

2.2 **Company Profile**

2.2.1 ED-Goa came into regulatory regime wef FY 2011-12 i.e. the first tariff filing year. The Electricity Department is a deemed Distribution Licensee within the meaning of Section 2 (17) of Electricity Act 2003 and pursuant to the Section 14 of the Electricity Act. Further, Section 42 and 43 of the Electricity Act 2003 prescribes the following duties of the deemed Distribution Licensee:

- To develop and maintain an efficient, co-ordinated and economical distribution system;
- To supply electricity on an application of the consumer in accordance with the provisions specified in the Electricity Act 2003;
- To provide non-discriminatory open access to the consumers;
- To establish a forum for redressal of grievances of the consumers.

2.2.2 The Main purpose is to undertake the transmission, distribution and retail supply of electricity in its license area and for this purpose to plan, acquire, establish, construct, erect, lay, operate, run, manage, maintain, enlarge, alter, renovate, modernize, automate, work and use a power system network in all its aspects and also to carry on the business of purchasing, selling, importing, exporting, wheeling, trading of electrical energy, including formulation of tariff, billing and collection thereof and then to study, investigate, collect information and data, review operations, plan, research, design and prepare project reports, diagnose operational difficulties and weaknesses and advise on the remedial measures to improve and modernize existing sub-transmission and supply lines and sub-stations.

2.2.3 ED-Goa is under control of State Government and the maintenance of the accounts or Income and expenditure statement is on “cash” basis unlike other utilities/ licensees where it is being maintained on “accrual” basis. However, ED-Goa has also started preparation of financial statements on commercial principles as per directions of Hon’ble Commission. The financial statements of FY 2017-18 is to be audited by CAG. Financial Statements of FY 2018-19 are under preparations.

2.3 **Consumer Profile**

2.3.1 The Electricity Department of Goa caters to around 6.51 Lacs consumers with an annual energy consumption of FY 2020-21 approx 3575.63 MUs. The Consumers of the Electricity Department of Goa are classified as under:

Table 2-1: No of Consumers and Sales for FY 2020-21

Particulars	FY 2020-21		FY 2020-21	
	No.of Consumers (Nos.)	%	Sales (MU)	%
Domestic	526544.00	80.83%	1265.27	35.39%
Commercial	103066.00	15.82%	369.45	10.33%
Industrial	6619.00	1.02%	1791.68	50.11%
Agriculture	12322.00	1.89%	111.38	3.11%
Temporary	2899.00	0.45%	28.87	0.81%
Defence Establishment	3.00	0.00%	8.98	0.25%
Total	**651453.00**	**100.00%**	**3575.63**	**100.00%**

2.3.2 As seen from the above classification, the energy consumption of industrial consumers is the highest (50.11 %) amongst all these categories.

Figure 3: Category-wise Consumption for 2020-21

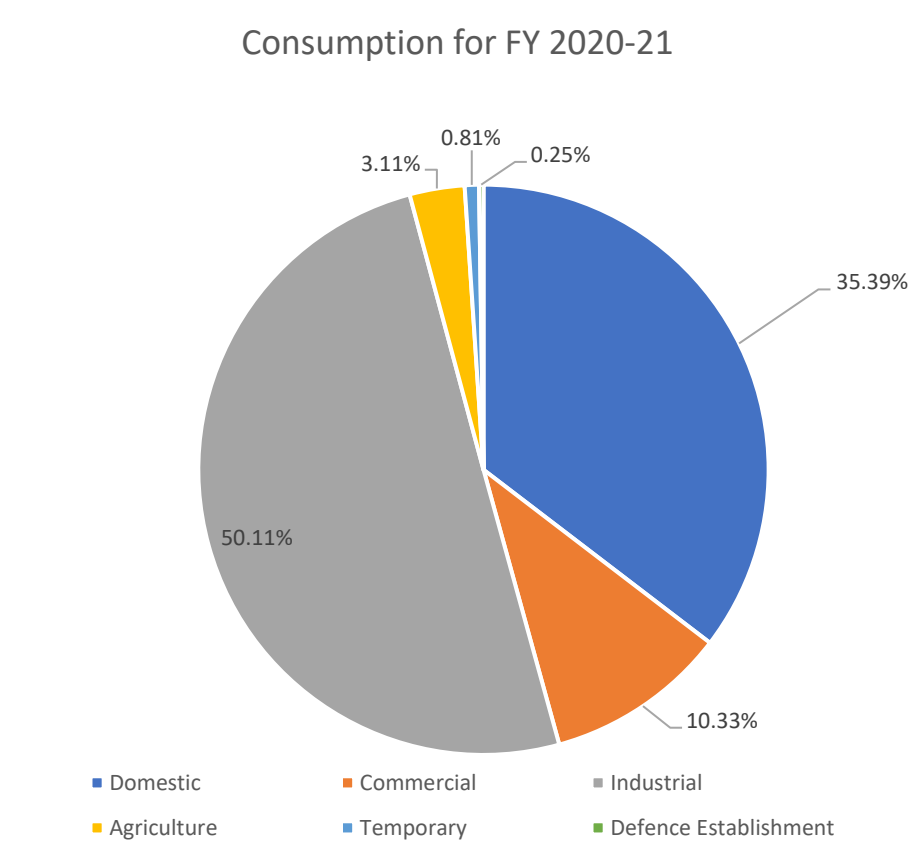
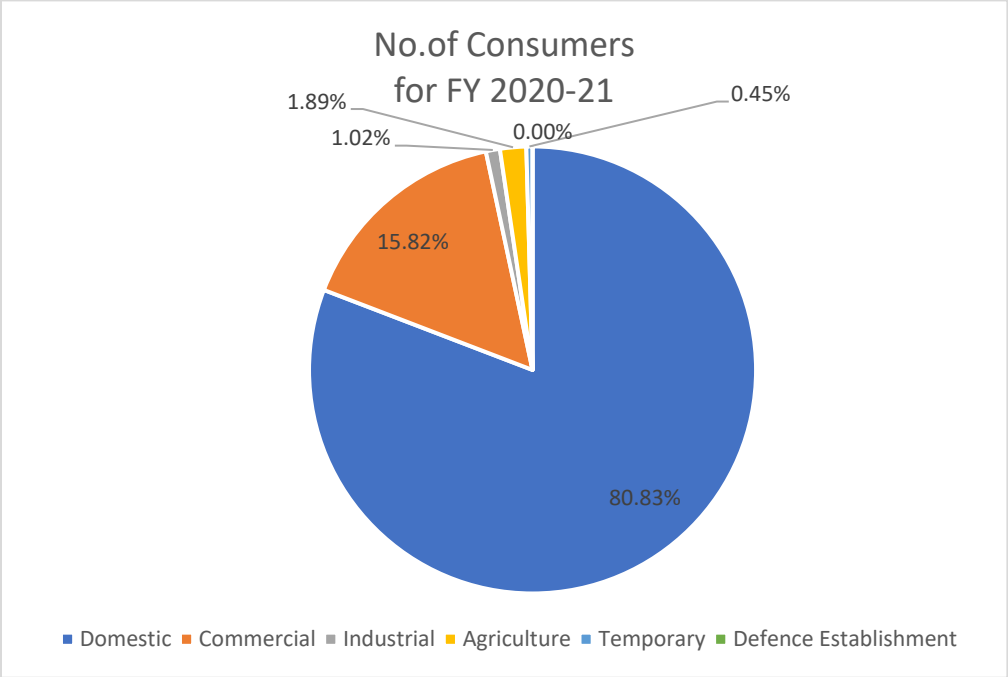


Figure 4: No. of Consumers for FY 2020-21



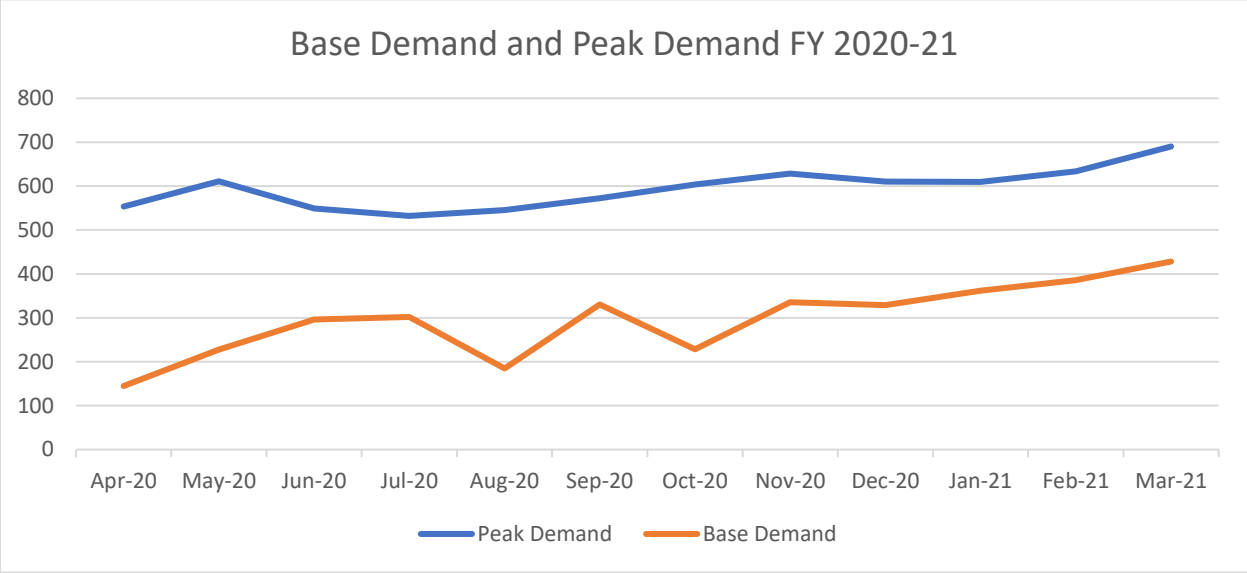
2.3.3 As seen from the above classification, the share of Domestic consumers is more than 80%, however their energy consumers is approx 35%, less than the energy consumption of industrial consumers which is the highest (50.11 %) amongst all these categories.

2.4 Peak Demand

2.4.1 The peak demand of Goa during FY 2020-21 was around 690 MW (March 2021). As per CEA LGBR report, for FY 2020-21, the Energy Deficit and the peak deficit for the State of Goa were 0.00% (NIL) and 0.00% (NIL) respectively. The peak demand in FY 2021-22 (April to September) recorded in April was 685 MW. EDG is currently receiving 418 MW of power from the Western Region (WR) and 100 MW from the Southern Region (SR). The total firm allocation of power from central sector is approx 518 MW. In addition, the department also purchases power from Co-generation stations within state and short term power procurement from the market, Traders, DEEP portal.

2.4.1 Base demand and Peak demand for previous year:

Figure 5: Base Demand and Peak Demand (MW)



2.5 Power Purchase Portfolio

2.5.1 The peak demand recorded during March 2021 is 698 MW. To cater the demand, the Electricity Department of Goa does not have its own generation. The majority of the power requirement for the State of Goa is met through its share from Central Sector Power Stations of the National Thermal Power Corporation as allocated by the Central Government. In addition, the department also purchases power from Co-generation, Exchange and Traders. The firm allocation and unallocated share of power from Central Sector Stations is provided in the table below:

Table 2-2: Share Power Allocation of Central Sector Stations (WR+SR)

S. No	Station	Peak Hrs (18.00 to 22.00)			Off Peak Hrs. (00 to 18.00 & 22.00 to 24.00)		
		Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)	Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)
1	Korba STPS	210	4.78	214.78	210	5.32	215.32
2	Korba STPS-VII	4.5	2.21	6.71	4.5	2.46	6.96
3	Vindhyachal STPS-I	35	4.21	39.21	35	4.68	39.68
4	Vindhyachal STPS-II	12	3.18	15.18	12	3.55	15.55
5	Vindhyachal STPS-III	10	3.18	13.18	10	3.55	13.55
6	Vindhyachal STPS-IV	11.2	4.42	15.62	11.2	4.92	16.12

S. No	Station	Peak Hrs (18.00 to 22.00)			Off Peak Hrs. (00 to 18.00 & 22.00 to 24.00)		
		Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)	Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)
7	Vindhyachal STPS-V	5.18	2.21	7.39	5.18	2.46	7.64
8	Sipat Stage-I	20	8.75	28.75	20	9.74	29.74
9	Sipat Stage-II	10	3.03	13.03	10	3.38	13.38
10	Mouda STPS-I	11.2	4.42	15.62	11.2	4.92	16.12
12	Mouda STPS-II	14.5	5.83	20.33	14.5	6.49	20.99
11	Kawas Gas PP	0	12.4	12.4	0	12.4	12.40
12	Gandhar Gas PP	0	12.66	12.66	0	12.66	12.66
13	Gadarwara STPS	14.55	7.07	21.62	14.55	7.87	22.42
14	Solapur STPS	15.09	5.83	20.92	15.09	6.49	21.58
15	Lara	7.31	7.06	14.36	7.31	7.84	15.15
16	Khargone STPS	11.75	5.83	17.58	11.75	6.49	18.24
17	Ramagundum STPS	100	0	100	100	0	100
18	KAPP	15	1.12	16.12	15	1.25	16.25
19	TAPP3&4	11	3.8	14.8	11	4.23	15.23
	Total	**518.28**	**101.98**	**620.26**	**518.28**	**110.70**	**628.98**

Source: - As per WRPC Allocation Circular No: WRPC/Comml.-I/6/Alloc/2021/7279 dated 13th July 2021 and SRPC Allocation Circular No: SRPC/SE(O)/54/UA/2021-22/ dated 28th June 2021.

2.5.2 The total firm allocation of power from central sector is approx 518.28 MW. As can be seen, more than 75% demand of EDG is met from three major sources viz VSTPS, KSTPS and RSTPS. If there is any forced outage/ event in any of these power stations, it severely affects power position of EDG and it needs to resort to short term power procurement from Traders & UI Pool to the extent of permissible limit and grid frequency norms.

2.5.3 EDG also has arrangement of power purchase from three Co-generation Power Plants in the State:

- Goa Energy Private Limited for 14-21 MW
- Goa Sponge and Power Limited for 3 MW
- Vedanta Ltd. (Erst while Sesa Sterlite) for minimum 2 MW

2.5.4 Apart from above, to meet its RPO obligations, ED-Goa has been procuring power from the Renewable Sources whereby 6 MW Solar Power is procured from NVVNL, 25 MW of Solar, 50 MW of Wind (Non-Solar) from SECI and balance is purchased through DEEP portal. Further ED-Goa has signed a PSA with SECI for 50 MW Wind Power (Tranche VI).

2.6 Transmission & Distribution Infrastructure:

2.6.1 There are no direct link lines between the generating station of central sector and Goa and hence this power is wheeled through the Grids of the neighbouring State of Maharashtra and Karnataka. Electricity Department earlier paid wheeling charges to MSETCL & KPTCL for using their line network for wheeling of power from central sector stations to Goa. Now the lines from MSETCL are being taken over by the Central Transmission Utility (CTU) and the power is obtained from the respective CTU point to ED-Goa at Colvale i.e 400/220 kV Powergrid substation and at Amona i.e 220/33 kV Powergrid substation.

2.6.2 The power from the Western region is wheeled from the MSETCL's 400 kV Sub-Station at Kolhapur to the 400 kV Sub-Station at Colvale in Goa. The power from this Sub-Station is transmitted at 220 kV level to Ponda and Tivim substations of the Department. Similarly, the Southern region power is transmitted from Nagjhari to Ponda & Xeldem. Sometimes, in the event of fault on the Ambevadi-Ponda link, power is diverted and re-routed through WR. This adds to 3.35% (upto September 2021) losses and excess wheeling charges to WR.

2.6.3 All the towns and villages of Goa are electrified and any intending consumer can avail power supply by submitting requisition in the prescribed form to the appropriate office of the Department subject to fulfilling the required conditions and payment of charges as per conditions of supply of Electrical Energy and miscellaneous charges.

2.6.4 However, the current infra capacity is not growing in proportion to consumer growth especially in the coastal belt areas of North Goa and the need to be augmented accordingly the works are initiated by bringing up the major projects listed as below:

- 3X63 MVA 220/33 kV Saligao S/s at Saligao & Associated D/C Lines from 400/220 kV Colvale Substation
- 2X63 MVA 220/33 kV Verna S/s at Verna and associated D/C Lines from 220/33 kV Cuncolim S/s.
- Upgradation of existing 220/110/33 kV Ponda Substation which includes Design, Supply, Erection, Testing and Commissioning of 1X63 MVA, 220/33 kV Power Transformer in replacement of failed 30 MVA, 110/33 kV Power Transformer at 220/110/33 kV Ponda Sub-Station. This project also includes digitalization of the Substation.
- Work of Design, Supply, Erection, Testing and Commissioning of 1x63 MVA, 220/33 kV Power Transformer at Tivim and 2x20MVA, 33/11 kV Sub-station at Tuem

[Electronic System Design & Manufacturing (ESDM)] along with two runs of 33 kV underground cables from Tivim Sub-station to proposed Tuem Sub-Station.

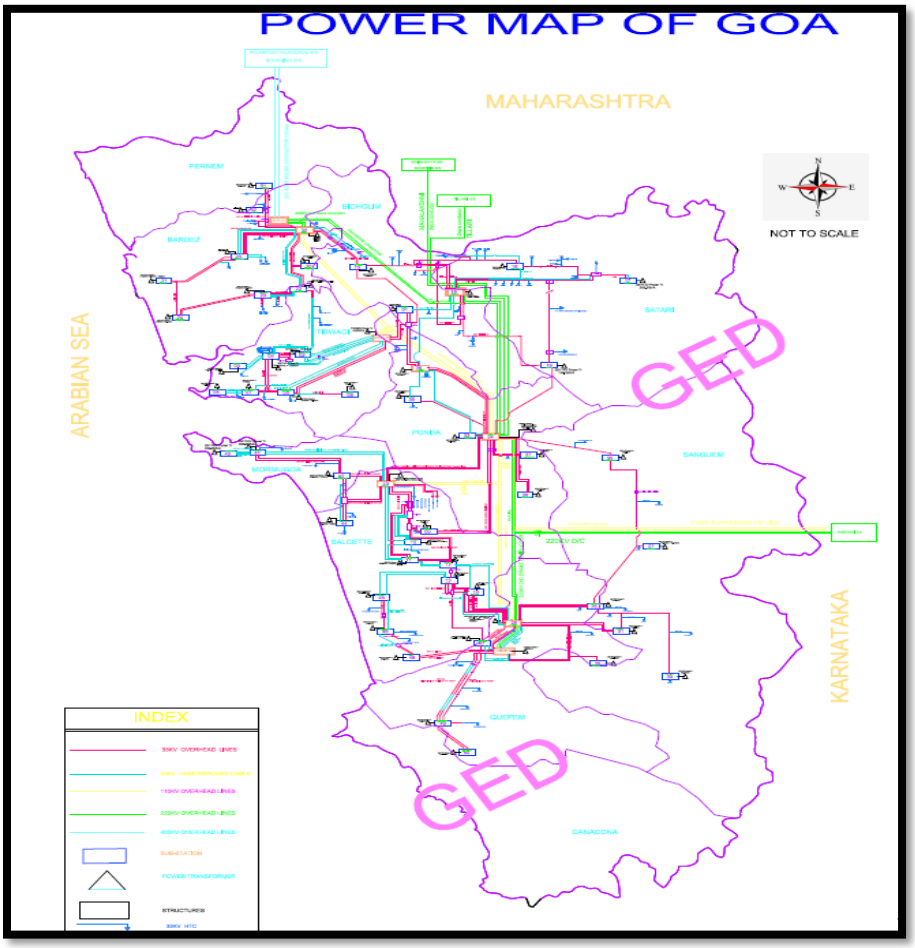
- Mandrem S/s: Work of supply, erection, testing and commissioning of 33/11kV, 2x 10 MVA, Indoor type Sub-Station (Electrical and Civil Works) at Mandrem under Sub Division-III Agarwada, Div XVII Mapusa.
- Work of Supply, Erection, Testing and Commissioning 11 KV 3Core, XLPE armoured Cable of size 300 Sq. mm. for conversion of existing overhead 11KV Morjim Feeder to underground system under the jurisdiction of Sub-Division-III, Agarwada, Div XVII - Mapusa.
- Work of conversion of existing O/H ACSR Raccoon conductor to HTLS conductor of 33KV Mapusa I and Mapusa II feeders from 220/110/33/11KV Tivim Sub-Station to 33/1KV Mapusa Sub-Station.
- Virdi 1 & 2 : Work of conversion of existing 33KV SC overhead Virdi II feeder to Double Circuit line with HTLS Conductor from 220 KV Amona Sub Station, under Sub Division – I(U), Bicholim.
- Work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Mandrem feeder emanating from 33/11KV Tuem S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa in Mandrem Constituency.
- Work of supply, erection, testing and commissioning of 33/11kV, 2x 10 MVA, Indoor type Sub-Station (Electrical and Civil Works) at Mandrem under Sub Division-III Agarwada, Div XVII Mapusa.
- Mapusa UG Works Work of Supply, Erection, Testing and Commissioning 11KV 3Core, XLPE armoured Cable of size 300 Sq. mm. for conversion of existing overhead 11KV Morjim Feeder to underground system under the jurisdiction of Sub-Division-III, Agarwada, Div XVII - Mapusa.
- Marcel UG: Worth of Design, Supply, Erection & Commissioning of 33 kV, 2x3 Core, 400 Sq.mm XLPE Cable from Cable from Ponda Sub-Station to Banastarim for a distance of 185 kms and 1x3 Core 185 Sq.mm XLPE Cable for a distance of 1.95 kms for providing reliable supply to kundaim, Marcel area and Industries of Kundaim Industrial Estate.
- Bicholim S/s: Work of conversion of the existing overhead 11 KV line of Bicholim City, Assonora, Bordem and Bicholim IDC feeder emanating from 33/11 kV Bicholim Sub-station to underground cable system in the jurisdiction of Sub Division-I(U), Bicholim-Goa.

- Work of conversion of O/H HT network to undergorund HT network in Chinchinium, Dharmapur & Sarzora area of Velim Contituency under the jurisdiction of Subdivision-II Chinchinim, Division-XVI Margao, in South Goa District.

2.6.5 The power supply to the consumers is released as per the Conditions of Supply framed by ED-Goa which is based on the JERC Electricity Supply Code Regulations 2010.

2.6.6 The Power Map of Goa with all the existing EHV Infrastructure is represented in the diagrammatic format as below:

Figure 6: Power Map of Goa



2.6.7 The current network configuration is as given below:

Table 2-3: Network Configuration (upto September 2021)

Particulars	TOTAL
No. of 220/110/33kV Substations	7
No. of 33/11 KV Stations available	49

Particulars	TOTAL
No. of 33 KV Feeders	166
Ckt length of 33 KV feeders (Kms)	1667
No. of 33/11KV Power Transformers	134
No. of 11 KV Feeders	320
Ckt Length of 11 KV Feeders (Kms)	4984
No. of 11 KV RMUs	2943
No. of Distribution Transformers	7111
Ckt Length of LT network (Kms)	8113
Ckt Length of LT network Service Line (Kms)	8554

2.6.8 The Transmission and Distribution Losses and the AT&C Losses are comparatively lower than those in many of the other states and Union Territories. The provisional actual Transmission & Distribution loss of the system is estimated to be around 10.15% for FY 2022-23.

2.6.9 The ED-Goa has adopted strategy for fixing the various issues in short term are as follows:

- Identifying and completing the critical requirements to do away with load shedding, provide ring feeding/alternate circuits in case of breakdown of lines and upgrading the capacities where the equipments / lines were already overloaded and were choking.
- Completing the works which were tendered years ago delayed due to unforeseen circumstances are taken up on fastrack basis. Most of the said works are completed and the remaining few are on the way to completion without giving any cost escalation to the contractors and without putting any additional financial burden.

2.6.10 The Government of Goa has initiated a lot of schemes to improve the power scenario. The objectives of the schemes are to achieve sustainable development by ensuring quality and reliable power supply to all consumers at affordable cost and to make the electricity department commercially viable. The power utilities all over the country have taken up institutional strengthening through sustainable initiatives in a systematic and focused approach.

2.7 **Organisational Structure:**

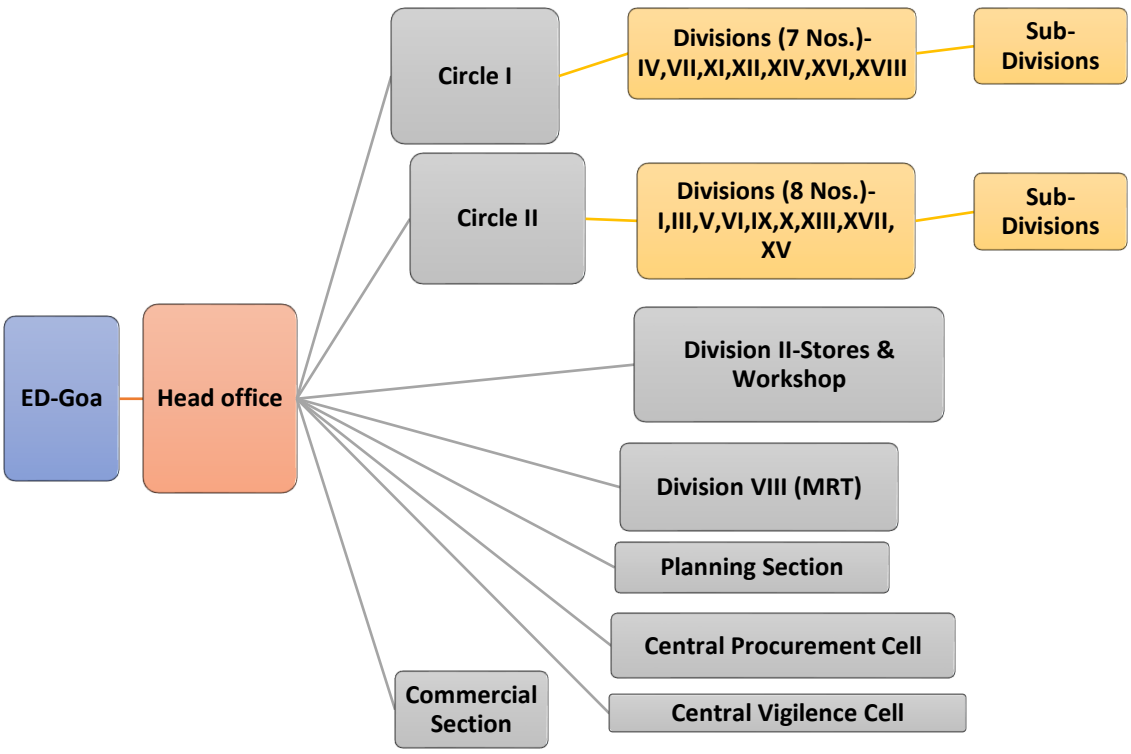
2.7.1 The hierarchy of the organization is with Head Office at the top of the vertical and goes down from Circles to Divisions and Subdivisions. Consumer services and network management are the core function of the Department for which reporting is from sub-division office to divisions and divisions to circles. Further, the Department also has a fully operational SLDC. In addition to this the department has centralized reporting

structures for Civil, Stores, Training, etc. which directly report to the Head office level.

The present structure prevailing in the department of electricity is as follows:

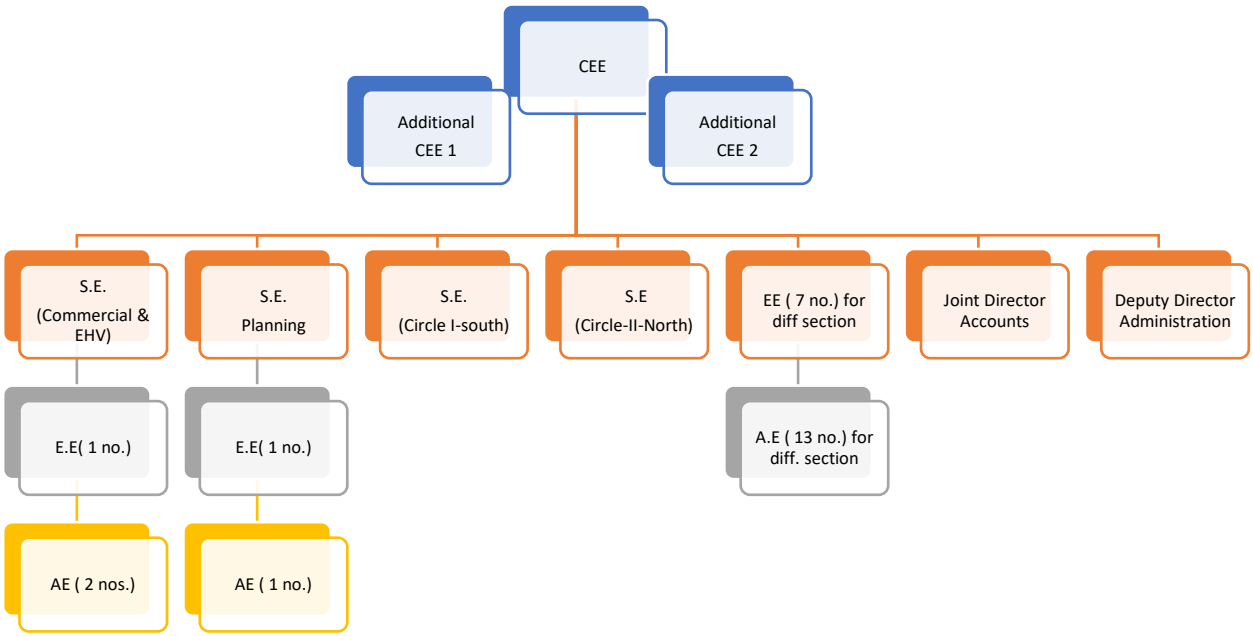
- Total no. of Circles: 2
- Total no. of Divisions: 18 (11 with O&M consumers and 7 with others)
- Total no. of Sub-Divisions: 53
- No. of Divisions in Circle 1: 7 namely division IV, VII, XI, XII, XIV, XVI, XVIII
- No. of Divisions in Circle 2: 9 namely division I, III, V, VI ,IX, X, XIII,XVII, XV
- Planning Section
- Commercial Section
- Contract Service Cell, Central Vigilance Cell, Division II (Stores & Works), Division VIII (MRT)

Figure 7: Existing Structure of ED-Goa



2.7.2 On the basis of the above discussed Organizational structure, the post wise hierarchy also exists in the department with Chief Electrical Engineer as the head of the department and Superintending Engineer, Executive Engineer, Assistant Engineer reporting to each other respectively as per the organizational structure.

Figure 8: Existing Hierarchical Posts in ED-Goa



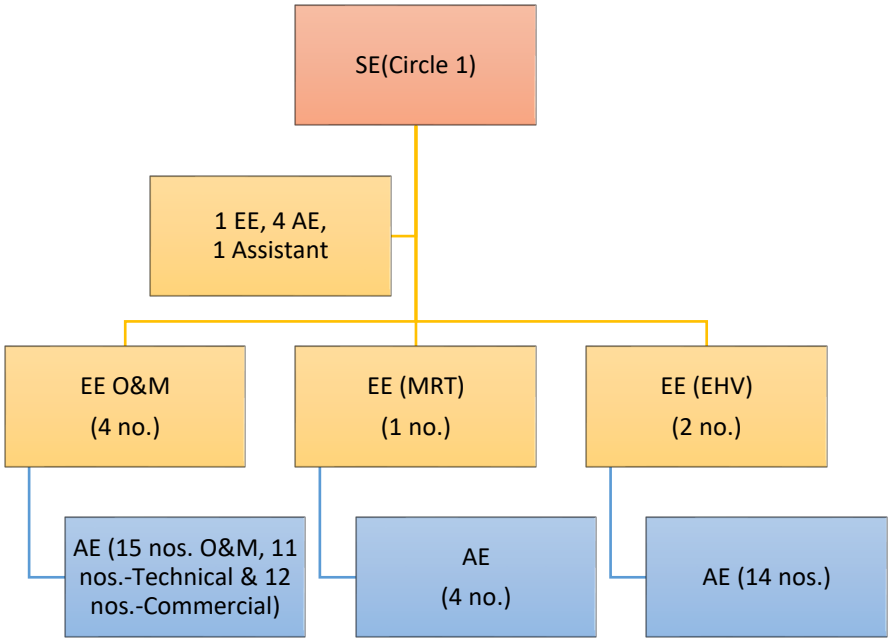
2.7.3 At the site/field level, the departments are divided according to the areas and number of consumers into Circles, divisions and sub-divisions with employees working at offices and field i.e. sub-stations and operation and maintenance of T&D system.

2.7.4 The organization structure is divided into head office and circle offices which includes staff at division and sub-division level i.e. the field level.

2.7.5 At Circle office level, the organization structure is as follows:

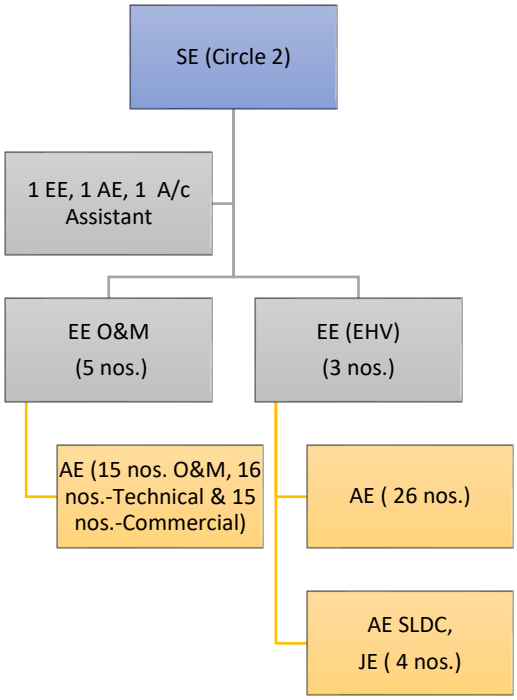
- Circle I (South Goa): The chart below provides the actual existing organization structure at Circle 1 in South Goa.

Figure 9: Structure of Circle I



- Circle II (North Goa): The chart below provides the actual existing organization structure at Circle II in North Goa

Figure 10: Structure of Circle II



2.7.6 Operation and Maintenance Functions

(a) Distribution Network:

In the existing set up, Transmission and Distribution O&M is handled by Divisions I,III,IV, V,VI,VII,VIII,IX,X,XI,XII,XIII,XIV,XVI,XVII, Division II handles central stores for the region and Division XV & Div XVIII handles Civil and infra part.

The main activities falling under O&M of distribution Divisions are:

- Operation and Maintenance of 220/110,33/11 kV EHT, HT Sub-Stations
- Providing needed supply to consumers of various categories like domestic, Commercial, industry, (HT, LT) Street Lights, agriculture and others.
- Maintenance of quality power supply.
- Breakdown and Preventive maintenance of, DTRs, overhead lines and cables, managing Breakdowns and fuse off calls
- Accurate metering.
- Prompt billing.
- Efficient Collections.

- Customer Care and Customer Services.
- Planning for improvement works
- HT Meter reading (by JE)
- Identification of pilferage and theft.

2.7.7 Other Functions

(a) There are 4 Superintending Engineers (S.E.) in Department of Electricity –Goa.

- S.E for Circle I (South)
- S.E. for Circle II (North)
- S.E. for Planning
- S.E. for EHV & Commercial

Each S.E. is the head of the above department and reports to CEE. The Superintending Engineer looks after the proper functioning of the circle which includes technical and commercial works, billing, collection and revenue generation, Loss reduction, operation and maintenance, future planning of network and new projects according to load/consumer growth etc.

Scope of work of Executive Engineers:

Each Executive Engineer is the head of the division which correspond to the S.E and some report directly to CEE for different sections such as Operation and Maintenance (O&M), Civil, EHV and commercial, stores, procurement, interstate power matters, training, vigilance etc.

The works of Executive Engineers at circle level comprises mainly of technical profile, i.e. O&M, Civil, EHV, loss reduction, Load projections, DSM measures and abiding by the Standards of Performance of the commission.

Work responsibility of a Circle

Circle is responsible for 7-8 divisions. The main functions of Circle include review performance of Subdivisions & sections, review of capital works & various schemes,

energy accounting, billing & revenue monitoring, MIS, establishment activities etc. The main functional departments at Division office are Technical, Accounts/Revenue. Circle offices are equipped with computerized infrastructure. The circle is headed by the Superintending Engineer.

Work responsibility of Division

Division is defined as unit comprising of approx 3-5 sub-divisions. The activities division includes monitoring & co-coordinating between various sub-divisions, Meter reading, Bill printing, Cash collection, and handling commercial complaints. A Subdivision comprises of mainly Technical, Accounts/Revenue, and general administration departments. Each division is headed by an Executive Engineer and Assistant Engineer and the office staff helps in operation.

Work responsibility of Sub-Division

The sub-division is the unit at the bottom of hierarchy and has direct interface with the consumers. The section is responsible for most of the consumer related activities be it technical (O&M) or commercial. O&M activities of section includes breakdown maintenance of HT & LT line & equipments, attending fuse call, operation & maintenance of Substation, and street light complaints. Commercial activities include recovery, bill distribution, and collection, need based meter reading, handling billing complaints, release of new connection, meter replacement, and theft detection. In addition to these, activities related to system augmentation are also carried out by sub-division. Junior Engineers, lineman, and other field staff operate at the sub-division level.

Work responsibility of SLDC

Electricity Department, Goa (ED-Goa) has been historically managing the Load Dispatch & Scheduling activities in house through SLDC wing. The State Load Despatch Centre is the apex body to ensure integrated operation of the power system in the State. Presently ED-Goa is functioning SLDC at Margao.

The SLDC is SLDC-MARGAO is currently functioning in two shifts daily from 08:00Hrs. to 20:00 Hrs. The system operations on daily basis are being handled by 8 nos. of Assistant Engineers/Junior Engineers posted at SLDC, Margao on working arrangement basis.

It is very much essential that the SLDC should function round-the-clock for effective load management, thereby avoid over drawal/under drawal to maintain grid & curtail the power purchase cost. In order to run the SLDC for 24 hrs. (3 shifts operation) ED-Goa is in the process of recruitment of manpower (contractual/permanent) for round-the clock functioning of the SLDC.

Further, there is a Backup SLDC at Cuncolim-Goa for upkeep and maintenance of the SLDC SCADA system. All the EHV telemetry data is first reporting to Backup SLDC and is routed to Main SLDC via a BSNL Leased Line thus making importance of Backup SLDC more critical for proper functioning of SLDC.

2.8 Human Resource Management:

Man Power Planning

2.8.1 The biggest asset of any organization is its work force. Their optimum performance can elevate its progress. At the same time, it is also true that the career growth of its employees is directly related to the growth of the organization. The responsibility towards maintenance of a highly efficient distribution system and the accountability towards discharge of the duties as a service provider have to be shared by the engineers and employees of the ED-Goa.

2.8.2 Considering the fact that Goa is one of the tourism capitals of India and approximately 5 lakh foreign tourists and 20 lakh domestic tourists visit Goa annually, hence the basic facilities have to be on world class level especially power and domestic electricity availability.

2.8.3 ED-Goa takes up efficient measures to provide world class services to the consumers and hence utilizes more number of employees especially the contractual employees to keep on track the operation and maintenance facilities and efficient redressal of consumer complaints. There are so many events being organized in Goa such as International Live Concerts, International Film Festival, Huge Christmas and New Year Celebrations etc.

Post entry into regulatory regime by Electricity Department-Goa, the activities/ tasks have increased which has necessitated creation of separate department/ addition in manpower strength. The activities/ tasks which have become routine and needs dedicated resources for successful compliances are:

- Compliance to Standards of Performance
- Compliance to Supply Code
- Implementation of MYT Regulations and responding to JERC draft regulations
- ED-Goa's expansion of Retail Business
- Increasing number of Regulatory, Legal and Consumer Court Cases
- Compliance to various other Directives of JERC
- Counterpart team for R-APDRP Part –A

2.8.4 The implementation of R-APDRP Part-A, Implementation of IT, Automation including AMR, SCADA, Call centres, Automation of Collection Activities, Procurement- E-procurement, HR, MIS etc will help the department to optimally utilize its employee resources, especially the ones at the site level i.e. contractual staff and meter readers, lineman, data entry operators etc.

2.8.5 The Department is in the process of implementation of HR module of SAP. The mode includes online performance monitoring system for employees, service records of all employees, attendance monitoring system, leave and travel management, etc.

Staffing

2.8.6 The Electricity Department has a total work force of 6935 employees (including those on contract basis) of different ranks who perform multifaceted technical duties, viz., maintaining power supply, metering, billing, revenue collections, customer services etc.

Tech & Non-tech structuring and staffing:

2.8.7 Outsourced/contractual staff is generally at the sub-division level for menial jobs such as linemen helper, and meter readers. Apart from this, watchman, sweeper, peon at office, lower division clerks or data entry operators are there. Highest no. of Lineman/wireman and line helpers are required in proportion to the no. of consumers and area.

Transferability:

2.8.8 All technical employees are transferable to any of the circles and within divisions and sub divisions offices.

Training:

2.8.9 There is a need to ascertain the training of the existing human resource and to identify their core competencies with an aim to enhance their skills and finally place them in appropriate job positions. ED-Goa endeavours to conduct training at periodic intervals for capacity building of its manpower. The Training centre of ED-Goa identifies the training requirements of the staff and schedules training programme for the entire year. The training includes technical training and training on soft skills. The faculties for the training are within the Department and also from external agencies.

2.9 IT Initiatives:

2.9.1 ED-Goa had started the IT related Part A works of R-APDRP for execution through the appointed IT implementing agency (ITIA) REC Power Distribution Company Ltd during the last control period. The work has been completed. The Data centre has already been established.

2.9.2 The Customer Care Centre (Call Centre) is fully functional for the convenience of the public who can lodge their billing, Metering, electricity complaints etc. on 1912 toll free number, which is then forwarded to the concerned section offices for redressal by issuing notification. Facebook page is also available for the public. During last 5 years, the Call Centre was outsourced. From January'18, it was running with Departmental Telephone Operators and thus will help in savings of approximately Rs. 2 crores per annum but unfortunately this did not work out as planned. Though the savings was done, it led to dis satisfaction of consumers due to poor quality of the calls attended due to non-trained staff. To overcome this from March'2019 it was outsourced again with improvement in services such as all power related complaints like billing, metering, low voltage, high voltage, fluctuations etc are attended directly by the call centre. Since GED has gone digital, all payment related complaints are also being attended. Besides this, emergency complaints such as sparks on the transformer, live wire fallen are also being taken here. Street light complaints are also taken. This has given immense satisfaction to our esteemed consumers leading to positive feedback from the customers.

2.9.3 Online electricity bill payment has been introduced all over Goa for enabling the public to pay their electricity bills online. At present two banks have given their gateways for collection of payment digitally. This facility has been extended further by developing

mobile app and UPI through which public can pay their electricity bills. RTGS/NEFT is also made possible by the two banks. This has alleviated the inconvenience caused to a large number of consumers in paying their electricity bills in time. Any Time Payment (ATP) machine along with Information Kiosks have also been installed at Panaji, Ponda, Mapusa, Margao, and Vasco for public to pay their bills through these machines. This is in addition to the cash collection centres which are already functioning at the Sub-division level for the convenience of the public with a provision for cash payment as well as digital payment through credit debit cards. Facility for any amount and payment from anywhere is also possible. The Online Application for new service connection, change of name, change of load is also made functional. Bharat Bill Payment System is also being implemented with the two banks which has connected many co-operative societies throughout Goa for payment collection making a collection centre for all our consumers through every nook and corner in Goa.

2.9.4 The Department has hosted a fully functional Website of the Department wherein many details for public are made available. Online Applications for service connections can also be submitted through the website. History of previous bills, payment history etc is also possible for the consumers along with copy of bill in the inbox the moment bill is generated for registered consumers.

2.9.5 The manual billing of Public Lighting is converted to SAP.

In-house activities:

2.9.6 The entire billing process is being done in-house right from the recording of the meter readings, generation of the bills through the SAP system established by the Department through the ITIA, as well as for delivery of the electricity bills to the consumers through the Meter Readers.

Outsourced activities:

2.9.7 The printing of the electricity bills has been outsourced to a private party. The bills are generated by the Department and converted to PDF format and then emailed to the party for printing of the bills. The bills are then printed and received in the Department for issuing the same to the consumers. The 24X7 Call Centre is outsourced.

New / Upcoming initiatives and upgrades planned:

2.9.8 New ATP cum cash recycler Machines at 10 more places are to be implemented within next three months which will allow consumer to pay 24x7, 7 days a week.

Benefits of the planned initiatives:

2.9.9 The new planned initiatives will result in ease of payment to the consumers with payment any time day or night work day or holidays.

2.10 Technological initiatives

Key technological initiatives under progress

2.10.1 The adoption of the Gas Insulated Technology has been a new technological initiative for the GED. The GED has adopted this key technology for establishing Gas Insulated Sub-Stations both at the 33/11 KV Sub-Stations and at the EHV level for 220/33 KV Sub-Stations. Although there is cost implication for adopting this technology, it outweighs the advantages derived from the same.

- It occupies very less space as compared to the Air insulated substations. Hence these Gas Insulated Substations (GIS) are most preferred where area for substation is small especially in the cities and the congested coastal belt tourist destinations.
- All the switchgear equipments are encapsulated in metallic chambers filled with SF6 Gas which has high di-electric properties.
- It is most reliable compared to Air Insulated Substations, number of outages due to the fault is less.
- It is generally maintenance free.
- It can be assembled at the shop and modules can be commissioned at the site easily and hence requires lesser time for execution of the project.

New/Upcoming initiatives and upgrades planned

2.10.2 It is planned to have the Supervisory Control and Data Acquisition System (SCADA) upto the 33 KV Sub-Station level. Lack of SCADA system in the Department has hampered the distribution activities of the Department from being automated. The adoption of the SCADA system will enable the Department to have advanced data collection capabilities and thus will play a significant role in the power system operation. At the distribution side SCADA will enable to do more than just collecting data by automating entire distribution network and facilitating remote monitoring, coordinate, control and operating the different distribution components through Distribution Management

System (DMS). SCADA/DMS system will replace the manual labour to perform electrical distribution tasks and manual processes in distribution systems with automated equipment's.

2.10.3 It is also planned to introduce Smartgrid as a pilot project in a particular area for effective control of the consumer loads during peak demand. The pros and cons will be studied before implementing in other areas. Smart meters/Prepaid meters are also being planned for installation to the consumers. Further, ED-Goa has planned to implement the central government Revamped Power Distribution scheme under which, installation of prepaid smart meters for all consumers along with associated AMI, communicable meters for DTs & Feeders, ICT including Artificial Intelligence (AI), Machine Learning (ML), etc. based solutions for power Sector and a unified billing and collection system;

2.10.4 Distribution infrastructure works as required for strengthening and modernizing the system as well as measures for loss reduction. The infrastructure strengthening works will include separation of Agriculture feeders to enable implementation of the KUSUM scheme, Aerial Bunch cables and HVDS for loss reduction, replacement of HT/LT lines as required, construction of new/ upgradation of substations, SCADA and DMS system etc. Each DISCOM/ State will draw up the scheme according to its requirement with the end objective of reducing losses and ensuring 24 x 7 supply.

Benefits of the planned initiatives

2.10.5 ED-Goa envisages the following benefits of the planned initiatives:

(a) Due to timely recognition of faults, equipment damage can be avoided.

(b) Continuous monitoring and control of distribution network can be performed from remote locations.

(c) Saves labour cost by eliminating manual operation of distribution equipment.

(d) Reduce the outage time by a system-wide monitoring and generating alarms so as to address problems quickly.

(e) Improves the continuity of service by restoring service after the occurrence of faults (temporary).

(f) Automatically improves the voltage profile by power factor correction and VAR control.

(g) Facilitates the view of historical data.

(h) Loads can be controlled remotely.

2.11 Customer Service-Related Activities

Current initiatives

2.11.1 The Customer Care Centre (Call Centre) is fully functional for the convenience of the public who can lodge their billing, Metering, electricity complaints etc. on 1912 toll free number, which is then forwarded to the concerned section offices for redressal by issuing notification.

Steps taken to act on feedbacks and customer complaints

2.11.2 The feedback and customer's complaints are received from at the Call centre telephonically as well as through web site online feedback. The feedback / complaints received through Online are handled by Planning Section Team, which in turn coordinate to the consumers through Call Centre and coordinate with the concerned Sub Division offices for the resolution of the feedback. A month wise data is being maintained and consumer's feedback is monitored on 2-3 working days.

Initiatives related to on-line payment and other online services

2.11.3 Online electricity bill payment has been introduced all over Goa for enabling the public to pay their electricity bills online. This facility has been extended further by developing mobile app through which public can pay their electricity bills. The payment gateway SBI is collecting online payment in sync with NIC e-challan system.

2.11.4 The Online Application for New Service Connection, Change of Name, Change of Load, Change of Category is also made functional through the Departmental web-site. The consumer can also view the status of the application. Once the Online application is submitted, the consumer is intimated with most of steps while processing the file, through registered emails and SMS's. Like Acknowledgment of Application, Document verification process, Site Visit Inspection, Demand Note for payment, Notice for availing Power Supply and Connection released. Similarly, for other online services also such as Change of Name, Load and Category consumer receives emails and SMS's for the ongoing process of consumers file.

Future Plans

2.11.5 In future, it is planned to have independent gateway i.e single hop instead of multiple hops so as to facilitate swifter complaints tackling and with only one Agency.

2.12 Energy Efficiency and Demand Side Management (DSM)

2.12.1 Ministry of Power and Bureau of Energy Efficiency (BEE) have been promoting energy efficiency. Efficient lighting in households, which accounts for 20% of energy, is an important thrust area to reduce peak demand as well as enhance awareness about energy efficiency and conservation to household consumers.

2.12.2 The Government of Goa then came up with the 'Jyotirmay Goa Scheme' wherein the bulbs were provided free of cost to all the domestic consumers. Around 8.04 lakh LED bulbs have been distributed to the domestic consumers and the scheme has been closed since June' 17.

2.12.3 The State has also undertaken the Street Lighting National Programme (SLNP) launched by Central Government, wherein all the conventional street lighting fixtures are to be replaced with the LED street lighting fixtures. Around 1.77 lakhs of street light fixtures in Goa have been replaced by LED street lights and 4123 CCMS panels. The scheme has been implemented through the Energy Efficiency Services Limited (EESL), New Delhi. There was no upfront cost to the Department. The monthly payments to EESL will be through energy savings and payment through annuity model.

2.12.4 The projected savings is 37 MU/year and cost of Power Procurement Rs. 18.90 Crore/ year. The project has been short closed and on short closure monthly payments are being paid to M/s EESL in 36 equal instalments. The ED-Goa is maintaining the project for next 8 years upto FY 2027-28. The balance conventional fixtures about 36000 are being replaced with LED fixtures.

2.12.5 The following works were also done by EESL.

- Conversion of Government High School, Dona Paula to Model Energy Efficient School by replacing all existing conventional appliances as a pilot project.
- Conversion of 17 nos. of Government high Schools including 5 nos. of Kendriya Vidyalayas and 2 nos. of Jawahar Navodaya Vidyalaya to Model Energy Efficient Schools.

2.12.6 Due to ongoing COVID-19 Pandemic the schools are closed and the exact quantum of savings cannot be ascertained at this stage.

2.12.7 Further, Department of New & Renewable Energy, Goa has signed a MoU with M/s. Convergence Energy Services Ltd. ("CESL") is a wholly owned subsidiary of Energy Efficiency Services Ltd. ("EESL") (JV of PSUs under Ministry of Power, Govt. of India), under which ED-Goa will sign a PPA with CESL for power procurement from a cumulative

capacity of 110 MW grid-interactive Solar PV power projects for 25 years. It includes replacement of 11,000 conventional Agricultural pumps by Energy Efficient Agriculture Pumps of capacity ranging from 0.1 HP to 10 HP; and Distribution of 16 lakh 9 Watt LED bulbs. The Tariff is fixed at Rs.3.60/kWh for a period of 25 years. The Government of Goa shall approach the Hon`ble Commission for approval of the PPA & Tariff separately.

2.13 Way Forward for ED-GOA

2.13.1 In bid to enhance its services to the consumers, the ED-Goa has implemented number of new initiatives:

- The Department has developed portal for Online Application of various services of the Department such as New Power Connections, Change of Name, Load, Category, etc. The portal can track the status of the application and also intimate the consumer through SMS and E-mail.
- The Department is in process of implementation of Human Resource module through SAP for online performance monitoring of each employee.
- The Department plans to install 7 Lakhs SMART meters to improve billing and collection efficiency besides providing valuable inputs for carrying data analysis using various Analytic tools.
- The Department also plans to install 2 Nos. EHV substation in North and South Goa to cater the increasing load in the state and also to improve power supply reliability and quality. Besides, this 3 Nos. of Ultra modern 33/11kV 2x20 MVA GIS substation are under commission at the major cities of Panaji and Margao and at Calangute to cater the load of the tourism industries along the coastal belt of Baga, Calangute, Arpora, etc.
- A number of new projects have been undertaken by the Department for replacement of Overhead Conductor to Underground cabling and also for replacement with Higher Amperage HLTS conductors.
- The Department in process for installation of Demand side management software for better management of the load and to improve revenue.
- The Department is implementing RT-DAS system across all its substation for online

monitoring of feeders and also for online calculation of SAIDI and SAIFI indices.

3 SWOT ANALYSIS

3.1 SWOT Analysis

3.1.1 The analysis of the strength, weakness, opportunities and threats as perceived by ED-GOA is summarized in the following figure:

Figure 11: SWOT Analysis of ED-GOA

STRENGTHS	WEAKNESS
• High Industrial base • Competitive tariffs • Relatively Lower Losses • High Billing efficiency • ATP, UPI enabled better Collection Efficiency • Implementation of IT Infrastructure (i.e. SAP, Data Centre, Disaster Recovery Centre, GIS Mapping & Consumer Indexing)	• Complete dependence on external sources for Power • Absence of upto date audited account • Ageing, overloaded and Over head Distribution Infra • Absence of automation in Distribution system operations. • Capacity building
OPPORTUNITIES	**THREATS**
• Implementation of new technologies in metering (Pre-paid meters, smart meters, AMI) and capacity building of staff under Revamped Scheme of central govt. • Ensuring quality of supply and make it reliable for industry by adopting automated distribution system. • Increasing industrial base and revenue • Increase state generation by focusing on renewables especially in Rooftop Solar, Solar Pumps etc using central govt. schemes.	• Increasing Power Purchase Cost of Conventional Power, may lead to tariff increase (due to coal shortages) • No upcoming Industrial Consumers and Reduction of Consumption of existing Industrial Consumers • Additional requirement of Peaking Power • Market Uncertainty • De-licensing, privatization/franchise

3.2 **STRENGTHS:**

- High Industrial base: ED-Goa has a high industrial base in terms of hotels, steel/ferro industries, and other industries which means higher revenue and lower losses.
- Relatively Lower Losses: ED-Goa has been very proficient in reducing the Distribution Losses over the last few years.
- The entire billing process is being done in-house right from the recording of the meter readings, generation of the bills through the SAP system established by the Department through the ITIA, as well as for delivery of the electricity bills to the consumers through the Meter Readers.
- Online electricity bill payment has been introduced all over Goa for enabling the public to pay their electricity bills online. Any Time Payment (ATP) machine along with Information Kiosks have also been installed at Panaji, Ponda, Mapusa, Margao, and Vasco for public to pay their bills through these machines.
- Competitive Tariff and Simple & Robust Tariff Structure: ED-Goa has lower tariffs as compared to the other utilities in the neighboring States and the tariff structure is the one of the simplest and robust when compared to other utilities in the Country.
- Implementation of IT Infrastructure: ED-Goa under RAPDRP Part A has installed the ERP software SAP, Data Centre for data collection and analysis, Disaster Recovery Centre, and is in process of finalizing GIS Mapping & Consumer Indexing. This IT infrastructure will help ED-Goa in increasing the reliability and quality of power supply, reduces the billing and collection issues and bring down the losses.

3.3 **WEAKNESSES:**

- Complete Dependence on External Sources for Power: ED-Goa has to entirely rely on power from external sources like CGS. Temporary shutdown or outage of any power plant leads to power cuts or purchase of power from open market/ exchange.
- Absence of up-to-date audited accounts: ED Goa, being a government department, has been maintaining accounts on cash basis and started maintaining on commercial

principles and as desired by Hon'ble Commission from FY 2007-08 onwards. The financial statements upto FY 2016-17 has been prepared and audited. Draft Financial Accounts for FY 2017-18 finalised and undergoing CAG Audit. Draft Financial Accounts for FY 2018-19 are almost final and will be audited by CAG subsequently. Financial Accounts and DCB statements for FY 2019-20 & FY 2020-21 are under progress and targeted to be completed before March 21.

- Ageing and overloaded Distribution Infra:

The assets of ED-Goa are old and proper maintenance is required on timely basis to ensure quality and reliable power supply. Further, in most of the divisions, the old network is overloaded and cannot afford any more upcoming load without augmentation.

- Absence of automation in Distribution system operations: ED-Goa has almost negligible automation in the distribution system to enable it for quick fault identification and rectification. ED-Goa is in talks to implement SCADA and then automation will be the next step.
- Capacity building: ED-Goa lacks in a proper capacity building/training facilities to train the new employees before moving to the site. Capacity building is also needed to educate all the staff about the new and upcoming technologies and the regulations etc.

3.4 **OPPORTUNITIES:**

- Implementation of new technologies in front of metering (AMR, pre-paid, smart meters), distribution and capacity building of staff under Revamped Scheme of central govt. ED-GOA, has the opportunity to be part of the Revamped scheme and in installing prepaid smart meters for all consumers along with associated AMI, communicable meters for DTs & Feeders, ICT including Artificial Intelligence (AI), Machine Learning (ML), etc. based solutions for power Sector and a unified billing and collection system; Distribution infrastructure works as required for strengthening and modernizing the system as well as measures for loss reduction. The infrastructure strengthening works will include separation of Agriculture feeders to enable implementation of the KUSUM scheme, Aerial

Bunch cables and HVDS for loss reduction, replacement of HT/LT lines as required, construction of new/ upgradation of substations, SCADA and DMS system etc. ED-Goa will draw up the scheme according to its requirement with the end objective of reducing losses and ensuring 24 x 7 supply.

- Ensuring quality of supply and make it reliable for Industry by adopting automated distribution system: ED-Goa, has one of the most competitive tariff in the country and has the perfect opportunity to promote the industries in the area by adopting newer technologies and ensuring quality and reliable supply of power, thereby increasing industrial base and in turn revenue.
- Increase state generation by focusing on renewables especially in Rooftop Solar, Solar Pumps etc using central govt. schemes: Department of New & Renewable Energy, Goa has signed a MoU with M/s. Convergence Energy Services Ltd. ("CESL") is a wholly owned subsidiary of Energy Efficiency Services Ltd. ("EESL") (JV of PSUs under Ministry of Power, Govt. of India), under which ED-Goa will sign a PPA with CESL for power procurement from a cumulative capacity of 110 MW grid-interactive Solar PV power projects for 25 years. It includes replacement of 11,000 conventional Agricultural pumps by Energy Efficient Agriculture Pumps of capacity ranging from 0.1 HP to 10 HP; and Distribution of 16 lakh 9 Watt LED bulbs. The Tariff is fixed at Rs.3.60/kWh for a period of 25 years. The Government of Goa shall approach the Hon`ble Commission for approval of the PPA & Tariff separately. Further, ED-Goa has signed has signed a PPA with SECI to procure Wind power at 50 MW on Long Term basis on 16th August 2019 at a fixed tariff of Rs. 2.83/kWh plus trading margin of Rs. 0.07/kWh at goa periphery. Further, ED-Goa is in the final stage of Govt approval for purchase of power from the SECI 150 MW RTC Peak Power from a combined sources of Renewable Power comprising of Solar, Wind and Battery Energy Storage System (BESS), which provides assured Peak Power to compensate the Peak Deficit of Goa. The project contributes to Peak Power compensation and RPO as well. The project envisages the supply to start from FY 2023-24 at the rate of Rs 4.03 /unit at goa periphery. ED-Goa shall approach the Hon`ble Commission for approval of the PSA

of the same, separately. PM KUSUM Scheme issued by MNRE on 08.03.2019. ED-Goa expects to add 10 MW under PM KUSUM in next 3 years in the State.

3.5 **THREATS:**

- Increase in Cost of Conventional Power: ED-Goa relies on external source of power and the cost of generation has been increasing (primarily due to domestic fuel supply concerns and use of imported coal) which may lead to increase in tariffs for consumers. Further, the capital cost of new power plants has gone up substantially resulting in higher power tariff from new generating units both under central sector as well as private power generating companies. This shall cause hardship on the consumers and ED-Goa in no way wants to burden its consumers.
- Reduction of Consumption of Industrial Consumers: The domestic consumer base has been increasing at a faster pace than the industrial consumer base, especially after the pandemic and lockdowns, which may be a cause of concern as decrease in number of high paying consumer's (cross subsidising consumers) may affect revenue generation for the department.
- Additional requirement of Peaking Power – Being a tourist destination, ED-Goa faces a lot of peak demand during holidays and tourism season apart from the seasonal increase in demand. Without any considerable PPA, the department will have to resort to open market sources/ exchanges at higher market prices.
- Market Uncertainty: The power sector has been very volatile in the last couple of years. With RE power costs reaching new lows, however projects not getting completed, PPAs being cancelled. Further, the convention thermal generating stations declaring NPAs with the stranded capacities, the future of power availability is uncertain.
- De-licensing, privatization/franchise in Goa: The proposed amendment in the Electricity Act 2003 has mentioned about the delicensing of the power distribution sector and allow multiple distribution companies (discoms) in each supply area. Further, the central govt, is keen on pushing privatization/franchising in the utilities.

This is one of the biggest threats to ED-Goa, which does not need privatization and is already performing at par to several private distribution utilities in the country.

3.5.1 The growth path for ED-Goa would be the key takeaways which have emerged from the SWOT analysis. While, there would be opportunities galore on the horizon, it would be only prudent on part of ED-Goa to first target the short-comings and overcome them. Simultaneously, it would also be necessary to start identifying areas which it intends to target in the short to medium term and which areas it intends to target in the long term.

4 DEMAND & SALES PROJECTIONS

For any Distribution utility, keeping track of Demand and sales is one of the most basic and important aspect as they are key drivers for revenue generation. There are many approaches to project the demand and sales for the future years; CAGR method is one of the most advanced forms of end use survey approach. In fact, CEA has been using partial end use method to project demand in different states. However, the technique adopted is mainly dependent of the kind of data that is available, nature of consumption and size of customer category.

Further, Demand and Sales Assessment is not a one-time exercise but needs to be constantly monitored against actual demand and updated for any major development or changes in other external drivers like policies, regulatory developments, industrial growth, changes in specific industry segments etc.

4.1 Regulatory Provisions for Sales Forecast

4.1.1 The Commission in the Regulation 8 of JERC (Multi Year Tariff) Regulations, 2021 has mentioned the methodology to be adopted for sales forecast in business plan. The relevant provisions of the JERC MYT Tariff Regulations, 2021 are extracted for reference as under:

Quote

6. Values for Base Year

6.1 The values for the Base Year of the Control Period shall be determined on the basis of the audited accounts or provisional accounts of last three (3) Years, and other factors considered relevant by the Commission:

Provided that, in absence of availability of audited accounts or provisional accounts of last three (3) Years, the Commission may benchmark the parameters with other similar utilities to establish the values for Base Year:

Provided further that the Commission may change the values for Base Year and consequently the trajectory of parameters for Control Period, considering the actual figures from audited accounts.

6.2 The Commission may revisit the performance targets for the Control Period during the Mid-term Review, carried out in accordance with the Regulation 11.

……..

8.6 Sales Forecast

a) The Distribution Licensee shall forecast sales for each Consumer category and subcategories, at different voltage levels, for each Year of the Control Period in their Business Plan filings, for the Commission's review and approval;

b) The forecast shall be based on the actual demand of electricity in previous Years, anticipated growth in demand in coming Years, expected growth in the number of Consumers, load growth, changes in the pattern of consumption, target distribution losses and other relevant factors;

c) The Licensee shall indicate separately the sale of electricity to traders or another Licensee and category wise sales to Open Access Consumers.

Unquote

4.2 Approach for Forecast No. of Consumers, Connected Load and Sales for the Control Period

4.2.1 The Petitioner has adopted the same methodology to arrive at the projections, as mentioned in the Regulations. The ED-Goa has taken the compounded annual growth rate (CAGR) of past years of each consumer category as per the provisional figures for FY 2017-18 till FY 2020-21 derived from SAP. Further, the figures of H1 of FY 2021-22 are also taken from SAP accounts, and ED-Goa has extrapolated these to arrive at the projections of FY 2021-22 i.e. the base year. For FY 2021-22, as there has been lockdown till September end and lockdowns have been relaxed from October onwards, ED-Goa expects demand to reach back to normal in FY 2021-22 H2, accordingly, ED-Goa has considered the category-wise demand of FY 2019-20 H2 as FY 2021-22 H2. Further, based on the CAGR for each consumer category & base year, ED-Goa has forecasted the figures for the control period FY 2022-23 to FY 2024-25.

4.3 Forecast of No. of Consumers, Connected Load and Sales

4.3.1 Based on the past data, the category wise CAGR of past 3 years of each consumer category as per provisional are considered for the projections for the control period. It is further submitted that FY 2020-21 being the year of the Covid-19 pandemic, due to lockdown etc, the demand/sales was reduced abnormally, hence, while considering the CAGR for sales/demand, FY 2020-21 has not been considered and CAGR of FY 2017-18 to FY 2019-20 has been considered.

4.3.2 ED-Goa has taken the compounded annual growth rate (CAGR) of past years of each consumer category as per the provisional figures for FY 2017-18 till FY 2020-21 derived from SAP. Further, the figures of H1 of FY 2021-22 are also taken from SAP accounts, and

ED-Goa has extrapolated these to arrive at the projections of FY 2021-22 i.e. the base year. For FY 2021-22, as there has been lockdown till September end and lockdowns have been relaxed from October, ED-Goa expects demand to reach back to normal in FY 2021-22 H2, accordingly, ED-Goa has considered the category-wise demand of FY 2019-20 H2 as FY 2021-22 H2. Further, based on the CAGR for each consumer category & base year, ED-Goa has forecasted the figures for the control period FY 2022-23 to FY 2024-25.

4.3.3 For Sales, No. of consumers and Connected load, 3 year CAGR is being considered for all categories with a cap of 5% for each category and 0% negative if any.

4.3.4 Connected load for FY 2021-22 is arrived at based on H1 data for FY 2021-22.

4.3.5 For HT Industrial, HT Industrial (Ferro metallurgical/ steel melting/power intensive/steel rolling) and HT Commercial categories, increase in sales and connected load projections are arrived after taking the inputs of divisional engineers in all the divisions/sub-divisions in the state and only the upcoming major projects envisaged to come up in the Control period are considred. For other HT categories, CAGR methodology described above has been adopted which is more or less negligible.

4.3.6 The category-wise projections considered from FY 2022-23 to 2024-25 are discussed hereunder:

Due to COVID-19, the FY 2020-21 sales is not considered for projection purposes. The FY 2017-18 to FY 2019-20 is considered for projection to arrive at the base year FY 2021-22. However, for projections of No.of consumers and Connected load, FY 2018-19 to FY 2020-21 is considered for projection to arrive at the base year FY 2021-22

LTD - Domestic Consumers:

There has been a decreasing trend in connected load, no. of consumers and sales of domestic category on y-o-y basis. Though the sales have a decreasing trend till FY 2018-19 but increased in FY 2019-20 by ~112 MU. 3 year CAGR for No.of Consumers and Connected load is positive and less than 5%. For projection of Sales, 4.05% growth rate as arrived is considered as per 3 year CAGR.

LTD Low Income Group:

The number of consumers in the LIG category is not expected to grow as more and more consumers are shifting from this category to LT Domestic category due to increased consumption. Hence, NIL CAGR is assumed for this category.

LTC-Commercial Consumers:

Commercial Consumers have been showing significant increase in their consumption of around 8%-9%. However, as per CAGR 2.67% is considered on sales as the growth is assumed in commercial activities considering various developments and increasing tourism activities in the State. As the 3 year CAGR is arriving with positive with less than 5%, accordingly the same is considered for No.of Consumers and connected load for FY 2023-24 and FY 2024-25.

LT Industry:

There has been dip in No. of consumers and Sales in this category. In this case, NIL growth is considered for projection for FY 2023-24 and FY 2024-25. In case of Connected load, it is observed that, there is an overall rise in FY 2020-21 w.r.t FY 2018-19. However, there is a dip w.r.t FY 2019-20 due to covid-19. Accordingly, there is 0.45% increase w.r.t 3-year CAGR is observed.

LTP Mixed (Hotel Industries):

For LTP Mixed Hotel Industries category, Sales and No. of consumers has decreasing trend. In this case, 3 year CAGR considered to be NIL for projection for FY 2022-23 and FY 2024-25.

LTAG/Agriculture (Pumpsets):

LT-AG/Agriculture (Pumpsets), for projecting No.of Consumers, Connected Load and Sales for this category, 3 year CAGR is being used for projections arrives at 3.15%, 3.80% and 2.67% respectively.

LTAG/Agriculture (Allied Activities):

LT-AG/Agriculture (Allied Activities) categories have negative CAGR in case of Sales. Hence, NIL growth rate is assumed for Sales. For projecting no. of consumers and connected load for this category, 3-year CAGR is being used for projections which is capped at 5% respectively.

LTPL/Public Lighting:

LTPL/Public Lighting categories have a sudden kink in FY 2018-19 due to conversion of manual mapping /Billing to SAP. Further Public Lighting Billing was not done for most of the consumers in FY 2017-18 and the same was back billed in FY 2018-19. For projecting no. of consumers and sales for this category, 3 year CAGR is being used for projections which is capped at 5% for each respectively as it is exceeding 5%. The Connected Load has

a negative CAGR. Hence, NIL growth rate is assumed for Connected Load.

LH/Hoarding and Signboards:

LH Hoarding and Sign board categories have negative CAGR in case of No.of Consumers, Sales and Connected load. Hence, NIL growth rate is assumed.

LT Temporary supply:

For Temporary connections, has a decreasing trend in an overall basis with respect to Sales, Connected load and No. of consumers. Hence, NIL growth rate is assumed. Apart from the above the temporary supply connections and sales are not expected to follow any definite pattern and may increase or decrease on year on year basis.

HTI/ Industrial:

For HT Industries category, ED-Goa after taking the inputs of divisional engineers in all the divisions/sub-divisions in the state, envisages that electronic city TUEM electronic city are upcoming in the area, with total load of 40 MVA. However, only part load will come in this control period, accordingly, ED-Goa has envisaged 5 MVA in FY 2022-23, 10 MVA in FY 2023-24 and 10 MVA in FY 2024-25 load. Further, ayush hospital project is upcoming with 6 MVA load in FY 2022-23 and corresponding increase in sales and consumers are arrived at after taking the inputs of divisional engineers in all the territories in the state into consideration.

Industrial Consumers have been showing significant increase w.r.t No.of Consumers, Connected Load and Sales. The CAGR considered for No.of Consumers as 4.24%, Sales as 1.99% as computed, for connected load the CAGR is limited to 5%.

HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling):

For these categories, change in No.of Consumers, sales and connected load projections are arrived at after taking the inputs of divisional engineers in all the territories in the state into consideration. There are no upcoming consumers for the MYT Control period FY 2022-23 to FY 2024-25.

HTC/Commercial:

For HT Commercial category, ED-Goa after taking the inputs of divisional engineers in all the divisions/sub-divisions in the state, envisages that one International Airport (namely MOPA Airport) is upcoming in the area, with total load of 30 MVA. However, only 10 MVA

will come in this control period, accordingly, ED-Goa has envisaged 10 MVA in FY 2022-23.

HTAG/Agriculture (Pump sets and irrigation):

HT-AG/Agriculture (Pumpsets and irrigation), have negative CAGR in case of Connected load and Sales. Hence, NIL growth rate is assumed. For projecting No. of Consumers for this category, 3 year CAGR is being used for projections arrives at 1.24 %.

HTAG/Agriculture (allied activity):

HT-AG/Agriculture (allied activity), have constant No.of Consumers and Connected load. Hence, NIL growth rate is assumed. For projecting Sales for this category, 3 year CAGR is being used for projections and it is capped at 5%.

HTD/Domestic:

For projecting No.of Consumers, Connected load and Sales for HTD/Domestic, 3 year CAGR is being used for projections and it is capped at 5%.

HTMES/Defence establishment:

HTD/Domestic, have negative CAGR in case of Sales. Hence, NIL growth rate is assumed. For projecting No.of Consumer and Connected Load for this category, 3 year CAGR is being used for projections, with 4.08% and capping at 5% respectively.

HTTS/Temporary:

HTTS/Temporary, for projecting No.of Consumer, Connected Load and Sales for this category, 3 year CAGR is being used for projections, with capping at 5% respectively.

4.3.7 The table below shows the past five year Category wise data of LT and HT consumers, % CAGR assumed and the projections of no. of consumers for the control period:

Table 4-1: Summary of Category-wise Sales (MU) Growth Rate Considered for Projections

SALES (MU)	Actuals		Actual Provisional			CAGR	
	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	3yr	Considered
Tariff LTD/Domestic	1,038.36	1,110.6	1,089.92	1,202.3	1,263.83	4.05%	4.05%
Tariff LTIG/Low Income Group	2.86	1.8	1.51	1.4	1.33	0.00%	0.00%

SALES (MU)	Actuals		Actual Provisional			CAGR	
	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	3yr	Considered
Tariff LTC/Commercial	387.71	414.2	400.86	436.6	335.45	2.67%	2.67%
Tariff LTI/Industry	106.59	94.5	90.48	80.9	72.22	0.00%	0.00%
Tariff LTP/Mixed (Hotel Industries)	4.23	5.3	4.54	4.48	2.61	0.00%	0.00%
Tariff LTAG/Agriculture (Pump sets / Irrigation)	26.52	16.4	15.54	17.3	16.44	2.67%	2.67%
Tariff LTAG/Agriculture (Allied Activities)	-	0.9	0.81	0.8	0.89	0.00%	0.00%
Tariff LTPL/ Public Lighting	30.27	2.7	41.18	29.6	26.18	5.00%	5.00%
Tariff LTH/ Hoarding and Signboards	0.29	0.2	0.14	0.2	0.11	0.00%	0.00%
Tariff-LTTS/ Temporary Supply	36.88	20.5	22.11	9.8	2.94	0.00%	0.00%
Tariff-HTI/ Industrial	1,114.49	1,358.4	1,407.94	1,413.1	1,277.43	1.99%	1.99%
Tariff HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	305.46	442.6	514.69	484.7	439.42	4.64%	4.64%
Tariff HTC/ Commercial	-	104.4	107.86	115.7	89.11	5.00%	5.00%
Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	8.79	4.9	4.97	4.8	4.94	0.00%	0.00%
Tariff HTAG/ Agriculture (allied activity)	-	4.5	5.33	6.9	8.98	5.00%	5.00%
Tariff HTD/ Domestic	-	0.29	0.28	0.4	0.52	5.00%	5.00%
Tariff HTMES/ Defence Establishment	25.19	26.89	0.28	26.1	27.30	0.00%	0.00%
Tariff HTTS/ Temporary Supply	0.93	0.29	0.94	2.3	2.69	5.00%	5.00%
Single Point Supply	3.41	5.46	5.78	5.6	3.24	0.84%	0.84%
Total	**3,091.98**	**3,614.71**	**3,715.15**	**3,842.74**	**3,575.63**	**3.11%**	**3.11%**

Table 4-2: Summary of Category-wise Connected Load (kW/KVA/HP) Growth Rate Considered for Projections

Connected Load (KW/KVA/HP)	Actuals		Actual Provisional			CAGR	
	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	3yr	Considered
Tariff LTD/Domestic	11,52,770.42	13,81,714.0	14,50,471.00	15,38,770.0	15,63,985.00	3.84%	3.84%
Tariff LTIG/Low Income Group	105.56	232.0	138.00	117.0	115.00	0.00%	0.00%
Tariff LTC/Commercial	2,96,465.39	3,08,960.0	3,31,101.00	3,54,176.0	3,60,138.00	4.29%	4.29%
Tariff LTI/Industry	1,09,194.90	1,40,451.0	1,37,991.00	1,40,170.0	1,39,224.00	0.45%	0.45%
Tariff LTP/Mixed (Hotel Industries)	2,075.23	2,868.0	2,522.00	2,757.0	2,284.00	0.00%	0.00%
Tariff LTAG/Agriculture (Pump sets / Irrigation)	38,938.56	44,171.0	42,528.00	45,684.0	45,825.00	3.80%	3.80%
Tariff LTAG/Agriculture (Allied Activities)	4,082.03	1,522.0	1,530.00	1,786.0	1,799.00	5.00%	5.00%
Tariff LTPL/ Public Lighting	11,840.11	1,600.0	1,777.00	3,212.0	7,232.00	5.00%	5.00%
Tariff LTH/ Hoarding and Signboards	598.98	619.0	576.00	567.0	558.00	0.00%	0.00%
Tariff-LTTS/ Temporary Supply	15,327.27	20,748.0	33,440.00	9,107.0	10,707.00	0.00%	0.00%
Tariff-HTI/ Industrial	4,60,234.00	4,71,764.0	5,09,633.00	5,33,850.0	5,28,085.00	1.79%	1.79%
Tariff HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	1,09,050.00	98,700.0	1,04,550.00	95,340.0	1,00,820.00	0.00%	0.00%
Tariff HTC/ Commercial	65,210.00	70,821.0	76,660.00	83,425.0	91,998.00	5.00%	5.00%
Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	7,800.00	8,000.0	8,675.00	9,085.0	9,085.00	2.34%	2.34%
Tariff HTAG/ Agriculture (allied activity)	860.00	1,310.0	2,200.00	2,200.0	2,200.00	0.00%	0.00%
Tariff HTD/ Domestic	300.00	300.0	300.00	300.0	400.00	5.00%	5.00%
Tariff HTMES/ Defence Establishment	6,955.00	6,955.0	6,825.00	7,675.0	7,675.00	5.00%	5.00%
Tariff HTTS/ Temporary Supply	350.00	350.0	1,348.00	2,468.0	2,444.00	5.00%	5.00%
Single Point Supply	4,035.00	4,035.0	4,035.00	4,035.0	4,035.00	0.00%	0.00%
Total	**22,86,192.45**	**25,65,120.00**	**27,16,300.00**	**28,34,724.00**	**28,78,609.00**	**2.94%**	**2.94%**

Table 4-3: Summary of Category-wise No. of consumers Growth Rate Considered for Projections

SALES (MU)	Actuals		Actual Provisional			CAGR	
	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	3yr	Considered
Tariff LTD/Domestic	4,63,272.00	4,98,606.0	5,03,319.00	5,22,090.0	5,25,260.00	2.16%	2.16%
Tariff LTIG/Low Income Group	1,125.00	1,845.0	1,522.00	1,314.0	1,240.00	0.00%	0.00%
Tariff LTC/Commercial	89,328.20	94,788.0	96,599.00	99,918.0	1,00,301.00	1.90%	1.90%
Tariff LTI/Industry	6,010.00	5,961.0	5,728.00	5,799.0	5,723.00	0.00%	0.00%
Tariff LTP/Mixed (Hotel Industries)	108.80	138.0	126.00	125.0	116.00	0.00%	0.00%
Tariff LTAG/Agriculture (Pump sets / Irrigation)	11,118.00	11,252.0	11,089.00	11,735.0	11,799.00	3.15%	3.15%
Tariff LTAG/Agriculture (Allied Activities)	187.80	181.0	188.00	216.0	220.00	8.18%	5.00%
Tariff LTPL/ Public Lighting	3,041.60	215.0	254.00	1,097.0	2,887.00	5.00%	5.00%
Tariff LTH/ Hoarding and Signboards	62.00	63.0	49.00	47.0	44.00	0.00%	0.00%
Tariff-LTTS/ Temporary Supply	4,223.60	5,151.0	5,446.00	2,609.0	2,747.00	0.00%	0.00%
Tariff-HTI/ Industrial	657.00	692.0	724.00	748.0	754.00	2.05%	2.05%
Tariff HTFS Industrial (Ferro Metallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	32.00	29.0	27.00	26.0	26.00	0.00%	0.00%
Tariff HTC/ Commercial	191.00	209.0	225.00	252.0	262.00	5.00%	5.00%
Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	39.00	40.0	40.00	41.0	41.00	1.24%	1.24%
Tariff HTAG/ Agriculture (allied activity)	2.00	3.0	3.00	3.0	3.00	0.00%	0.00%
Tariff HTD/ Domestic	3.00	3.0	3.00	3.0	4.00	5.00%	5.00%
Tariff HTMES/ Defence Establishment	12.00	12.0	12.00	13.0	13.00	4.08%	4.08%
Tariff HTTS/ Temporary Supply	1.00	1.0	4.00	11.0	12.00	5.00%	5.00%
Single Point Supply	1.00	1.0	1.00	1.0	1.00	0.00%	0.00%
Total	**5,79,415.00**	**6,19,190.00**	**6,25,359.00**	**6,46,048.00**	**6,51,453.00**	**2.07%**	**2.07%**

4.4 Projected No. of Consumers, Connected Load and Sales for the MYT Control Period

4.4.1 Based on the above discussions and assumptions of growth rate, the projection for the sales/ consumption and number of consumers during the control period is given below.

Table 4-4: Projection of category wise Sales (MUs) for the MYT Control Period

S.No	SALES (MU)	Base Year Projections	Projections		
		FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
1(a)	Tariff LTD/Domestic	1,273.99	1,325.53	1,379.16	1,434.96
1(b)	Tariff LTIG/Low Income Group	1.27	1.27	1.27	1.27
2	Tariff LTC/Commercial	406.99	436.59	448.26	460.24
3	Tariff LTI/Industry	78.23	80.91	80.91	80.91
4	Tariff LTP/Mixed (Hotel Industries)	3.67	4.48	4.48	4.48
5A	Tariff LTAG/Agriculture (Pump sets / Irrigation)	15.19	17.25	17.71	18.18
5 B	Tariff LTAG/Agriculture (Allied Activities)	0.99	0.99	0.99	0.99
6	Tariff LTPL/ Public Lighting	48.01	50.41	52.93	55.58
7	Tariff LTH/ Hoarding and Signboards	0.16	0.16	0.16	0.16
8	Tariff-LTTS/ Temporary Supply	3.18	9.77	9.77	9.77
9	Tariff-HTI/ Industrial	1,454.39	1,483.35	1,512.88	1,543.01
10	Tariff HTFS Industrial (Ferro Mettallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	484.34	506.83	530.35	554.97
11	Tariff HTC/ Commercial	111.19	116.74	122.58	128.71
12 A	Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	5.30	5.30	5.30	5.30
12 B	Tariff HTAG/ Agriculture (allied activity)	8.91	9.36	9.82	10.32
13	Tariff HTD/ Domestic	0.41	0.43	0.45	0.47
14	Tariff HTMES/ Defence Establishment	27.86	27.86	27.86	27.86
15	Tariff HTTS/ Temporary Supply	3.34	3.51	3.69	3.87
16	Single Point Supply	4.27	5.55	5.60	5.65
	Total	**3,931.70**	**4,086.29**	**4,214.18**	**4,346.69**

Table 4-5: Projection of category wise No. of Consumers (Nos.) for the MYT Control Period

S.No	Consumer Category	Base Year Projections	Projections		
		FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
1(a)	Tariff LTD/Domestic	5,36,227.00	5,47,790.10	5,59,602.55	5,71,669.71
1(b)	Tariff LTIG/Low Income Group	877.00	877.00	877.00	877.00
2	Tariff LTC/Commercial	1,01,893.00	1,03,827.09	1,05,797.88	1,07,806.09

S.No	Consumer Category	Base Year Projections	Projections		
		FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
3	Tariff LTI/Industry	5,649.00	5,649.00	5,649.00	5,649.00
4	Tariff LTP/Mixed (Hotel Industries)	116.00	116.00	116.00	116.00
5A	Tariff LTAG/Agriculture (Pump sets / Irrigation)	12,100.00	12,481.36	12,874.73	13,280.51
5 B	Tariff LTAG/Agriculture (Allied Activities)	244.00	256.20	269.01	282.46
6	Tariff LTPL/ Public Lighting	5,453.00	5,725.65	6,011.93	6,312.53
7	Tariff LTH/ Hoarding and Signboards	61.00	61.00	61.00	61.00
8	Tariff-LTTS/ Temporary Supply	2,726.00	2,726.00	2,726.00	2,726.00
9	Tariff-HTI/ Industrial	782.00	798.04	814.40	831.11
10	Tariff HTFS Industrial (Ferro Mettallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	22.00	22.00	22.00	22.00
11	Tariff HTC/ Commercial	275.00	288.75	303.19	318.35
12 A	Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	42.00	42.52	43.05	43.58
12 B	Tariff HTAG/ Agriculture (allied activity)	3.00	3.00	3.00	3.00
13	Tariff HTD/ Domestic	4.00	4.20	4.41	4.63
14	Tariff HTMES/ Defence Establishment	14.00	14.57	15.17	15.79
15	Tariff HTTS/ Temporary Supply	15.00	15.75	16.54	17.36
16	Single Point Supply	1.00	1.00	1.00	1.00
	Total	**6,66,504.00**	**6,80,699.22**	**6,95,207.86**	**7,10,037.12**

Table 4-6: Projection of category wise Connected Load (kW/kVA/HP) for the MYT Control Period

S.No	Connected Load (kW)	Base Year Projections	Projections		
	Consumer Category	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
1(a)	Tariff LTD/Domestic	16,59,217.00	17,22,919.38	17,89,067.48	18,57,755.21
1(b)	Tariff LTIG/Low Income Group	85.00	85.00	85.00	85.00
2	Tariff LTC/Commercial	3,73,956.00	3,90,009.09	4,06,751.31	4,24,212.23
3	Tariff LTI/Industry	1,45,096.00	1,45,742.80	1,46,392.49	1,47,045.07
4	Tariff LTP/Mixed (Hotel Industries)	2,295.00	2,295.00	2,295.00	2,295.00
5A	Tariff LTAG/Agriculture (Pump sets / Irrigation)	46,815.00	48,595.81	50,444.35	52,363.21

S.No	Connected Load (kW)	Base Year Projections	Projections		
	Consumer Category	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
5B	Tariff LTAG/Agriculture (Allied Activities)	2,199.00	2,308.95	2,424.40	2,545.62
6	Tariff LTPL/ Public Lighting	11,611.67	12,192.25	12,801.87	13,441.96
7	Tariff LTH/ Hoarding and Signboards	514.00	514.00	514.00	514.00
8	Tariff-LTTS/ Temporary Supply	9,248.00	9,248.00	9,248.00	9,248.00
9	Tariff-HTI/ Industrial	5,60,918.00	5,70,982.14	5,81,226.85	5,91,655.37
10	Tariff HTFS Industrial (Ferro Mettallurgical/ Steel Melting/ Power Intensive/ Steel Rolling)	93,250.00	93,250.00	93,250.00	93,250.00
11	Tariff HTC/ Commercial	1,03,442.00	1,08,614.10	1,14,044.81	1,19,747.05
12 A	Tariff HTAG/ Agriculture (Pump Sets/ irrigation)	9,260.00	9,476.30	9,697.65	9,924.17
12 B	Tariff HTAG/ Agriculture (allied activity)	2,200.00	2,200.00	2,200.00	2,200.00
13	Tariff HTD/ Domestic	400.00	420.00	441.00	463.05
14	Tariff HTMES/ Defence Establishment	8,295.00	8,709.75	9,145.24	9,602.50
15	Tariff HTTS/ Temporary Supply	5,394.00	5,663.70	5,946.89	6,244.23
16	Single Point Supply	4,035.00	4,035.00	4,035.00	4,035.00
	Total	**30,38,230.67**	**31,37,261.27**	**32,40,011.32**	**33,46,626.67**

4.5 Distribution Loss

4.5.1 ED-Goa has been working hard to reduce its Distribution losses to the targets approved by the Hon`ble Commission in the previous Business Plan control period. ED-Goa has reduced some of its Distribution Loss due to implementation of SAP, R-APDRP Part A schemes, by resolving the billing issues, transition of billing and collection agencies and infusion of funds to strengthen and improve the distribution network. As the issues are resolved and data billing etc is done through SAP, the provisional actual distribution losses observed for FY 2020-21 are 11.90%. Further, ED-Goa has considered the distribution loss for target FY 2021-22 of 10.25%, as approved by the Commission.

4.5.2 Further, ED-Goa submits that it would further invest in the capital expenditure during the control period to further reduce the technical losses and commercial losses. However, ED-Goa would like to submit, even if commercial losses are reduced to NIL, as ED-Goa has a vastly spread area along with coastal belts, it is very difficult to reduce the technical losses, and after a certain level requires huge technological and capital expenditure. Accordingly, considering the above constraints, ED-Goa has proposed the

distribution loss trajectory for the control period as mentioned below.

Table 4-7: Distribution Loss Reduction (%) Trajectory for the Control Period

Particulars	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Loss (%)	10.25%	10.15%	10.00%	9.85%

5 POWER PURCHASE PLAN

ED-Goa has prepared a power purchase plan through which it envisages to source power during the control period. In the previous section, ED-Goa had projected sales and the demand requirement for the State; based on that power requirement for the control period has been discussed in this chapter.

5.1 Energy Requirement

5.1.1 Based on the energy sales and distribution loss trajectory forecasted for the control period, the petitioner requests the Hon'ble Commission to approve the proposed energy balance for the control period based on the above projections.

Table 5-1: Energy Balance for the MYT Control Period (MUs)

Energy Requirement (MU)	Projections			
	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Total Sales within Goa	**3,931.70**	**4,086.29**	**4,214.18**	**4,346.69**
Loss (%)	10.25%	10.15%	10.00%	9.85%
Loss (MU)	449.02	461.61	468.24	474.93
Total Energy/Power Purchase Requirement (MU)	**4,380.72**	**4,547.90**	**4,682.42**	**4,821.62**

5.2 Power Purchase Sources

5.2.1 In this section, the Petitioner has projected energy requirement based on the existing and upcoming sources of power available to ED-Goa in the next control period. The power required for control period would be met through following sources:

- Central Generating Stations
- Within State Generation (Co-Generation Plants)
- Renewable Energy tie-ups

- Traders/Open Market/Short Term

Following assumptions have been considered for projecting the quantum of power purchase:

5.3 Share Allocation for CGS Station

5.3.1 The Petitioner has considered the plant wise share allocation from Central Generating Stations as per the latest per WRPC Allocation Circular No: WRPC/Comml.-I/6/Alloc/2021/7279 dated 13th July 2021 and SRPC Allocation Circular No: SRPC/SE(O)/54/UA/2021-22/ dated 28th June 2021.

5.3.2 The following table shows the capacity share allocation (allocated +unallocated) for Central Generating Stations considered for projecting quantum of power purchase for the next control period.

Table 5-2: Share of CGS from Allocated and Unallocated Capacity

S. No	Station	Peak Hrs (18.00 to 22.00)			Off Peak Hrs. (00 to 18.00 & 22.00 to 24.00)		
		Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)	Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)
1	Korba STPS	210	4.78	214.78	210	5.32	215.32
2	Korba STPS-VII	4.5	2.21	6.71	4.5	2.46	6.96
3	Vindhyachal STPS-I	35	4.21	39.21	35	4.68	39.68
4	Vindhyachal STPS-II	12	3.18	15.18	12	3.55	15.55
5	Vindhyachal STPS-III	10	3.18	13.18	10	3.55	13.55
6	Vindhyachal STPS-IV	11.2	4.42	15.62	11.2	4.92	16.12
7	Vindhyachal STPS-V	5.18	2.21	7.39	5.18	2.46	7.64
8	Sipat Stage-I	20	8.75	28.75	20	9.74	29.74
9	Sipat Stage-II	10	3.03	13.03	10	3.38	13.38
10	Mouda STPS-I	11.2	4.42	15.62	11.2	4.92	16.12
12	Mouda STPS-II	14.5	5.83	20.33	14.5	6.49	20.99
11	Kawas Gas PP	0	12.4	12.4	0	12.4	12.40
12	Gandhar Gas PP	0	12.66	12.66	0	12.66	12.66
13	Gadarwara STPS	14.55	7.07	21.62	14.55	7.87	22.42
14	Solapur STPS	15.09	5.83	20.92	15.09	6.49	21.58
15	Lara	7.31	7.06	14.37	7.31	7.86	15.17
16	Khargone STPS	11.75	5.83	17.58	11.75	6.49	18.24
17	Ramagundum STPS	100	0	100	100	0	100
18	KAPP	15	1.12	16.12	15	1.25	16.25

S. No	Station	Peak Hrs (18.00 to 22.00)			Off Peak Hrs. (00 to 18.00 & 22.00 to 24.00)		
		Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)	Share from firm Allocation (MW)	Share from unallocated Allocation (MW)	Total Allocation (MW)
19	TAPP3&4	11	3.8	14.8	11	4.23	15.23
	Total	**518.28**	**101.99**	**620.27**	**518.28**	**110.72**	**629.00**

* - As per WRPC Allocation Circular No: WRPC/Comml.-I/6/Alloc/2021/7279 dated 13th July 2021 and SRPC Allocation Circular No: SRPC/SE(O)/54/UA/2021-22/ dated 28th June 2021.

5.3.3 Allocations of power have been obtained from the Ministry of Power (MoP) against the demand made by the State from Central Sector Generating Stations;

- Apart from this, power is obtained to some extent from the U.I (Unscheduled interchanges) pool depending upon permissible grid frequency and also from traders/ open market.

5.4 Power Purchase from New/Upcoming Stations

5.4.1 ED-Goa has no upcoming power purchase planned from the thermal generating stations.ED-Goa has planned the tie-ups of Renewable energy both outside and within the state during the control period to meet its RPO obligations. Accordingly, ED-Goa has also considered the upcoming power stations of during the control period. The same is as under:

Table 5-3: 5.4 Power Purchase from New/Upcoming Stations (MW)

Sr.	Power Projects	Capacity for Goa (MW)	Estimated date of Start of Power Supply
1	Convergence Solar (110 MW)	110	FY 2023-24
2	SECI 50 MW (Wind)	50	FY 2022-23
3	SECI 150 MW (Peak power Solar, Wind and BESS)	150	FY 2023-24
4	PM KUSUM	10	FY 2023-24

5.4.2 Department of New & Renewable Energy, Goa has signed a MoU with M/s. Convergence Energy Services Ltd. ("CESL") is a wholly owned subsidiary of Energy Efficiency Services Ltd. ("EESL") (JV of PSUs under Ministry of Power, Govt. of India), under which ED-Goa will sign a PPA with CESL for power procurement from a cumulative capacity of 110 MW grid-interactive Solar PV power projects for 25 years. It includes replacement of 11,000 conventional Agricultural pumps by Energy Efficient Agriculture Pumps of capacity

ranging from 0.1 HP to 10 HP; and Distribution of 16 lakh 9 Watt LED bulbs. The Tariff is fixed at Rs.3.60/kWh for a period of 25 years. The Government of Goa shall approach the Hon`ble Commission for approval of the PPA & Tariff separately.

5.4.3 Further, ED-Goa has signed a PPA with SECI to procure Wind power at 50 MW on Long Term basis on 16th August 2019 at a fixed tariff of Rs. 2.83/kWh plus trading margin of Rs. 0.07/kWh at goa periphery. The power flow is expected to start in FY 2022-23. As per the directions of Hon`ble JERC, ED-Goa is filing a separate petition for adoption of the same.

5.4.4 Further, ED-Goa is in the final stage of Govt approval for purchase of power from the SECI 150 MW RTC Peak Power from a combined sources of Renewable Power comprising of Solar, Wind and Battery Energy Storage System (BESS), which provides assured Peak Power to compensate the Peak Deficit of Goa. The project contributes to Peak Power compensation and RPO as well. The project envisages the supply to start from FY 2023-24 at the rate of Rs 4.03 /unit at goa periphery. ED-Goa shall approach the Hon`ble Commission for approval of the PSA of the same, separately.

5.4.5 PM KUSUM Scheme issued by MNRE on 08.03.2019. The Scheme consists of three components:

- Component A: 10,000 MW of Grid Connected Solar or any other RE Plants (500 kW to 2 MW capacity)
- Component B: 17.50 lakh standalone Solar Ag Pumps (up to 7.5 HP)
- Component C: Solarisation of 10 Lakh grid-connected Ag Pumps (up to 7.5 HP)

The main Objective of the Scheme are as follows:

- Water security to farmers through reliable Solar power
- Utilization of degraded/un-used land of farmers.
- Additional income to farmers by selling surplus power to DISCOM.
- Water conservation.
- Promotion of decentralized Solar power generation.
- Reduction of burden of subsidy to agriculture sector

5.4.6 ED-Goa will:

- Notify sub-station wise capacity feasible for injection
- Invite applications from interested beneficiaries for setting up the renewable energy plants

- Ensure “must-run” status to solar plants and keep feeders ‘ON’ during day.
- Power generated will be purchased by DISCOMs at pre-fixed tariff or tariff arrived through bidding with pre-fixed tariff as ceiling tariff
- Duration of PPA will be 25 years from Commercial Operation Date (COD)
- In case of project set up by a developer: − Lease rent to farmers by developers on basis of per acre per year or per unit energy generated per acre per year − Lease rent payment directly to the farmers by DISCOM.
- DISCOM obliged to buy the entire power within the contract capacity
- Extension of the PPA period beyond 25 years through mutual agreements between the generator and DISCOM
- DISCOM to maintain LC and Escrow Arrangement
- Plant to be commissioned within nine months from issued of LoA
- Two months extension permitted with penalties
- No penalties if delay beyond control of RPG
- DISCOM to get PBI on submission of documentary evidence:
- Timely payment of monthly lease rent to the land owner, if applicable
- Payment made to RPG for power supplied to DISCOM.
- Assess and notify capacity that can be injected in to identified distribution substation of rural areas - 31 October 2019
- Registration of farmers willing to lease out their land for development of RE plants near above notified substations - 15 October 2019
- Advertise on the capacity available and call for RfS from interested farmers/ Developers - 30 November 2019
- Determination of pre-fixed tariff for purchase of power from these plants - 30 November 2019
- Finalisation of successful farmers/developers - 31 January 2020.
- Organising State level PPA signing ceremony - 1 March 2020.
- SNAs to help farmers/developers in getting all necessary clearances, finance from Banks/FIs, technical support for preparation of DPR, tendering and contracting for EPC, project execution, etc. They will get Rs. 25,000 per MW as service charges.

5.4.7 The proposal was sent to Ministry of New and Renewable Energy (MNRE) accordingly, the sanction is obtained as below:

Sr. no	Component	Capacity allocated	Approval letter no & date. by MNRE, GOI
1.	Component A - Small RE plants (MW)	50 MW	F.No. 32/54/2018-SPV division dated 05/03/2021
2	Component B - Stand alone solar water pumps for agricultural purpose	200 nos.	F.No. 32/54/2018-SPV division dated 13/01/2021
3	Component C - Solarisation of grid connected pumps	7000 nos.	F.No. 32/54/2018-SPV division dated 13/01/2021

5.4.8 ED-Goa expects approx. 10 MW from PM KUSUM to come up in this Control Period starting FY 2023-24.

5.4.9 Apart from the above sources, ED-Goa also expects to purchase power in Short-term from exchanges or Traders or DEEP portal to fulfil its peak requirements. Further, ED-Goa also expects some surplus to be available during off-peak hours and would indulge in banking or sale of power in exchanges in the real time basis.

5.5 Plant Load Factor for CGS Stations

5.5.1 The Petitioner has considered the provisional actual figures of FY 2020-21 of PLF for each plant and has considered the same for FY 2021-22 and for the projection of Power Purchase for the Control Period FY 2022-23 to FY 2024-25:

Table 5-4: Actual PLF of CGS from FY 2020-21 (%)

S. No	Station	FY 2020-21
1	Korba STPS	93.56%
2	Vindhyachal STPS-I	81.74%
3	Vindhyachal STPS-II	88.13%
4	Vindhyachal STPS-III	95.71%
5	Vindhyachal STPS-IV	86.57%
6	Vindhyachal STPS-V	91.83%
7	Kawas Gas PP	16.75%
8	Gandhar Gas PP	12.44%
9	Sipat Stage-I	93.32%
10	Korba STPS-VII	95.66%
12	Ramagundum STPS	75.76%
11	Sipat Stage-II	87.87%
12	Solapur STPS	34.35%
13	Gadarwara STPS	33.14%

S. No	Station	FY 2020-21
14	Lara STPS	44.17%
15	Khargone STPS	44.99%
16	Mouda STPS -I	42.32%
17	Mouda STPS -II	27.77%
18	KAPS	96.51%
19	TAPS 3&4	82.96%

5.6 Auxiliary consumption

5.6.1 The Petitioner has considered auxiliary consumption for each of the central generating station as per the CERC Tariff Order, (where the same were considered for the Power Purchase for FY 2021-22 approved by the Hon'ble Commission through the JERC Tariff Order for ED-Goa for the period FY 2021-22) for the purpose of projection of Power Purchase for the Control Period FY 2022-23 to FY 2024-25:

5.6.2 The following table shows the auxiliary consumption considered for each of the FY of the control period.

Table 5-5: Auxiliary Consumption considered for next control period

S. No	Station	Capacity (MW)	Aux. Consumption (%)
1	Korba STPS	2,100	7.75%
2	Vindhyachal STPS-I	1,260	7.75%
3	Vindhyachal STPS-II	1,000	7.75%
4	Vindhyachal STPS-III	1,000	7.75%
5	Vindhyachal STPS-IV	1,000	7.75%
6	Vindhyachal STPS-V	500	7.75%
7	Kawas Gas PP	656	2.50%
8	Gandhar Gas PP	657	2.50%
9	Sipat Stage-I	1,980	7.75%
10	Korba STPS-VII	500	7.75%
11	Ramagundum STPS	2,100	7.75%
12	Sipat Stage-II	1,000	7.75%
13	Solapur STPS	1,320	7.75%
14	Gadarwara STPS	1,600	5.25%
15	Lara STPS	1,600	7.75%
16	Khargone STPS	1,320	7.75%
17	Mouda STPS -I	1,000	7.75%

S. No	Station	Capacity (MW)	Aux. Consumption (%)
18	Mouda STPS -II	1,320	7.75%
19	KAPS	440	10.00%
20	TAPS 3&4	1,080	10.00%

5.6.3 In case of new generating stations, normative Aux. Consumption has been considered as per as per the assumptions as approved in the Tariff Order FY 2021-22 to carry out power purchase projections.

5.7 Fixed Charges

5.7.1 The Fixed costs of FY 2021-22, since CERC has still not issued the Order for the Control Period for most of the Plant, ED-Goa has considered actual fixed charges paid to the plant in Q1 of FY 2021-22 and extrapolated them to arrive at the revised projections of base year FY 2021-22 for respective Central Generating Stations. Further, projection of fixed charged for the Control have been done, considering the CAGR of past 3 yrs of each plant, with a cap of 5% for the control period.

5.8 Variable Charges

5.8.1 The Petitioner has considered the actual per unit variable costs of FY 2021-22 Q1 and has calculated the revised projections of base year FY 2021-22 w.r.t to power purchase projections for respective Central Generating Stations. Further, year on year projections has been done by considering 3 year CAGR on energy charges for each plant, with an escalation cap of 5% for purpose of estimation of the variable charges for the control period. Escalation % with negative CAGR are considered to be NIL.

5.8.2 For Solar and Non-Solar firm power, the rates as per the PPA are considered for the entire Control Period from FY 2022-23 to FY 2024-25 without any escalation.

5.8.3 To fulfil the RPO compliance, the deficit renewable power as per the ED-Goa's obligation is compensated by procuring renewable power (Solar and Non-Solar) from the Short-Term Market. The market rates as per the actuals of Q1 FY 2021-22 is considered for the base year FY 2021-22 and also for the entire Control Period from FY 2022-23 to FY 2024-25 without any escalation.

5.9 Transmission Losses

5.9.1 The Petitioner has considered the actual transmission losses of H1 of FY 2021-22 as the revised transmission losses for the base year FY 2021-22. Further, ED-Goa has assumed the transmission losses to slightly reduce over the control period. The following table

shows the transmission losses that are considered for energy projection.

Table 5-6: Transmission Losses (%) considered for the next control period

Transmission Loss	Projections			
	Base Year FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
Western Region	3.35%	3.34%	3.31%	3.29%
Southern Region	7.95%	7.92%	7.85%	7.80%

5.10 Transmission Charges

5.10.1 The Petitioner has considered the actual transmission charges for H1 of FY 2021-22 and calculated the transmission charges per unit for PGCIL. The same per unit rate has been considered for computation of Transmission charges for the control period without any escalations.

5.10.2 Based on the above assumptions, power purchase quantum for Central Generating Stations is derived for entire control period.

5.11 Energy Projection within State Generation

5.11.1 ED-Goa has tied up power from three Co-Generating Plants within State namely Goa Energy Private Limited (GEPL), Goa Sponge and Power Limited (GSPL) and Sesa Sterlite Limited (SSL).

5.11.2 The total energy projection from GEPL, SSL and GSPL for the entire control period is based on actual energy received in FY 2020-21 i.e 149.79 MUs and at the same rates.

5.12 Energy from Solar

5.12.1 EDG has been procuring power from the Renewable Sources whereby 6 MW Solar Power is procured from NVVNL and 25 MW from SECI to meet its RPO obligations. The NVVNL tie-up will be till FY 22-23 only (4 or 5 months). Hence, power purchase from NVVNL has been considered in revised projections of FY 2021-22 and FY 2022-23 upto August only. Power Purchase from SECI is considered as 48 MU as per the PPA and the entire control period.

5.12.2 Further, ED-Goa has planned the tie-ups of Renewable energy during the control period to meet its RPO obligations and the same has been discussed in the earlier section of Upcoming Power plant. However, the same has been reproduced here below.

5.12.3 ED-Goa has signed a Power Supply Agreement (PSA) M/s. Convergence Energy Services Ltd. ("CESL") is a wholly owned subsidiary of Energy Efficiency Services Ltd. ("EESL") (JV of PSUs under Ministry of Power, Govt. of India) for power procurement from a cumulative capacity of 110 MW grid-interactive Solar PV power projects for 25 years. It includes replacement of 11,000 conventional Agricultural pumps by Energy Efficient Agriculture Pumps of capacity ranging from 0.1 HP to 10 HP; and Distribution of 16 lakh 9 Watt LED bulbs. The Tariff is fixed at Rs.3.60/kWh for a period of 25 years. 1 MWp under the project is already Commission and another 3 MWp is expected to come in FY 2021-22. Further, around 55 MWp is expected to completed in FY 2022-23 and completed 110 MW in H2 of FY 2023-24. Accordingly, it is expected that around 3.15 MUs will be received in FY 2021-22 and 43 MU, 87 MU and 173 MUs in FY 2022-23, FY 2023-24 & FY 2024-25 respectively.

5.12.4 ED-Goa is in the final stage of Govt approval for the SECI 150 MW RTC Peak Power from a combined sources of Renewable Power comprising of Solar, Wind and Battery Energy Storage System (BESS) provides assured Peak Power to compensate the Peak Deficit of Goa. The project contributes to Peak Power compensation and RPO as well. The project envisages the supply to start FY 2023-24 at the rate of Rs 4.03 /unit at goa periphery.

5.12.5 Further, ED-Goa is also expecting the consumers to go for solar rooftops and indulge in more Net Metering/ Gross Metering during the Control Period. The total Cumulative installed capacity including all types of rooftop solar and ground mounted solar as on 30.09.2021 within Goa is 17.423 MW of which, Residential is 1.764 MW and non-Residential is 15.659 MW. ED-Goa expects to receive certain power from rooftop projects during the control period.

5.12.6 Apart from above, to meet any shortfall (if any) and to fulfil the Solar RPO obligation, EDG shall purchase power through short term (Traders) through DEEP portal, GTAM.

5.13 **Energy from Non-Solar**

5.13.1 ED-Goa would be procuring non-solar Renewable power for meeting the RPO during MYT control period through short term on DEEP portal. ED-Goa is also procuring 2 MUs (for FY 2024-25 it is 0.5 MUs) every year from Hindustan Waste Energy Ltd and the same has been envisaged to buy during the entire control period.

5.13.2 Further, the petitioner has also tied up with SECI Tranche II 50 MW Wind power and procuring the power at a rate of Rs. 2.72/unit plus trading margin of Rs. 0.07/kWh at goa periphery. The actual energy delivered by SECI Tranche II 50 MW, for FY 2019-20 is 102.70MU, for FY 2020-21 is 112.42 MU and for FY 2021-22 H1 is 82.58 MU. For the purpose of arriving at the base year FY 2021-22, the actual energy delivered during FY

2020-21 is considered for FY 2021-22, and for the entire control period FY 2022-23 to FY 2024-25.

5.13.3 EDG submits that it has executed a Power Sale Agreement (PSA) on 16th August 2019 with SECI for Procurement of 50 MW Wind Power (Tranche VI) for 25 years at a fixed tariff for Rs. 2.83/kWh plus trading margin of Rs. 0.07/kWh for fulfilment of Non-Solar RPO. Accordingly, EDG will be submitting a separate petition before the Hon'ble Commission to accord its approval for adoption of said PSA which would enable EDG to meet its commitment towards Non-Solar RPO.

5.14 SECI 150 MW Combined Solar, Non-Solar and BESS

5.14.1 ED-Goa is in the final stage of Govt approval for the SECI 150 MW RTC Peak Power from a combined sources of Renewable Power comprising of Solar, Wind and Battery Energy Storage System (BESS) provides assured Peak Power to compensate the Peak Deficit of Goa. The said project contributes to Peak Power compensation and RPO as well. The project envisages the supply to start from FY 2023-24 at the rate of Rs 4.03 /unit at goa periphery.

5.15 RPO Obligation

5.15.1 As discussed above, ED-Goa envisages to meet its RPO obligation through purchase of physical renewable power and may even exceed the RPO obligations as cheap power is available in the market, in comparison to the conventional sources. Further, for the Control Period, since Hon`ble Commission has not yet approved any trajectory, ED-Goa has assumed a 1% increase in Solar and Non-Solar RPO every year and has accordingly considered the projections for RPO fulfilment. Further, after considering all the proposed tied-up renewable energy, ED-Goa proposes to meet any shortfall to fulfil the RPO obligation, through purchase from short term (Traders) through DEEP portal, GTAM. For projection of ED-Goa does not plan to buy and REC during the control period.

5.15.2 The following table shows the Renewable Purchase Obligation for Solar and Non Solar for ED-Goa for the respective years.

Table 5-7: Details of RPO Obligation for ED-Goa for entire control period (MUs)

S.No	Description	Unit	Revised Projections	Projections		
			FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
1	Sales Within State	MUs	3,931.70	4,086.29	4,214.18	4,346.69
2	RPO Obligation	%				

S.No	Description	Unit	Revised Projections	Projections		
			FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
	- Solar	%	8.00%	9.00%	10.00%	11.00%
	- Non Solar	%	9.00%	10.00%	11.00%	12.00%
3	RPO Obligation	**MUs**				
	- Solar	MUs	314.54	367.77	421.42	478.14
	- Non Solar	MUs	353.85	408.63	463.56	521.60
4	Power Purchase	**MUs**				
	- Solar	MUs	314.54	367.77	421.42	478.14
	- Non Solar	Mus	353.85	408.63	712.38	712.38

5.16 Power Purchase from Traders/ Short Term

5.16.1 ED-Goa also expects to purchase power in Short-term from exchanges or Traders or DEEP portal to fulfil its peak or shortfall requirements. Further, ED-Goa also expects some surplus to be available during off-peak hours and would indulge in banking or sale of power in exchanges in the real time basis.

5.16.2 To meet any shortfall, if occurs, EDG purchase power through short term (Traders). For FY 2021-22, ED-Goa has envisaged purchase of 104.52 MUs from traders/exchange at a rate of Rs. 3.46/unit depending upon the past rates.

5.16.3 However, for the entire control period, ED-Goa does not envisage to buy any power from the traders/exchange/short term.

5.17 Power Purchase Projections

5.17.1 Based on the above assumptions, ED-Goa has considered projection on quantum of power in MU's for FY 2021-22 (base year revised projections) to FY 2024-25. The following table shows the quantum of power projected from different sources for the next control period.

Table 5-8: Power Procurement in MU for the entire control period

S. No.	Source	Capacity (MW)	Firm allocation to Licensee		PLF (%)	Gross Generation (MU)	Aux consumption (%)	Net Generation (MU)	External Losses (%)				Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee		
									Base Year (Tariff Order Approved)	Projections						
			%	MW					FY 2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
A	**Central Sector Power Stations**															
I	**NTPC**	**21,914**		**596.14**		**5,222.19**		**3,628.75**	**4.13%**				**3,482.62**	**3,483.08**	**3,484.48**	**3,485.41**
1	*KSTPS*	2,100	10.25%	*215.23*	*93.56%*	1,885	7.75%	1,627.27	*3.35%*	*3.34%*	*3.31%*	*3.29%*	1,572.72	1,572.89	1,573.40	1,573.74
2	*VSTPS - I*	1,260	3.14%	*39.60*	*81.74%*	347	7.75%	261.60	*3.35%*	*3.34%*	*3.31%*	*3.29%*	252.83	252.86	252.94	252.99
3	*VSTPS - II*	1,000	1.55%	*15.49*	*88.13%*	136	7.75%	110.31	*3.35%*	*3.34%*	*3.31%*	*3.29%*	106.61	106.62	106.66	106.68
4	*VSTPS -III*	1,000	1.35%	*13.49*	*95.71%*	118	7.75%	104.32	*3.35%*	*3.34%*	*3.31%*	*3.29%*	100.82	100.83	100.87	100.89
5	*VSTPS-IV*	1,000	1.60%	*16.04*	*86.57%*	140	7.75%	112.18	*3.35%*	*3.34%*	*3.31%*	*3.29%*	108.42	108.44	108.47	108.49
6	*VSTPS-V*	500	1.52%	*7.60*	*91.83%*	67	7.75%	56.39	*3.35%*	*3.34%*	*3.31%*	*3.29%*	54.50	54.50	54.52	54.53
7	*KGPP*	656	1.89%	*12.40*	*16.75%*	109	2.50%	17.74	*3.35%*	*3.34%*	*3.31%*	*3.29%*	17.14	17.15	17.15	17.16
8	*GGPP*	657	1.93%	*12.66*	*12.44%*	111	2.50%	13.45	*3.35%*	*3.34%*	*3.31%*	*3.29%*	13.00	13.00	13.01	13.01
9	*SIPAT- I*	1,980	1.49%	*29.58*	*93.32%*	259	7.75%	223.04	*3.35%*	*3.34%*	*3.31%*	*3.29%*	215.56	215.58	215.65	215.70
11	*KSTPS-VII*	500	1.38%	*6.92*	*95.66%*	61	*7.75%*	53.48	*3.35%*	*3.34%*	*3.31%*	*3.29%*	55.33	55.33	55.35	55.36
14	*RSTPS*	2,100	4.76%	*100.00*	*75.76%*	876	7.75%	612.22	*7.95%*	*7.92%*	*7.85%*	*7.80%*	563.58	563.73	564.19	564.49
15	*SIPAT- II*	1,000	1.33%	*13.32*	*87.87%*	117	7.75%	94.59	*3.35%*	*3.34%*	*3.31%*	*3.29%*	91.42	91.43	91.46	91.48
16	*Solapur*	1,320	1.63%	*21.47*	*34.35%*	188	*7.75%*	59.60	*3.35%*	*3.34%*	*3.31%*	*3.29%*	57.61	57.61	57.63	57.64
17	*Gadarwara*	1,600	1.39%	*22.29*	*33.14%*	195	*5.25%*	61.30	*3.35%*	*3.34%*	*3.31%*	*3.29%*	59.25	59.25	59.27	59.28
18	*Lara*	1,600	0.94%	*15.02*	*44.17%*	132	*7.75%*	53.61	*3.35%*	*3.34%*	*3.31%*	*3.29%*	51.81	51.82	51.84	51.85
19	*Khargone*	1,320	1.37%	*18.13*	*44.99%*	159	*7.75%*	65.92	*3.35%*	*3.34%*	*3.31%*	*3.29%*	63.71	63.71	63.73	63.75
20	*Mouda I*	1,000	1.60%	*16.04*	*42.32%*	140	*7.75%*	54.85	*3.35%*	*3.34%*	*3.31%*	*3.29%*	53.01	53.01	53.03	53.04
21	*Mouda II*	1,320	1.58%	*20.88*	*27.77%*	183	*7.75%*	46.86	*3.35%*	*3.34%*	*3.31%*	*3.29%*	45.29	45.30	45.31	45.32

S. No.	Source	Capacity (MW)	Firm allocation to Licensee		PLF (%)	Gross Generation (MU)	Aux consumption (%)	Net Generation (MU)	External Losses (%)				Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee		
									Base Year (Tariff Order Approved)	Projections						
			%	MW					FY 2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
	Add/ Less: Other Adjustments													-		
III	**NPCIL**	**1,520**		**31**				**222.63**					**215**	**215**	**215**	**215**
	KAPS	440	*3.69%*	*16.23*	*96.51%*	142	10.00%	123.48	*3.35%*	*3.34%*	*3.31%*	*3.29%*	119.34	119.36	119.39	119.42
	TAPS	1,080	*1.40%*	*15.16*	*82.96%*	133	10.00%	99.15	*3.35%*	*3.34%*	*3.31%*	*3.29%*	95.83	95.84	95.87	95.89
IV	**Short-Term Purchase**			-									**(149)**	**(77)**	**(401)**	**(207)**
	a) IEX PURCHASE AND SALES								*3.35%*	*3.34%*	*3.31%*	*3.29%*	*(148.98)*	(76.55)	(400.90)	(207.39)
	A1)IEX PURCHASE								*3.35%*				101.01			
	A2)IEX SALES								*3.35%*				249.99	76.55	400.90	207.39
	b) Traders								*3.35%*					-	-	-
V	**OVER/ UNDER DRAWAL**												(3.82)			
	OVER DRAWAL								*3.35%*				27.74			
	UNDER DRAWAL								*3.35%*				31.44			

S. No.	Source	Capacity (MW)	Firm allocation to Licensee		PLF (%)	Gross Generation (MU)	Aux consumption (%)	Net Generation (MU)	External Losses (%)				Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee		
									Base Year (Tariff Order Approved)	Projections						
			%	MW					FY 2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
VI	***Banking of Power***								*3.35%*	*3.34%*	*3.31%*	*3.29%*	17.56			
B	**Within State Generations**															
I	**CO-GENERATION**	**26.00**		**26.00**		**227.76**							**150**	**150**	**150**	**150**
	Vedanta Plant-1	*14.00*	*100.00%*	*14.00*		*122.64*			*0.00%*				90.88	90.88	90.88	90.88
	Vedanta Plant -2	*2.00*	*100.00%*	*2.00*		*17.52*			*0.00%*				53.10	53.10	53.10	53.10
	Goa Sponge and private limited	*10.00*	*100.00%*	*10.00*		*87.60*			*0.00%*				5.81	5.81	5.81	5.81
C	**RPO Obligation**												**668**	**776**	**1,134**	**1,191**
	Solar			***301***									***314.54***	***367.77***	***421.42***	***478.14***
	NVVNL Solar			*6*									*12.00*	*12.00*		
	Solar STOA								*3.35%*	*3.34%*	*3.31%*	*3.29%*	*238.74*	*244.64*	*117.53*	*48.00*
	SECI Solar			*25.00*									*48.00*	*48.00*	*48.00*	*48.00*
	CONVERGENCE SOLAR			*110.00*									*3.15*	*43.36*	*86.72*	*173.45*
	Net Metering												*12.65*	*19.76*	*39.52*	*79.04*

S. No.	Source	Capacity (MW)	Firm allocation to Licensee		PLF (%)	Gross Generation (MU)	Aux consumption (%)	Net Generation (MU)	External Losses (%)				Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee		
									Base Year (Tariff Order Approved)	Projections						
			%	MW					FY 2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
	PM KUSUM			*10.00*											16.64	16.64
	SECI Hybrid (Solar)			*150.00*											113.00	113.00
	Non-Solar			100.00									***353.85***	***408.63***	***712.38***	***712.38***
	Non Solar - SECI Wind Tranche II LTOA			50.00									*112.42*	*112.42*	*112.42*	*112.42*
	STOA (Non Solar)								*3.35%*	*3.34%*	*3.31%*	*3.29%*	240.47	220.25	-	-
	SECI Tranche-VI			50.00										75.00	112.00	112.00
	Hindustan waste treatment plant Goa												0.96	0.96	0.96	0.96
	SECI Hybrid (Non-Solar)														487.00	487.00
D	REC Certificates															
E	**OTHER CHARGES**															
	PGCIL Transmission Charges,															

S. No.	Source	Capacity (MW)	Firm allocation to Licensee		PLF (%)	Gross Generation (MU)	Aux consumption (%)	Net Generation (MU)	External Losses (%)				Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee		
									Base Year (Tariff Order Approved)	Projections						
			%	MW					FY 2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
	Wheeling, Oen Access & Trading Marrgin & Other Charges															
F	**Total**	**23,460**		**1,055**									**4,381**	**4,548**	**4,582**	**4,834**

Table 5-9: Power Procurement Variable Cost in Rs. Per unit and Rs. Crore for the entire control period

S. No.	Source	Power Purchase Cost - Variable Cost (VC)											
		Actuals (VC- pc/unit)			Base Year Projections (VC- pc/unit)	Projections (%)	Projections (VC- pc/unit)			Base Year Projections (VC- Rs.Crore)	Projections (VC- Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR (considered)	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
A	**Central Sector Power Stations**												
I	**NTPC**			**2,959.81**						**608.88**	**612.98**	**617.33**	**621.66**
1	*KSTPS*	*135.66*	*139.35*	*140.37*	140.37	*1.72%*	142.79	145.24	147.74	220.77	224.59	228.53	232.51
2	*VSTPS - I*	*173.27*	*166.79*	*157.62*	157.62	*0.00%*	157.62	157.62	157.62	39.85	39.85	39.87	39.88
3	*VSTPS - II*	*166.52*	*160.12*	*151.36*	151.36	*0.00%*	151.36	151.36	151.36	16.14	16.14	16.14	16.15

S. No.	Source	Power Purchase Cost - Variable Cost (VC)											
		Actuals (VC- pc/unit)			Base Year Projections (VC- pc/unit)	Projections (%)	Projections (VC- pc/unit)			Base Year Projections (VC- Rs.Crore)	Projections (VC- Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR (considered)	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
4	*VSTPS -III*	*165.44*	*159.02*	*150.17*	150.17	*0.00%*	150.17	150.17	150.17	15.14	15.14	15.15	15.15
5	*VSTPS-IV*	*163.33*	*156.90*	*148.87*	148.87	*0.00%*	148.87	148.87	148.87	16.14	16.14	16.15	16.15
6	*VSTPS-V*	*168.12*	*161.67*	*153.34*	153.34	*0.00%*	153.34	153.34	153.34	8.36	8.36	8.36	8.36
7	*KGPP*	*271.98*	*201.26*	*153.15*	153.15	*0.00%*	153.15	153.15	153.15	2.63	2.63	2.63	2.63
8	*GGPP*	*273.93*	*203.93*	*167.71*	167.71	*0.00%*	167.71	167.71	167.71	2.18	2.18	2.18	2.18
9	*SIPAT- I*	*143.11*	*141.90*	*142.99*	142.99	*0.00%*	142.99	142.99	142.99	30.82	30.83	30.84	30.84
11	*KSTPS-VII*	*133.67*	*137.03*	-	137.65	*1.48%*	139.68	141.75	143.84	7.62	7.73	7.85	7.96
14	*RSTPS*	*264.16*	*246.67*	*253.63*	253.63	*0.00%*	253.63	253.63	253.63	142.94	142.98	143.10	143.17
15	*SIPAT- II*	*145.45*	*146.92*	*147.67*	147.67	*0.76%*	148.80	149.93	151.07	13.50	13.60	13.71	13.82
16	*Solapur*	*349.33*	*298.75*	*348.50*	348.50	*0.00%*	348.50	348.50	348.50	20.08	20.08	20.08	20.09
17	*Gadarwara*	*328.96*	*250.06*	-	276.14	*0.00%*	276.14	276.14	276.14	16.36	16.36	16.37	16.37
18	*Lara*	*244.54*	*204.06*	-	211.99	*0.00%*	211.99	211.99	211.99	10.98	10.99	10.99	10.99
19	*Khargone*	*293.35*	*269.02*	*272.90*	272.90	*0.00%*	272.90	272.90	272.90	17.39	17.39	17.39	17.40
20	*Mouda I*	*317.51*	*270.72*	*273.37*	273.37	*0.00%*	273.37	273.37	273.37	14.49	14.49	14.50	14.50
21	*Mouda II*	*314.45*	*290.10*	*298.16*	298.16	*0.00%*	298.16	298.16	298.16	13.50	13.51	13.51	13.51
	Add/ Less: Other Adjustments												
III	**NPCIL**									**59.55**	**60.78**	**62.06**	**63.39**
	KAPS	*249.99*	*141.35*	*228.99*	228.99	*0.00%*	228.99	228.99	228.99	27.33	27.33	27.34	27.35
	TAPS	*312.16*	*492.73*	*336.25*	336.25	*3.79%*	348.98	362.19	375.91	32.22	33.44	34.72	36.04
IV	**Traders**									**(14)**	**(19)**	**(98)**	**(49)**
	a)IEX PURCHASEAND SALES	467.77	*215.54*	*89.40*	91.07		249.14	243.30	237.59	(13.57)	(19.07)	(97.54)	(49.28)
	a)IEX PURCHASE	355.29	*346.20*		346.20					34.97			
	a)IEX SALES	267.53	*255.13*		255.13		249.14	243.30	237.59	63.78	19.07	97.54	49.28
	b) Traders	-	-	-			-	-	-				

S. No.	Source	Power Purchase Cost - Variable Cost (VC)											
		Actuals (VC- pc/unit)			Base Year Projections (VC- pc/unit)	Projections (%)	Projections (VC- pc/unit)			Base Year Projections (VC- Rs.Crore)	Projections (VC- Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR (considered)	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
V	**OVER/ UNDER DRAWAL**	(530.64)	*(802.55)*	*88.25*	88.25					(0.34)	-	-	-
	OVER DRAWAL												
	UNDER DRAWAL												
VI	***Banking of Power***	**47.41**	*9.17*	*(2.53)*	(2.53)					(0.04)	-	-	-
B	**Within State Generations**												
I	**CO- GENERATION**									**35.81**	**35.95**	**35.95**	**35.95**
	Vedanta Plant-1	239.72	*238.38*	*240.36*	240.36	*0.13%*	240.00	240.00	240.00	21.84	21.81	21.81	21.81
	Vedanta Plant -2	238.27	*234.49*	*236.75*	236.75	*0.00%*	240.00	240.00	240.00	12.57	12.74	12.74	12.74
	Goa Sponge and private limited	240.00	*240.00*	*240.00*	240.00	*0.00%*	240.00	240.00	240.00	1.39	1.39	1.39	1.39
C	**RPO Obligation**									**293.10**	**325.64**	**435.49**	**447.29**
	Solar									**148.77**	**168.20**	**174.91**	**186.71**
	NVVNL Solar	672.65	*550.00*	*550.00*	550.00	*0.00%*	550.00	550.00	550.00	6.60	6.60	-	-
	Solar STOA	500.00	*470.00*	*464.95*	464.95	*0.00%*	464.95	464.95	464.95	111.00	113.75	54.65	22.32
	SECI Solar	567.84	*550.00*	*550.00*	550.00	*0.00%*	550.00	550.00	550.00	26.40	26.40	26.40	26.40
	CONVERGENCE SOLAR				360.00		360.00	360.00	360.00	1.14	15.61	31.22	62.44
	Net Metering				287.00		295.61	304.48	313.61	3.63	5.84	12.03	24.79
	PM KUSUM						295.61	304.48	313.61	-	-	5.07	5.22
	SECI Hybrid (Solar)							403.00	403.00			45.54	45.54
	Non-Solar									**144.34**	**157.44**	**260.59**	**260.59**

S. No.	Source	Power Purchase Cost - Variable Cost (VC)											
		Actuals (VC- pc/unit)			Base Year Projections (VC- pc/unit)	Projections (%)	Projections (VC- pc/unit)			Base Year Projections (VC- Rs.Crore)	Projections (VC- Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR (considered)	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
	Non Solar - SECI Wind Tranche II LTOA	271.01	*271.01*	*271.00*	271.12	*0.02%*	279.00	279.00	279.00	30.48	31.37	31.37	31.37
	STOA (Non Solar)	508.39	*508.39*	*470.00*	471.48	*0.00%*	471.48	471.48	471.48	113.38	103.84	-	-
	SECI Tranche-VI				290.00		290.00	290.00	290.00	-	21.75	32.48	32.48
	Hindustan waste treatment plant Goa	500.00	*500*	*500*	500.00	*0.00%*	500.00	500.00	500.00	0.48	0.48	0.48	0.48
	SECI Hybrid (Non-Solar)							403.00	403.00			196.26	196.26
D	REC Certificates												
E	**OTHER CHARGES**												
	PGCIL Transmission Charges, Wheeling, Oen Access & Trading Marrgin & Other Charges	*0.49*	*0.45*		0.49	*0.00%*	0.49	0.49	0.49	213.23	221.36	223.04	235.27
F	**Total**						**0**	**0**	**0**	**1,197**	**1,238**	**1,276**	**1,354**

Table 5-10: Power Procurement Fixed Cost and Total Power Purchase Cost in Rs. Cr for the entire control period

S. No.	Source	Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)							
		Actuals			Base Year Projections	Projections	Projections (FC Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR Considered	2022-23	2023-24	2024-25
A	**Central Sector Power Stations**								
I	**NTPC**	**378.50**	**402.88**	**104.79**	**419.17**		**422.80**	**426.62**	**430.62**
1	*KSTPS*	*103.12*	*102.18*	*25.55*	102.21	*0.00%*	102.21	102.21	102.21
2	*VSTPS - I*	*23.14*	*22.44*	*5.69*	22.76	*0.00%*	22.76	22.76	22.76
3	*VSTPS - II*	*7.87*	*7.49*	*1.84*	7.35	*0.00%*	7.35	7.35	7.35
4	*VSTPS -III*	*10.40*	*9.85*	*2.40*	9.58	*0.00%*	9.58	9.58	9.58
5	*VSTPS-IV*	*18.06*	*17.70*	*4.37*	17.50	*0.00%*	17.50	17.50	17.50
6	*VSTPS-V*	*9.06*	*8.88*	*2.19*	8.76	*0.00%*	8.76	8.76	8.76
7	*KGPP*	*7.72*	*7.59*	*1.88*	7.53	*0.00%*	7.53	7.53	7.53
8	*GGPP*	*9.84*	*9.77*	*2.43*	9.71	*0.00%*	9.71	9.71	9.71
9	*SIPAT- I*	*27.76*	*27.07*	*6.73*	26.91	*0.00%*	26.91	26.91	26.91
11	*KSTPS-VII*	*6.94*	*6.75*	*1.67*	6.69	*0.00%*	6.69	6.69	6.69
14	*RSTPS*	*50.05*	*49.11*	*11.99*	47.98	*0.00%*	47.98	47.98	47.98
15	*SIPAT- II*	*12.11*	*11.52*	*2.88*	11.52	*0.00%*	11.52	11.52	11.52
16	*Solapur*	*26.52*	*26.06*	*6.37*	25.48	*0.00%*	25.48	25.48	25.48
17	*Gadarwara*	*13.24*	*17.42*	*8.04*	32.18	*5.00%*	33.78	35.47	37.25
18	*Lara*	*5.69*	*12.85*	*4.40*	17.58	*5.00%*	18.46	19.38	20.35
19	*Khargone*	*2.23*	*23.21*	*5.71*	22.86	*5.00%*	24.00	25.20	26.46
20	*Mouda I*	*21.85*	*21.31*	*5.29*	21.14	*0.00%*	21.14	21.14	21.14
21	*Mouda II*	*22.91*	*21.68*	*5.36*	21.43	*0.00%*	21.43	21.43	21.43
	Add/ Less: Other Adjustments								
III	**NPCIL**				**-**		**-**	**-**	**-**
	KAPS	-			-	*0.00%*	-	-	-
	TAPS	-			-	*0.00%*	-	-	-
IV	**Traders**								
	a)IEX PURCHASEAND SALES					*0.00%*	-	-	-

S. No.	Source	Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)							
		Actuals			Base Year Projections	Projections	Projections (FC Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR Considered	2022-23	2023-24	2024-25
	a)IEX PURCHASE								
	a)IEX SALES								
	b) Traders								
V	**OVER/ UNDER DRAWAL**					*0.00%*	-	-	-
	OVER DRAWAL								
	UNDER DRAWAL								
VI	***Banking of Power***					*0.00%*	-	-	-
B	**Within State Generations**								
I	**CO- GENERATION**								
	Vedanta Plant-1					*0.00%*	-	-	-
	Vedanta Plant -2					*0.00%*	-	-	-
	Goa Sponge and private limited					*0.00%*	-	-	-
C	**RPO Obligation**								
	Solar								
	NVVNL Solar					*0.00%*	-	-	-
	Solar STOA					*0.00%*	-	-	-
	SECI Solar					*0.00%*	-	-	-
	CONVERGENCE SOLAR								
	Net Metering								
	PM KUSUM								
	SECI Hybrid (Solar)								
	Non-Solar								
	Non Solar - SECI Wind Tranche II LTOA					*0.00%*	-	-	-
	STOA (Non Solar)								
	SECI Tranche-VI								

S. No.	Source	Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)							
		Actuals			Base Year Projections	Projections	Projections (FC Rs.Crore)		
		2019-20	2020-21	2021-22 (Q1)	2021-22	CAGR Considered	2022-23	2023-24	2024-25
	Hindustan waste treatment plant Goa					*0.00%*	-	-	-
	SECI Hybrid (Non-Solar)								
D	REC Certificates								
E	**OTHER CHARGES**								
	PGCIL Transmission Charges, Wheeling, Oen Access & Trading Marrgin & Other Charges								
F	**Total**	**379**	**403**	**105**	**419**		**423**	**427**	**431**

Table 5-11: Power Procurement Fixed Cost and Total Power Purchase Cost in Rs. Cr for the entire Control Period

S. No.	Source	MU				Power Purchase Cost - Variable Cost (VC)				Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)				Total Power Purchase Cost - (Rs.Cr)			
		Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee			Base Year Projections (VC-Rs.Crore)	Projections (VC- Rs.Crore)			Base Year Projections	Projections (FC Rs.Crore)			(Base year)	Projections (VC+FC)		
		2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
A	**Central Sector Power Stations**																
I	**NTPC**	**3,482.62**	**3,483.08**	**3,484.48**	**3,485.41**	**608.88**	**612.98**	**617.33**	**621.66**	**419.17**	**422.80**	**426.62**	**430.62**	**1,028.05**	**1,035.79**	**1,043.95**	**1,052.28**
1	*KSTPS*	1,572.72	1,572.89	1,573.40	1,573.74	220.77	224.59	228.53	232.51	102.21	102.21	102.21	102.21	322.98	326.80	330.74	334.72
2	*VSTPS – I*	252.83	252.86	252.94	252.99	39.85	39.85	39.87	39.88	22.76	22.76	22.76	22.76	62.61	62.62	62.63	62.64
3	*VSTPS – II*	106.61	106.62	106.66	106.68	16.14	16.14	16.14	16.15	7.35	7.35	7.35	7.35	23.49	23.49	23.49	23.50

S. No.	Source	MU				Power Purchase Cost - Variable Cost (VC)				Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)				Total Power Purchase Cost - (Rs.Cr)			
		Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee			Base Year Projections (VC-Rs.Crore)	Projections (VC- Rs.Crore)			Base Year Projections	Projections (FC Rs.Crore)			(Base year)	Projections (VC+FC)		
		2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
4	*VSTPS -III*	100.82	100.83	100.87	100.89	15.14	15.14	15.15	15.15	9.58	9.58	9.58	9.58	24.72	24.72	24.73	24.73
5	*VSTPS-IV*	108.42	108.44	108.47	108.49	16.14	16.14	16.15	16.15	17.50	17.50	17.50	17.50	33.64	33.64	33.64	33.65
6	*VSTPS-V*	54.50	54.50	54.52	54.53	8.36	8.36	8.36	8.36	8.76	8.76	8.76	8.76	17.12	17.12	17.12	17.12
7	*KGPP*	17.14	17.15	17.15	17.16	2.63	2.63	2.63	2.63	7.53	7.53	7.53	7.53	10.15	10.15	10.16	10.16
8	*GGPP*	13.00	13.00	13.01	13.01	2.18	2.18	2.18	2.18	9.71	9.71	9.71	9.71	11.89	11.89	11.89	11.89
9	*SIPAT- I*	215.56	215.58	215.65	215.70	30.82	30.83	30.84	30.84	26.91	26.91	26.91	26.91	57.74	57.74	57.75	57.76
11	*KSTPS-VII*	55.33	55.33	55.35	55.36	7.62	7.73	7.85	7.96	6.69	6.69	6.69	6.69	14.30	14.41	14.53	14.65
14	*RSTPS*	563.58	563.73	564.19	564.49	142.94	142.98	143.10	143.17	47.98	47.98	47.98	47.98	190.92	190.96	191.08	191.15
15	*SIPAT- II*	91.42	91.43	91.46	91.48	13.50	13.60	13.71	13.82	11.52	11.52	11.52	11.52	25.02	25.13	25.24	25.34
16	*Solapur*	57.61	57.61	57.63	57.64	20.08	20.08	20.08	20.09	25.48	25.48	25.48	25.48	45.56	45.56	45.57	45.57
17	*Gadarwara*	59.25	59.25	59.27	59.28	16.36	16.36	16.37	16.37	32.18	33.78	35.47	37.25	48.54	50.15	51.84	53.62
18	*Lara*	51.81	51.82	51.84	51.85	10.98	10.99	10.99	10.99	17.58	18.46	19.38	20.35	28.57	29.45	30.37	31.34
19	*Khargone*	63.71	63.71	63.73	63.75	17.39	17.39	17.39	17.40	22.86	24.00	25.20	26.46	40.24	41.39	42.59	43.85
20	*Mouda I*	53.01	53.01	53.03	53.04	14.49	14.49	14.50	14.50	21.14	21.14	21.14	21.14	35.63	35.63	35.64	35.64
21	*Mouda II*	45.29	45.30	45.31	45.32	13.50	13.51	13.51	13.51	21.43	21.43	21.43	21.43	34.94	34.94	34.94	34.95
	Add/ Less: Other Adjustments		-														
III	**NPCIL**	**215**	**215**	**215**	**215**	**59.55**	**60.78**	**62.06**	**63.39**	**-**	**-**	**-**	**-**	**59.55**	**60.78**	**62.06**	**63.39**
	KAPS	119.34	119.36	119.39	119.42	27.33	27.33	27.34	27.35	-	-	-	-	27.33	27.33	27.34	27.35
	TAPS	95.83	95.84	95.87	95.89	32.22	33.44	34.72	36.04	-	-	-	-	32.22	33.44	34.72	36.04

S. No.	Source	MU				Power Purchase Cost - Variable Cost (VC)				Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)				Total Power Purchase Cost - (Rs.Cr)			
		Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee			Base Year Projections (VC-Rs.Crore)	Projections (VC- Rs.Crore)			Base Year Projections	Projections (FC Rs.Crore)			(Base year)	Projections (VC+FC)		
		2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
IV	**Traders**	**(149)**	**(77)**	**(401)**	**(207)**	**(14)**	**(19)**	**(98)**	**(49)**					**(14)**	**(19)**	**(98)**	**(49)**
	a)IEX PURCHASEAND SALES	*(148.98)*	(76.55)	(400.90)	(207.39)	(13.57)	(19.07)	(97.54)	(49.28)		-	-	-	(13.57)	(19.07)	(97.54)	(49.28)
	a)IEX PURCHASE	101.01				34.97											
	a)IEX SALES	249.99	76.55	400.90	207.39	63.78	19.07	97.54	49.28								
	b) Traders		-	-	-									-	-	-	-
														-	-	-	-
V	**OVER/ UNDER DRAWAL**	(3.82)				(0.34)	-	-	-		-	-	-	(0.34)	-	-	-
	OVER DRAWAL	27.74															
	UNDER DRAWAL	31.44															
														-	-	-	-
VI	***Banking of Power***	17.56				(0.04)	-	-	-		-	-	-	(0.04)	-	-	-
														-	-	-	-
B	**Within State Generations**													-	-	-	-

S. No.	Source	MU				Power Purchase Cost - Variable Cost (VC)				Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)				Total Power Purchase Cost - (Rs.Cr)			
		Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee			Base Year Projections (VC-Rs.Crore)	Projections (VC- Rs.Crore)			Base Year Projections	Projections (FC Rs.Crore)			(Base year)	Projections (VC+FC)		
		2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
I	**CO-GENERATION**	**150**	**150**	**150**	**150**	**35.81**	**35.95**	**35.95**	**35.95**					**35.81**	**35.95**	**35.95**	**35.95**
	Vedanta Plant-1	90.88	90.88	90.88	90.88	21.84	21.81	21.81	21.81		-	-	-	21.84	21.81	21.81	21.81
	Vedanta Plant -2	53.10	53.10	53.10	53.10	12.57	12.74	12.74	12.74		-	-	-	12.57	12.74	12.74	12.74
	Goa Sponge and private limited	5.81	5.81	5.81	5.81	1.39	1.39	1.39	1.39		-	-	-	1.39	1.39	1.39	1.39
														-	-	-	-
C	**RPO Obligation**	**668**	**776**	**1,134**	**1,191**	**293.10**	**325.64**	**435.49**	**447.29**					**293.10**	**325.64**	**435.49**	**447.29**
														-	-	-	-
	Solar	***314.54***	***367.77***	***421.42***	***478.14***	**148.77**	**168.20**	**174.91**	**186.71**					**148.77**	**168.20**	**174.91**	**186.71**
	NVVNL Solar	*12.00*	*12.00*			6.60	6.60	-	-		-	-	-	6.60	6.60	-	-
	Solar STOA	*238.74*	*244.64*	*117.53*	*48.00*	111.00	113.75	54.65	22.32		-	-	-	111.00	113.75	54.65	22.32
	SECI Solar	*48.00*	*48.00*	*48.00*	*48.00*	26.40	26.40	26.40	26.40		-	-	-	26.40	26.40	26.40	26.40
	CONVERGENCE SOLAR	*3.15*	*43.36*	*86.72*	*173.45*	1.14	15.61	31.22	62.44					1.14	15.61	31.22	62.44
	Net Metering	*12.65*	*19.76*	*39.52*	*79.04*	3.63	5.84	12.03	24.79					3.63	5.84	12.03	24.79

S. No.	Source	MU				Power Purchase Cost - Variable Cost (VC)				Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)				Total Power Purchase Cost - (Rs.Cr)			
		Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee			Base Year Projections (VC-Rs.Crore)	Projections (VC- Rs.Crore)			Base Year Projections	Projections (FC Rs.Crore)			(Base year)	Projections (VC+FC)		
		2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
	PM KUSUM			16.64	16.64	-	-	5.07	5.22					-	-	5.07	5.22
	SECI Hybrid (Solar)			113.00	113.00			45.54	45.54							45.54	45.54
	Non-Solar	***353.85***	***408.63***	***712.38***	***712.38***	**144.34**	**157.44**	**260.59**	**260.59**					**144.34**	**157.44**	**260.59**	**260.59**
	Non Solar - SECI Wind Tranche II LTOA	*112.42*	*112.42*	*112.42*	*112.42*	30.48	31.37	31.37	31.37		-	-	-	30.48	31.37	31.37	31.37
	STOA (Non Solar)	240.47	220.25	-	-	113.38	103.84	-	-					113.38	103.84	-	-
	SECI Tranche-VI		75.00	112.00	112.00	-	21.75	32.48	32.48					-	21.75	32.48	32.48
	Hindustan waste treatment plant Goa	0.96	0.96	0.96	0.96	0.48	0.48	0.48	0.48		-	-	-	0.48	0.48	0.48	0.48
	SECI Hybrid (Non-Solar)			487.00	487.00			196.26	196.26							196.26	196.26

S. No.	Source	MU				Power Purchase Cost - Variable Cost (VC)				Power Purchase Cost - Fixed Cost Cost (FC) (Rs.Cr)				Total Power Purchase Cost - (Rs.Cr)			
		Base Year Projections recorded by Licensee	Projections of Energy recorded by Licensee			Base Year Projections (VC-Rs.Crore)	Projections (VC- Rs.Crore)			Base Year Projections	Projections (FC Rs.Crore)			(Base year)	Projections (VC+FC)		
		2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
D	REC Certificates													-	-	-	-
														-	-	-	-
E	**OTHER CHARGES**													-	-	-	-
	PGCIL Transmission Charges, Wheeling, Oen Access & Trading Margin & Other Charges					213.23	221.36	223.04	235.27					213.23	221.36	223.04	235.27
														-	-	-	-
F	**Total**	**4,381**	**4,548**	**4,582**	**4,834**	**1,197**	**1,238**	**1,276**	**1,354**	**419**	**423**	**427**	**431**	**1,615.79**	**1,660**	**1,703**	**1,785**

6 CAPITAL EXPENDITURE

The Electricity Department has carried out significant improvement in transmission and distribution networks over the last few years, however the prevailing infrastructure is insufficient to cater to the present load growth. To meet the ever increasing demand from HT and LT consumers and moreover to overcome the constant interruptions, it is absolutely necessary to undertake significant capital expenditure. The strengthening of the sub-transmission and distribution infrastructure is of utmost importance in order to ensure reliable power supply to the end consumers. The transmission & distribution new schemes have also been proposed for ensuring flexibility & reliability of power supply and having a robust network within the State to take care of future load growth. Further the network/ infrastructure in some parts of the state is insufficient to carry the required power to the consumers of that area.

The Capital investment plan for the State is needed to improve efficiency and to meet the constant growth in demand of the existing consumers; meet the requirement of strengthening of the system and to meet the Standards of Performance (SOP) laid down by the Hon'ble Commission. The Capital Investment is essential to undertake following initiatives:

- Improving quality of supply and reduction of interruptions;
- Proactive distribution network planning with viable funding plan;
- Distribution System Loss Reduction;
- Demand Side Management;
- Provide adequate transmission and distribution network to meet the growing load demands;
- Measures for capacity building and to improve working (including safety) conditions of employees.
- Automation and Advanced Distribution Management System
- Smart Metering and AMI.

6.1 Details of Capital Expenditure

6.1.1 ED-GOA plans to carry out the capital expenditure during the control period for augmentation and expansion of its capacity and to reduce the transmission and distribution loss in the system. The works to be carried out are with an intention to

maintain a reliable and efficient system.

6.1.2 The major capital expenditure schemes being executed by ED-Goa are as follows:

A: Existing Schemes/Projects (including Spillover)

- EHV New Transmission/Sub-Station/Capacitor banks
- RAPDRP Part A
- RAPDRP Part B/IPDS
- Underground cabling scheme
- Infrastructure development through Electricity Duty (Plan)
- Schedule Tribe Development Scheme
- Erection and Augmentation of 33/11 kV S/S & Lines
- Normal Development Schemes
- System improvement scheme
- Strengthening of 220 KV Transmission Network
- Erection of 220/110/33/11 KV Sub-Station at Verna (New)
- Construction of Staff Quarters and Office Buildings etc

B: New Schemes/Projects

- Projects with Administrative approval
- Projects Approved by EFC
- Projects tendered (To start next year)
- New EHV Works
- REVAMPED Distribution Projects

6.1.3 The major capital expenditure is towards establishment of new substations and system strengthening. Also, significant amount of capital expenditure is towards renovation and modernization / augmentation of system capacity proposed under the Revamped Distribution scheme of central government. Further, the new schemes have been planned and under execution for having a robust & reliable transmission & distribution network. The proposed capital expenditure will definitely be helpful to achieve the loss targets set by ED-GOA in its distribution loss trajectory and to meet any additional load surging due to increase in demand.

6.1.4 This section discusses the scheme wise capital expenditure and funding of the same to be carried out by ED-GOA for the MYT control period. Capital Expenditure Schemes other

than Electricity Duty Fund are funded through the internal reserves/ equity contribution from Government of Goa or from the Electricity Duty fund. ED-Goa has discussed below the benefits/ need for undertaking the major types of capital expenditure schemes only.

A: EXISTING SCHEMES/PROJECTS (including spillover work from previous Control period):

6.1.5 For the Business Plan for the Control Period FY 2019-20 – FY 2021-22, the capital expenditure proposals submitted to the Hon'ble JERC included the new works to be taken up and executed during the control period. However, at the time of submission of the proposals during the last control period, the DPRs / Government approval and sanctions accorded to the different projects could not be submitted since the same were not available at that point of time. Accordingly, the Hon`ble Commission did not deem fit to approve any of the capital expenditure and capitalisation proposed for the schemes for which the ED-Goa failed to submit the DPRs / Technical Clearance letters or the submitted proofs/details were missing for the required information for any of the proposed scheme.

6.1.6 Subsequently, the detailed estimates were prepared and Government sanction was accorded to these Projects. These Projects were then taken up for execution in the control period, although devoid of Hon'ble Commission approval. During the Petition for the Annual performance review and Tariff petition for the year FY 2020-21 & FY 2021-22, the Government sanctions were submitted to the Hon'ble JERC vis-à-vis the approved and actually taken up. The works were thus taken up for execution during the control period and will be partly executed in the last year of the present control period i.e 2021-22. The balance works will spill over to the Business Plan period FY 2022-23 – FY 2024-25. Also, with advent of the coronavirus, the Covid-19 pandemic hit the country and there were lockdowns from March 2020 till recently. Further the lockdowns and enhanced protocols in terms of hygiene, social distancing, etc led to completed off-roading of the capital investment plans of ED-Goa. Further, most of the governments funds were diverted towards relief works. Accordingly, ED-Goa submits that the capital investment and capitalization plan maybe different from that approved by the Hon`ble Commission and certain other schemes may also spillover to the current control period FY 2022-23 – FY 2024-25 and have been appropriately dealt with. The details of the works are as follows:

(a) <u>Scheduled Tribe Development Scheme:</u>

<u>The following works have been taken up for execution / tendered and being taken up under this scheme:</u>

- Work of renovation, erection, conversion, realignment and improvement of voltage

under SC/ST category in V.P Mardol, Veling, Priol in Ponda Constituency.

- Work of Erection of TC, HT/LT lines, converting overhead line etc at Savoiverem under Tribal Sub Plan fund in Priol Constituency.
- Work for conversion of 11KV Overhead Cortalim feeder to underground network in the areas falling under the jurisdiction of V.P. Quellossim under the Tribal Welfare fund.
- Work of Renovation & Improvement of HT/LT distribution network in the areas of Village Panchayat Bethki, Candola, Tivre, Orgao, Bhoma, Adcona, Palsare under the jurisdiction of section office Marcela.
- Other small works of Renovation and Improvement of voltage at Bagwada Piligao in Mayem, and Kalay in Sanguem.
- Work of conversion of 11 KV S/C overhead Chimbel feeder to underground network for a distance of 23 KMs under tribal welfare scheme.
- Work of conversion of LT overhead lines to underground system under Marcella Section office under Tribal Sub Plan
- Work of erection of new transformer centres and augmentation of existing distribution transformer centres in Agassaim, Neura, Siridao and Bambolim village
- Work of conversion of 33 KV SC OH line to UG 3 core 400 Sq. mm XLPE cable from 33/11 KV Bambolim Sub-Station to Pilar Sub-Station for a distance of 9.12 KMS under Tribal Welfare Scheme.
- Work of laying of 11KV 3 core 300 sq. mm armoured UG cable for 11 KV Batim feeder from Pilar S/S for a distance of 21.95 Kms under Tribal Welfare Scheme.
- Work of reconductoring and strengthening of LT lines in the areas of V.P Priol, Cuncoliem, Veling at Mardol under tribal welfare scheme.

(b) <u>Erection of 33/11 KV S/S and lines:</u>

- Work of enhancement of 6.3 MVA Power Transformer to 10 MVA at 33/11 KV Campal S.S
- Work of providing additional 10 MVA Power Transformer at 33/11KV Porvorim Sub-

Station along with associated equipments

- Work of supply, erection, testing and commissioning of new 10 MVA Power transformer at Saligao Sub station.
- Work of erection of 33/11 KV 10 MVA sub station at Anjuna
- Other minor Civil works at the 33/11 KV Sub-stations.

(c) System Improvement Scheme:

- Work of conversion of 11KV overhead system to underground system under system improvement scheme in Cumbharjua Constituency.
- Work for conversion of existing overhead 11KV & LT line to underground system, covering major portion of Old Goa, Mollar & Dhulapi.
- Work of Renovation and Improvement of the existing LT Distribution Network at various places of Cuncolim Municipal Area under Cuncolim Constituency
- Work of laying of 33KV S/c XLPE cable 3Cx400 sq.mm. from 220/110/33/11 KV Tivim Sub-station to 33/11 KV Nachinola Sub-station alongwith associated equipments at 220/110/33/11 KV Tivim and 33/11KV Nachinola Sub-station under R&I
- Design, supply, erection, testing & commissioning of 220KV Bus coupler bay & Interstate metering at 220/110/33KV Sub-Station, Ponda.
- Work of LT line, Transformer Centres, enhancement of transformer & new transformer centres under jurisdiction of section office Shiroda
- Work of R&I of HT/ LT lines,transformers centre, enhancement of transformers & New tranasformer centres in jurisdiciton of V. P. Borim, under Section office Shiroda & Borim.
- Work of renovation and improvement of LT lines, Transformer centres, relocation of HT lines, enhancement of transformers and new transformer centres under the jurisdiction of section office Usgaon (V.P Usgaon) under renovation & improvement scheme.
- Work for conversion of HT/LT overhead lines to underground network of 11KV IDC feeder in order to provide uninterrupted power supply to consumers of Kakoda

industrial estate, Kakoda in Curchorem Constituency.

(d) Construction of staff quarters and Office buildings:

During the control period FY 2019-20 to FY 2021-22 approval, the Commission had observed that Department had not provided the approval/ DPRs for the additional capital expenditure and hence had approved limited capital expenditure. The Department had proposed for taking up new building at Bicholim and other major works.

- The new Building works has not materialized though, and the Department has undertaken repair works of the residential buildings and office buildings. No major works have been executed. The new Office buildings at Mapusa, Bicholim and Panaji will be taken up in the new Business Plan period.

(e) Strengthening of 220 KV Transmission network:

- The approved work of replacement of the existing 40 MVA, 110/33 KV power transformer with 50 MVA power transformer at Tivim 110/33 KV Sub-Station has been completed. The work of major repairs of On-Load Tap Changer (OLTC) was also taken up at Xeldem 220/110 KV Sub-Station.
- Apart from the above it was also proposed to provide a 50 MVA additional power transformer at 110/33 KV Verna Sub-Station to tide over the increasing loads of the Verna Industrial Estate and the surrounding areas of Mormugao taluka. The work has been tendered and work will spill over to the next control plan period 2022-23 to 2024-25.
- The Central Government is setting up a 400/220 kV Sub-station at Dharbandora. Therefor in order to avail the 220 KV power supply from this Sub-Station the Work of Design, Supply, erection, testing & commissioning of 220KV intake gantry structures with switchgear at Xeldem sub – station yard emanating from the proposed 400/220kV Sub-station at Dharbandora has been tendered and work will be awarded.

(f) Erection of 220/110/33/11 KV Sub-Station at Verna (New):

- The work of erection of 220/110/33/11 KV Sub-Station at Verna was tendered, however the same was then cancelled and deferred to be taken up during the Business Plan period 2022-23 to 2024-25. Hence the same has spilled over to the new plan period. The same was cancelled to incorporate new technological improvements. Although spilled over, this has been considered as new plan proposal.

(g) R-APDRP Part A:

- The implementation of the R-APDRP Part A had been completed earlier and the Capital expenditure proposed during the last control period was for the payment towards the FMS charges of the IT implementing agency, the AMC charges of the Data Centre, the AMC charges of the Disaster Recovery Centre hosted on Railtel server, and the additional services sought from the IT implementing agencies. These charges will also spill over to the new Business Plan period 2022-23 to 2024-25.

(h) Underground Cabling:

The Commission had approved limited capital expenditure during the control period 2019-20 to 2021-22 citing the reason that the Department had not provided the DPR/Sanction for the Projects. The sanctions to the Schemes were then obtained from the Government and the tendering process was initiated for executing the works. The details of the works are as follows:

- Work for conversion of HT overhead lines to underground network of 11KV Kakoda feeder in order to provide uninterrupted power supply to consumers connected to Kakoda feeder in Curchorem constituency.
- Conversion of HT overhead lines to underground network of 11KV Bansai feeder and part of 11KV Xelvona feeder & Rivona feeder in order to provide un-interrupted power supply to consumers of connected of Bansai feeder under Curchorem Constituency.
- Work for conversion of HT overhead lines to underground network of 11KV Hodar feeder and part of 11KV Xelvona feeder in order to provide un-interrupted power supply to consumers of Assolda-Xelvona & Xeldem V.P. areas under Curchorem

Constituency.

- Work of conversion of 11KV overhead Industrial feeder emanating from 33/11KV Sancoale Sub-Station to underground network at Sancoale Industrial Estate, Zuarinagar, Sancoale.
- Work for conversion of LT overhead lines to underground network of 11KV Hodar feeder & part of 11KV Xelvona feeder in order to provide uninterrupted power supply to consumers of Assolda-Xelvona & Xeldem V. P. areas under Curchorem Constituency.
- Work of conversion of LT overhead lines to underground network of 11KV Bansai and part of 11KV Xelvona and Rivora feeder in order to provide uninterrupted power supply to consumers of CCMC, Curchorem and Xeldem V.P. areas under Curchorem Constituency.
- Work of conversion of HT & LT overhead feeder to underground cabling for Mapusa Town.
- Work of conversion of 33KV OH line to UG network from Malpe 9-pole structure to 33/11KV Tuem S/S

6.1.7 Some of the above works have already been awarded (via tendering process) during the current financial year FY 2021-22 and are to be taken up for execution and in case of some, the tendering process has been completed and the works are on verge of being awarded. All these works will get only partly executed during this year and will spill over to the next Business Plan 2022-23 to 2024-25.

6.1.8 Similarly, the work of underground cabling at Sada, Bogda, Baina in Mormugao constituency will also partially spill over to the first year of the next plan period. Further, some of the projects were approved by the Commission, however the Department has been able to work only partially in the previous Control period and those projects are being taken up currently and may be completed in FY 2021-22 only or may spill over to the first year of the next Control Period.

(i) <u>R-APDRP Part B / IPDS:</u>

- The Commission had approved a higher amount of Capital expenditure and capitalization for the control period 2019-20 to 2021-22, however the Government

of India has accorded only limited sanction to the DPR amounting to Rs. 48.24 crores for 3 Nos of Gas Insulated Sub-Stations at Altinho, Navelim and at Calangute and Rs. 3.33 crores for Real Time Data Acquisition System (RT-DAS) under IPDS. The earlier sanctioned works have also been completed in respect of Metering and Solar rooftops under IPDS and Metering and 3 Village electrification under DDUGJY.

- The GIS Sub-Stations at Navelim and Altinho will be completed during this present plan period and the GIS Sub-Station at Calangute will get partially spilled over. The RT-DAS will get completed in this Plan period.

(j) EHV New transmission, Sub-Stations, Capacitor Banks:

- No new works have been taken up although the Commission had approved capital expenditure during the last year of the control period 2019-2 to 2021-22. Only the Protection study relay final setting & calculation, Co-ordinates, scheme checks, power automation system (PAS) upgradation of Amona substation was taken up.

(k) Sub-transmission and distribution improvement scheme:

During the last Business Plan approval, the Commission had noted that the Department had failed to submit the DPRs for the above schemes. Based on the Commission's overall approach, if the Department has failed to submit the DPRs / Work orders for any scheme, the Commission did not approved any of the capital expenditure and capitalisation proposed for the said schemes. However, thereafter the Government sanctions were obtained for the different works under the Scheme and works were tendered. Some of the works have been awarded and in respect of some the tendering process has been completed and works are being awarded shortly. Thus, these works will get partly executed in this Plan period and the balance works will get spilled over to the Business Plan period 2022-23 to 2024-25. The details of the works are as follows:

- Work of conversion of existing overhead ACSR Raccoon conductor to HTLS conductor of 33KV Double circuit lines from 33/11KV Nachinola Sub-Station to 33/11KV Saligao Sub-Station via 33/11KV Porvorim Sub-Station.

- Work of conversion of existing O/H ACSR Raccoon conductor to HTLS conductor of 33KV Mapusa I and Mapusa II feeders from 220/110/33/11KV Tivim Sub-Station to 33/1KV Mapusa Sub-Station.
- Work for conversion of overhead existing ACSR Panther conductor to HTLS conductor from 110/33/11KV Verna Sub-Station to 33/11KV Kadamba Sub-Station at Vasco via 33/11KV Sancoale Sub-Station.
- Work of conversion of OH 11KV Cortalim feeder from 33/11KV Sancoale SS to 11KV UG network at Zuarinagar Sancoale

(l) Infrastructure development through Electricity Duty:

The Commission had approved various works under the Infrastructure development through Electricity Duty. The following approved works have been completed or will be completed by the end of this control period.

- Design, Supply, installation, Testing and Commissioning of 33/11KV Gas insulated Substation 2x16/20MVA along with associated equipment at Patto Plaza Panaji.
- Work of 2x10MVA, 33/11KV Indoor type substation along with associated equipment at Karaswado Mapusa.
- Work of laying of underground 33KV double circuit 3Cx400 sq mm cable from Porvorim Substation to Saligao Substation.
- Work of 2x10MVA, 33/11KV Indoor type substation along with associated equipment's at Sal in the jurisdiction of V.P Sal in Bicholim
- Work of conversion of existing O/H 11KV & LT line to U/G cabling system at Cacora Curchorem Municipal area in Curchorem constituency.
- Work for conversion of 11KV and LT overhead lines to underground network in the left out parts of Margao Municipal areas in Margao & Fatorda
- Work of erection of 33KV O/H line tapping from Mapusa II Circuit at Verla Canca to Nagoa Substation.
- Work of S.E.T & C for replacement of 5 Nos of 110 KV SF6 Circuit breakers (MOCB) on the existing foundations with new gang operated spring.

- Work of Development of V.P Ibrambur as Model Village under Sansad Adarsh Gram Yojana (SAGY)
- Work of laying of 11 KV XLPE underground cable from Candolim church to Saipem village
- Work of conversion of existing overhead 11KV line to underground system of feeders namely 11KV Torda, 11KV Housing Board, 11KV Pundalik Nagar feeder and associated LT network on transformer of said feeders and bifurcation of 11KV Torda feeder and Chogum road feeder emanating from 33/11KV Porvorim Sub-Station covering major portion of Porvorim Plateau area in Porvorim constituency.
- Work of linking of 33KV Velim, Canacona & MES DC feeder to 220/33KV Cuncolim Sub-Station.
- Work of conversion of HT/LT overhead network to underground HT &LT network in Cuncolim Industrial Estate
- Work of conversion of existing overhead 11 KV feeders to underground system, erection of new DTCs, augmentation of DTC, erection of additional feeders, conversion single phase to three phase, replacement of conductor, providing guarding, DP renovation etc. under Section Office Saligao and Britona.
- Change of conductor of 110 KV Ponda -Verna and Ponda -Xeldem with higher current capacity HTLS conductor.

The other works approved by the Commission which were cancelled and were deferred are as follows:

- Work of New 50 MVA, 220/33 KV transformer & associated works at 220KV receiving station at Ponda and erection of 220/33/11KV GIS Substation at Tuem & 220KV double circuit transmission line from PGCIL Colvale to Tuem Goa :
- The 50 MVA work will be taken up in the new Business Plan period alongwith the revamping of the Sub-station at Ponda. The erection of the GIS Sub-Station at Tuem alongwith the 220 KV line will not be taken up.
- Work of 2x10 MVA, 33/11KV (indoor type) sub-station at Badem & Mandrem:

- The work at Badem will not be taken up and only the Sub-Station at Mandrem will be taken up in the new Business Plan.
- Work of survey, design, supply, erection and commissioning of 3x63 MVA, 220/33 KV GIS Sub-Station at Saligao along with associated interconnecting 220 KV D/C line from 400/220 KV PGCIL Colvale Sub-Station to Saligao Sub-Station.

The works under Electricity Duty Fund, that will be taken up in the new Control period are as under:

- Work of providing 33 KV underground feeder from 110/33 KV Sub-Station to 33/11 KV Sub-Station at Nachinola:

  This work had been taken up under the System improvement scheme and completed. The same has also been mentioned under the System improvement Scheme.

- Change of conductor of 33 KV Verna Sancoale line with higher current carrying capacity HTLS conductor.

  This work has been taken up under the Sub-transmission and Distribution improvement scheme. The work with scope Verna –Sancoale-Kadamba (Vasco) had been tendered and is being awarded. The same has also been mentioned under the Sub-Transmission and Distribution improvement scheme.

- Apart from the above, the work of conversion of overhead 11 KV HT network to Aerial Bunched Cabling in North and South Goa has also been executed, although it was not approved by the Commission. This was necessitated since the work could not be completed prior to the start of this control period and hence got spilled over to the ongoing control period.

In addition, some additional works considering the urgent necessity were also taken up during the control period after obtaining Government sanction, which were not approved in the previous Business Plan. The details of such works are as follows:

- Conversion of 11KV (HT) overhead lines to underground network in the areas of

Margao Industrial Estate at Nessai under Velim Constituency.

- Work of construction of control room for augmentation of capacity of EDC Sub-Station (GIS) from 1 x 6.3MVA + 1 x 8MVA to additional 2 x 10MVA at Patto-Panaj:

  This work was necessitated since the erection of the GIS Sub-station at EDC Patto was awarded only considering the Electrical infrastructure whereas the Control Room building housing the switchgear were not in the scope.

- Work of conversion of existing 33KV single circuit overhead Chandel feeder to double circuit line with HTLS conductor for releasing 10MVA power supply to M/s GMR Goa International Airport Limited at Mopa:

  This was necessitated since the Mopa Airport work is ithe advanced stage of completion and they had requisitioned for a load of 10 MVA initially. The present line supplying power supply to the area would be insufficient to cater this additional load, and hence this work was proposed and taken up.

- Work of augmentation of 33/11KV Sankhali Sub-Station from 1x10MVA to 2x10MVA and bifurcation of 11KV Poriem feeder and 11KV Amona feeder along with its associated equipments.
- Work of providing additional 10 MVA Power Transformer at 33/11KV Sub-Station at Porvorim, Bardez-Goa along with its associated equipments
- Work of providing additional 10 MVA power transformer at 33/11KV Mapusa Sub-station along with its associated equipments
- Work of laying of single run 33KV 3core 400sq.mm. XLPE cable from 220/33KV Amona Sub-Station to Marcel for a distance of 8.5kms
- Work of Supply, Erection, Testing and Commissioning of 33KV, 3 Core, 400 sq.mm. XLPE cable from 6 pole structure at Leela Resort to 33/11KV Carmona Sub-Station.
- Work of laying of 11KV 3 core 120sq.mm underground cable from 33/11KV Pernem Sub-Station to WRD along the Airport Road to Nagzar.

The department submits that all the related supporting documents for the schemes like govt approvals/sanction orders etc are submitted as annexure to the Petition. The summary table of existing schemes/projects (including spillover work from previous Control period) is as under:

Table 6-1: Existing schemes/projects (including spillover work from previous Control period) (Rs.Crore)

S.No	Name of scheme	CAPEX								
		BUSINESS PLAN FY 2022-23 TO FY 2024-25								
		SPILL OVER works from Previous Control Period			New works in the Control Period			Spill Over from Previous Control Period + Proposed Capex		
		FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
Existing Schemes										
A1	**Schedule Tribe Development Scheme (P)**	**21.75**	**-**	**-**	**34.11**	**28.83**	**-**	**55.86**	**28.83**	**-**
A2	**Infrastructure development through Electricity Duty (Plan)**	**107.78**	**39.01**	**-**	**-**	**-**	**-**	**107.78**	**39.01**	**-**
	Conversion of overhead 11 KV HT network to Aerial Bunched Cabling in North and South Goa	-	-	-	-	-	-	-	-	-
	Work of New 50 MVA, 220/33 KV transformer & associated works at 220KV receiving station at Ponda and erection of 220/33/11KV GIS Substation at Tuem & 220KV double circuit transmission line from PGCIL Colvale to Tuem Goa	-	-	-	-	-	-	-	-	-
	Work of 2x10 MVA, 33/11KV (indoor type) sub-station at Badem & Mandrem	-	-	-	-	-	-	-	-	-
	Design, Supply, installation, Testing and Commissioning of 33/11KV Gas insulated Substation 2x16/20MVA along with associated equipment at Patto Plaza Panaji	4.00	-	-				4.00	-	-
	Work of 2x10 MVA, 33/11KV Indoor type substation along with associated equipment at Karaswado Mapusa.	-	-	-	-	-	-	-	-	-

S.No	Name of scheme	CAPEX								
		BUSINESS PLAN FY 2022-23 TO FY 2024-25								
		SPILL OVER works from Previous Control Period			New works in the Control Period			Spill Over from Previous Control Period + Proposed Capex		
		FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Work of laying of underground 33KV double circuit 3Cx400 sq mm cable from Porvorim Substation to Saligao Substation.	-	-	-	-	-	-	-	-	-
	Work of 2x10 MVA, 33/11KV Indoor type substation along with associated equipment's at Sal in the jurisdiction of V.P Sal in Bicholim	-	-	-	-	-	-	-	-	-
	Work of conversion of existing O/H 11KV & LT line to U/G cabling system at Cacora Curchorem Municipal area in Curchorem constituency	-	-	-	-	-	-	-	-	-
	Work for conversion of 11KV and LT overhead lines to underground network in the left out parts of Margao Municipal areas in Margao & Fatorda	-	-	-	-	-	-	-	-	-
	Work of erection of 33 kV O/H line tapping from Mapusa II Circuit at Verla Canca to Nagoa Substation.	-	-	-	-	-	-	-	-	-
	Work of S.E.T & C for replacement of 5 Nos of 110 KV SF6 Circuit breakers (MOCB) on the existing foundations with new gang operated spring.	-	-	-	-	-	-	-	-	-
	Work of Development of V.P Ibrambur as Model Village under Sansad Adarsh Gram Yojana (SAGY)	-	-	-	-	-	-	-	-	-

S.No	Name of scheme	CAPEX								
		BUSINESS PLAN FY 2022-23 TO FY 2024-25								
		SPILL OVER works from Previous Control Period			New works in the Control Period			Spill Over from Previous Control Period + Proposed Capex		
		FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Work of laying of 11 KV XLPE underground cable from Candolim church to Saipem village	-	-	-	-	-	-	-	-	-
	Work of conversion of existing overhead 11 KV line to underground system of feeders namely 11 KV Torda, 11KV Housing Board, 11 KV Pundalik Nagar feeder and associated LT network on transformer of said feeders and bifurcation of 11KV Torda feeder and Chogum road feeder emanating from 33/11KV Porvorim Sub-Station covering major portion of Porvorim Plateau area in Porvorim constituency.	-	-	-	-	-	-	-	-	-
	Work of laying of 33KV S/C 3 core 400 Sq mm. XLPE underground cable from Naveli Amona 220/33KV Sub-substation to Marcel for a distance of 8.4 kms	-	-	-	-	-	-	-	-	-
	Work of linking of 33KV Velim, Canacona & MES DC feeder to 220/33KV Cuncolim Sub-Station.	-	-	-	-	-	-	-	-	-
	Work of conversion of HT/LT overhead network to underground HT & LT network in Cuncolim Industrial Estate	-	-	-	-	-	-	-	-	-
	Work of survey, design, supply, erection and commissioning of 3x63 MVA, 220/33	-	-	-	-	-	-	-	-	-

S.No	Name of scheme	CAPEX								
		BUSINESS PLAN FY 2022-23 TO FY 2024-25								
		SPILL OVER works from Previous Control Period			New works in the Control Period			Spill Over from Previous Control Period + Proposed Capex		
		FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	KV GIS Sub-Station at Saligao along with associated interconnecting 220 KV D/C line from 400/220 KV PGCIL Colvale Sub-Station to Saligao Sub-Station.									
	Work of conversion of existing overhead 11 KV feeders to underground system, erection of new DTCs, augmentation of DTC, erection of additional feeders, conversion single phase to three phase, replacement of conductor, providing guarding, DP renovation etc. under Section Office Saligao and Britona	-	-	-	-	-	-	-	-	-
	Work of providing 33 KV underground feeder from 110/33 KV Sub-Station to 33/11 KV Sub-Station at Nachinola	-	-	-	-	-	-	-	-	-
	Change of conductor of 110 KV Ponda - Verna and Ponda -Xeldem with higher current capacity HTLS conductor.	-	-	-	-	-	-	-	-	-
	Change of conductor of 33 KV Verna Sancoale line with higher current carrying capacity HTLS conductor.	-	-	-	-	-	-	-	-	-
	Work of conversion of overhead network to Underground cabling in the balance areas of Porvorim constituency (Phase II)	-	-	-	-	-	-	-	-	-

S.No	Name of scheme	CAPEX								
		BUSINESS PLAN FY 2022-23 TO FY 2024-25								
		SPILL OVER works from Previous Control Period			New works in the Control Period			Spill Over from Previous Control Period + Proposed Capex		
		FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Conversion of the overhead HT/LT network to underground cabling in the important town of Vasco, Navelim etc.	-	-	-	-	-	-	-	-	-
	Erection of 33/11 KV Sub-Stations at Navelim, Calangute, Colva.	-	-	-	-	-	-	-	-	-
	Conversion of overhead HT network to Aerial Bunched Cabling (Phase II)	-	-	-	-	-	-	-	-	-
	Street Light EESL Payment	41.34	31.01	-	-	-	-	41.34	31.01	-
	Other than approved works undertaken	62.44	8.00	-	-	-	-	62.44	8.00	-
A3	Erection and Augmentation of 33/11 KV S/S line (Plan)	-	-	-	5.00	5.00	5.00	5.00	5.00	5.00
A4	Normal Development Schemes (Plan)	-	-	-	6.00	6.00	6.00	6.00	6.00	6.00
A5	System Improvement Schemes (Plan)	10.83	-	-	6.40	3.00	3.00	17.23	3.00	3.00
A6	Construction of staff quarters and office buildings (Plan)	-	-	-	21.00	26.00	15.00	21.00	26.00	15.00
A7	Strengthening of 220 KV Transmission Network	15.00	-	-	-	-	-	15.00	-	-
A8	Erection of 220/110/33/11 KV Sub-Station at Verna (New)	-	-	-	-	-	-	-	-	-
A9	Restructured Accelerated Power Development and Reforms Programme Part A	18.00	18.00	18.00	-	-	-	18.00	18.00	18.00
A10	Underground Cabling	141.50	57.00	-	-	-	-	141.50	57.00	-
A11	R-APDRP Part B / IPDS	15.00	-	-	-	-	-	15.00	-	-
A12	EHV new Transmission / Sub-Station / Capacitor banks schemes	-	-	-	-	-	-	-	-	-

S.No	Name of scheme	CAPEX								
		BUSINESS PLAN FY 2022-23 TO FY 2024-25								
		SPILL OVER works from Previous Control Period			New works in the Control Period			Spill Over from Previous Control Period + Proposed Capex		
		FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25	FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
B1	Smartgrid Development of existing network	-	-	-	-	-	-	-	-	-
B2	Sub-transmission and distribution improvement scheme	49.00	-	-	8.00	2.00		57.00	2.00	-
Other Schemes										
	Public Lighting Scheme	0.10	-	-	-	-	-	0.10	-	-
	Total	**378.96**	**114.01**	**18.00**	**80.51**	**70.83**	**29.00**	**459.47**	**184.84**	**47.00**

B: NEW SCHEME/PROJECT PROPOSALS IN THE BUSINESS PLAN 2022-23 TO 2024-25

6.1.9 Apart from the above Capital expenditure during FY 2022-23 to FY 2024-25 due to the existing schemes, the Department also envisages to execute some new schemes/projects and related works during the Control period. ED-Goa submits that for the ease of understanding and clarity wrt to the documents, the department has segregated the projects under the head vis-à-vis their status of approval. The process flow of project approval for ED-Goa by Government of Goa is explained as under:

- All New Projects are forwarded to the Government for obtaining administrative approval.
- For any project with estimated cost of tender more than Rs. 22.5 Crs, approvals from the Expenditure Finance Committee (EFC), Govt. of Goa is required.
- After obtaining administrative sanctions and approval from EFC (for projects cost above Rs. 22.5 Crs), a project can be tendered.
- After opening of the financial bid, the proposal is sent for expenditure sanction to the finance department of Govt. of Goa, in case the project cost is less than Rs. 12.5 Crs,.
- In case project cost is more than Rs. 12.5 Crs, the project sent for approval Goa state works board (GSWB), after which it is sent to finance department for expenditure sanction.
- Once the expenditure sanction is granted by the finance dept. work order/LOI can be placed to the agency/contractor.

6.1.10 Accordingly, the new schemes proposed during the Control are as under:

A) PROJECTS WITH ADMINISTRATIVE APPROVAL

6.1.11 These are new projects, which have already received the administrative approval from the Government have been covered under this classification:

Table 6-2: New Projects with Administrative Approval (Rs.Crore)

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
New Schemes				
Projects with Administrative approval				
1	Estimate for the work of providing U/G cabling network for ring feeding 11KV Barazan feeder emanating from 1 x 6.3MVA Xelpem S/S under the jurisdiction of S/D-III, Sanguem, Div-VII, Curchorem in Sanguem Constituency.	11.09	11.09	5.55
2	Estimate for the work of Design, Supply, Erection, Testing and Commissioning of new Outdoor Gas Insulated Hybrid Switchgears of 220KV Incomer line bays KP-I and TP-II at 220/110/33KV Ponda Sub-Station.	0.94	3.78	-
3	Estimate for the work of conversion of existing 11 KV overhead lines to underground system, coming under the jurisdiction of Sub Division-III, Division XIV Verna of areas under Cortalim Constituency and Nuvem Constituency.	13.41	13.41	6.70
4	Estimate for the work of S.E.T.C. of 1 no. of 50MVA, 110KV/ 33KV Power transformer at 110KV/ 33KV Verna S/S.	4.43	1.90	-
5	Estimate for the work of conversion of existing 11 KV O/H network to U/G cabling network of 11KV Bhati feeder emanating from 1 x 3.15 MVA, 33/11KV Waddem S/S under the jurisdiction of S/D-III Sanguem, Div-VII, Curchorem in Sanguem Constituency.	5.20	2.23	-
6	Estimate for the work of conversion of existing 11 KV O/H network to U/G cabling network of 11KV Sanguem feeder emanating from 1 x 6.3MVA, 33/11KV Xelpem S/S under the jurisdiction of S/D-III, Div-VII, Curchorem in Sanguem Constituency.	6.87	2.94	-
7	Estimate for the work of conversion of existing 11KV overhead network to underground cabling network of 11KV Ponsamol feeder emanating from 1x6.3MVA, Xelpem Sub-Station under the jurisdiction of Sub Division-III, Sanguem, Division-VII, Curchorem in Sanguem Constituency.	14.00	14.00	7.00
8	Estimate for the work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Mandrem feeder emanating from 33/11KV Tuem S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa in Mandrem Constituency.	10.54	10.54	-

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
9	Estimate for the work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Sodiem feeder emanating from 33/11KV Mapusa S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa.	6.95	2.98	-
10	Estimate for the work of improvement of 11KV HT network of Undir & Durbhat feeder in Village Wadi Talaulim, Durbhat, Bandora, pert of Curti & part of Borim inhabited by the Scheduled Tribes population under Tribal Sub-Plan by converting 11KV HT O/H lines to U/G cable under the jurisdiction of S/D-I, Div-X, Ponda	8.88	3.80	-
11	Estimate for the work of conversion of 11KV HT electrical network of Khadpabandh, Ponda-I, Bazar and part of Durbhat, Farmagudi & Curti feeders by converting 11KV HT O/H lines to U/G cable, under the jurisidiction of S/D-I, Div-X, Curti-Ponda.	11.06	11.06	-
	Total	**93.37**	**77.73**	**19.25**

A1: Estimate for the work of Providing underground cabling network for ring feeding 11KV Barazan Feeder emanating from 1 x 6.3MVA, Xelpem Sub-Station under the jurisdiction of Sub-division III, Sanguem, Division – VII, Curchorem in Sanguem Constituency.

6.1.12 The existing 11 KV Barazan feeder emanating from 33/11KV Xelpem substation feeds the power supply to the area of V. P. Uguem, Bhati and other areas and is in service for more than 40 years. This is the lengthiest feeder from 33/11KV Xelpem Substation which runs for a total distance of 45Kms. Presently, 30 Kms of this is converted into Aerial Bunched Cable system and the remaining 15Kms is an overhead bare conductor network.

6.1.13 The said 11 KV feeder passes mostly through dense forest, coconut plantation, water logged areas and hilly terrain resulting in frequent interruption of power supply due to snapping of conductor by falling of trees, branches or coconut leaves and it is difficult to restore the power supply in short time. Most of the portion of the said feeder is inaccessible by vehicle and has to be patrolled on foot which is time consuming, resulting in delay in restoration of supply. Since the line passes through forest area, there are restrictions on cutting the branches, due to which the interruptions are frequent and difficult to restore the line within a shorter time frame. A statement showing the duration of interruption and for the monsoon period from June to October for the year

2019-20 and 2020-21 are tabulated as under:

Year	Name of Feeder	Transient Fault			Breakdown			Shutdown			Total Nos. of Hours
		No.	Total Duration		No.	Total Duration		No.	Total Duration		
			Hrs	Mins		Hrs	Mins		Hrs	Mins	
2019-2020 (June to October)	11KV Barazan	209	04	34	82	118	21	135	40	23	163.18
2020-2021 (June to October)	11KV Barazan	217	8	59	48	61	24	81	38	59	108.42

6.1.14 In order to minimise the down time and to improve the reliability of power supply to the areas fed through this feeder, it is proposed to lay underground cabling system for ring feeding the overhead feeder so that during fault in the overhead line, power will be restored through ring feed system by sectionalizing the overhead feeder. The overhead feeder of 15 Kms length will be refurbished departmentally thereby the affected area is minimised.

A2: Estimate for the work of Design, Supply, Erection, Testing and Commissioning of new Outdoor Gas Insulated Hybrid Switchgears of 220KV Incomer line bays KP-I & TP-II at 220/110/33KV Ponda Sub-Station.

6.1.15 The 220 KV bus selector isolators, 2nos. of each for 220KV Ponda-Amona-II (KP-I) and Ponda-Amona – III (TP-II) line bays are in service for more than 30 years at Ponda Sub-Station. These isolators are in a dilapidated condition with burnt/ damaged contacts and blades, jammed drive mechanism gears, corroded pipes and structure materials, etc. There are no spares available for replacement of the contacts/ blades. In these isolators electrical operations are not possible and remote operation/ indications do not exist. Voltage selection is also not possible due to non-availability of auxiliary contacts in these isolators. The existing earthings of the isolators are in corroded, dilapidated state and unsafe for operating. As these isolators have completed more than 35 years of continuous operation and its service life, it is technically and commercially non-viable to carry out any further repairs.

6.1.16 The bay level equipments viz. current transformers and voltage transformers of these line bays are also in bad condition due to ageing. All these equipments have completed its service life. It is now mandatory to replace the EHV metering equipments with 0.2 class accuracy for healthy metering system.

6.1.17 The aforesaid proposal is prepared for replacement of age old, totally worn out busbar selection isolators and bay level EHV equipments (Current Transformers & Voltage Transformers) of 220KV Ponda-Amona-II (KP-I) and Ponda-Amona-III(TP-II) line bays with compact 245KV, 50Hz, Outdoor Gas Insulated Hybrid Switchgear. The proposed advance

switchgear module shall comprise of Double Bus Bar arrangement with one set of Current Transformer, three nos. of single phase CVT. One set circuit breakers & two sets of three pole combined disconnecting switch with High Speed Earthing switch. The Disconnectors and the Earthing switch are combined and operated by means of a common driving mechanism. The switchgear shall have health monitoring system duly compatible with IEC 61850 Ed. 2 communication protocol & IEC-104, to ensure adequate robustness in performing the functional and safety requirements of the 220KV incoming supply system.

6.1.18 These new hybrid switchgears are aimed to provide system stability, reliability, and ease of transfer of feeder / bus selections, minimize overall operation/ change over time & minimize maintenance cost.

A3: Work of conversion of existing 11 KV overhead network to underground network of areas coming under Cortalim and Nuvem Constituency under the jurisdiction of S/D-III, Div XIV, Verna.

6.1.19 The work is proposed for conversion of all the existing 11 KV overhead lines under the jurisdiction of Sub Division III, Division XIV Verna, namely 11KV Arrosim feeder, 11KV Utorda feeder emanating from 33/11 KV Majorda substation, 11 KV Cansaulim feeder emanating from Sancoale substation and 11 KV Nagoa feeder emanating from Verna substation. The existing 11 KV overhead lines of existing Cansaulim feeder, Arossim feeder, Utorda feeder and Nagoa feeder are more than 25 to 40 years old. There are lots of power interruptions on these 11 KV feeders due to impact of cyclonic sea wind as the lines are running parallel to the coastline. In monsoon, these interruptions are considerably more since coconut palms fall on the overhead lines.

6.1.20 Converting these existing overhead lines to underground cabling will improve power supply fed to the consumers under Cortalim and Verna constituency fed from these feeders namely Velsao-Pale-Issorcim, Cabsaulim, Cuelim, Arossaim, Cortalim Consau Vado and Nagoa-Pirni, Nuem, Majorda Calata Utorda under Nuem Constituency and make the overall 11 KV network stable and reliable. The quality of power supply to the consumers will improve as the number of power interruptions/outages will reduce drastically, most during monsoon season and cyclonic condition.

6.1.21 The work proposed in the is as follows:

Sr no	Name of 11 KV feeder	XLPE Cable (In KMS)		RMU with breaker for DTC's and HT connections (Nos)	RMU without breaker for junction (Nos)	Plinth & fencing for DTC's (Nos)
		300 SQ.mm.	95 SQ.mm.			
1	Cansaulim	21.58	0.414	23	2	22
2	Arossim	17.765	0.342	19	2	18

Sr no	Name of 11 KV feeder	XLPE Cable (In KMS)		RMU with breaker for DTC's and HT connections (Nos)	RMU without breaker for junction (Nos)	Plinth & fencing for DTC's (Nos)
		300 SQ.mm.	95 SQ.mm.			
3	Utorda	12.405	0.234	13	1	12
4	Nagoa	2.1	0.27	15	1	9
5	Sub station (spare)	0.015	0.18	10	4	0
Total		53.865	1.44	80	10	61

A4: Work of S.E.T & C of 1 no. of 50 MVA, 110 KV/33 KV Power Transformer at 110 KV/33 KV Verna Sub-station.

6.1.22 The 110/33/11KV Verna Sub-Station has 3 nos. 110/33KV power transformers i.e 40MVA (2 Nos.) and 50MVA (1 No.). The present load demand of the Verna Sub-Station is 130 MW. The 50 MVA power transformer supplies a load of 45MW, 40MVA-I supplies a load of 35 MW and 40MVA-II supplies a load of 35 MW. All the power transformers are more than 80-85% loaded. During peak summer seasons, the total load on the substation exceed the transformer capacity and the Sub-Station has to carry out load restrictions. Presently, about 150Amps on 33KV side load restrictions are carried out. Further, there is no redundancy in case of shutdown of any one of the transformer for carrying out any maintenance / repairs works.

6.1.23 The 33KV incoming Ponda – Verna-I and 33KV Ponda – Verna-II feeders with a capacity of 30MW power can supply only 12MW due to restriction of transformer capacity at Ponda.

6.1.24 The load restrictions cause interruption of power to major industries in Verna Industrial Estate causing valuable revenue loss to the Department. Hence, in order to avoid load restrictions and forecasting future load increase a new 50MVA power transformer is proposed.

A5: Estimate for re-conductoring of existing overhead ACSR Raccoon Conductor to HTLS conductor of 33kV double circuit line from 110/33kV Kadamba Substation to 33/11kV Bambolim Substation.

6.1.25 The estimate has been prepared for the work related to re-conductoring of 33 KV double circuit line from 110/33 KV Kadamba-S/S to 33/11KV Bambolim- S/S and Revamping of 33/11KV Bambolim-substation.

6.1.26 The 33/11 KV substation at Bambolim is catering load to some of the vital installations like Goa Medical College, Goa University, All India Radio and further the same line is linked with 33/11KV Nagali Substation to provide Ring feed supplying power to Raj

Bhavan and NIO. The area around Bambolim Substation is fast developing and four numbers of important Health Care related projects are fast upcoming. This includes Super Speciality Hospital with a load of 4MW, IPHB with a load of 1MW, Garrisons Hospital (Military) with a load of 1.2MW and Dental College with a load of 2MW, totalling about more than 8MW. In addition, there are multiple housing project being developed which will add to the load growth in the area.

6.1.27 The existing 33 KV existing line from 110/33kV Kadamba Substation to Bambolim Substation is with ACSR Racoon conductor and was erected about 30 years back. Over a period of time the line has become brittle due to ageing and experiencing frequent breakdowns. Considering the criticality of the load supplied by the line, the frequent breakdown is a cause of concern and hence it is proposed to re-conductor the existing line with HTLS ACCC Conductor for a distance of about 5 Kms.

6.1.28 The HTLS ACCC conductor consisting of total cross-sectional area 176.11 sq.mm, having a composite core of 5.97mm and conductor diameter of 15.65mm has a very high current carrying capacity up to 710 Amps at Maximum operating temperature of 175°C which is far more superior as compared to existing ACSR RACOON Conductor.

6.1.29 The Benefits of the projects include:

- Better Power Supply Reliability as the existing Raccoon conductor is in service for more than 30 years and is prone to faults. The feeder supplies critical loads such as Goa Medical College & Hospital, Goa University, All India Radio, Dental College and Hospital and also service as link feeder to supply loads of the Governor's palace and NIO.
- Higher Current Carrying Capacity with existing infrastructure to cater the existing load and the future proposed load in the area. The proposed load includes the Super Specialty Hospital with a load of 4MW, IPHB with a load of 1MW, Garrisons Hospital (Military) with a load of 1.2MW and Dental College with a load of 2MW, totaling about more than 8 MW.
- The payback period for the project is 1 year.

6.1.30 The work involves the following:

- HTLS conductor for a distance of around 4.5 Kms
- S.E.T.C of Incoming Line GOAB Switches, C.T, P.T, V.C.B - 2 Sets

A6: Estimate for the work of Conversion of existing 11KV overhead network to underground cabling network of 11KV Bhati Feeder emanating from 1 x 3.15MVA, 33/11KV Waddem

Sub-Station under the jurisdiction of Sub-division III, Sanguem, Division – VII, Curchorem in Sanguem Constituency.

6.1.31 The existing 11KV O/H Bhati feeder emanating from 33/11KV Waddem Substation feeds the power supply to the area of V. P. Waddem and is in service for more than 40 years. Presently 7 Kms of this line is converted into Aerial Bunched Cable system and the remaining 5Kms is an overhead network. The said 11KV feeder passes mostly through forest area and coconut plantation and water logged areas, resulting in frequent interruption of supply by snapping of conductor due to falling of trees, branches or coconut leaves. Most of the portion of the said feeder is inaccessible by vehicle and has to be patrolled on foot, resulting in delay in restoration of supply. Since the of line passes through forest area, there are restrictions on cutting the branches, due to which interruption are frequent and difficult to restore the faulty line within a shorter time frame.

6.1.32 A statement showing the duration of interruption and for the monsoon period from June to October for the year 2019-20 and 2020-21 are tabulated as under.

Year	Name of Feeder	Transient Fault			Breakdown			Shutdown			
		No.	Total Duration		No.	Total Duration		No.	Total Duration		Total Nos. of Hours
			Hrs	Mins		Hrs	Mins		Hrs	Mins	
2019-2020 (June to October)	11KV Bhati	89	5	30	10	7	06	21	8	36	21.12
2020-2021 (June to October)	11KV Bhati	25	1	50	6	5	50	13	3	54	10.54

6.1.33 In order to minimise the down time and to improve the reliability of power supply to the areas fed through this feeder, it is proposed to lay underground cabling system for ring feeding the overhead feeder so that during fault in the overhead line, power will be restored through ring feed system by sectionalizing the overhead feeder.

A7: Estimate for the work of Conversion of existing 11KV overhead network to underground cabling network of 11KV Sanguem Feeder emanating from 1 x 6.3MVA, 33/11KV Xelpem Sub-Station under the jurisdiction of Sub-division III, Division – VII, Curchorem in Sanguem Constituency.

6.1.34 The conversion of overhead line to underground system from Dando to Miracles School was already sanctioned and completed (3Kms) earlier. The existing 11KV Sanguem feeder emanates from 33/11KV Xelpem substation and is in service for more than 40 years. The said feeder feeds power supply to Sanguem Town area and V. P. Uguem. The line

structural materials of this feeder are in a corroded condition and deteriorates day by day which needs urgent replacement.

6.1.35 The said 11KV feeder passes mostly through forest areas, coconut plantation & water logged areas, resulting in frequent interruption of supply by snapping of conductor due to falling of trees, branches or coconut leaves and it is difficult to restore the supply, which inturn cause interruptions to the domestic consumers residing in V.P Ugem & Sanguem Municipal areas.

6.1.36 A statement showing the duration of interruption and for the monsoon period from June to October for the year 2019-20 and 2020-21 are tabulated as under.

Year	Name of Feeder	Transient Fault			Breakdown			Shutdown			Total Nos. of Hours
		No.	Total Duration		No.	Total Duration		No.	Total Duration		
			Hrs	Mins		Hrs	Mins		Hrs	Mins	
2019-2020 (June to October)	11KV Sanguem	135	3	45	37	42	37	105	28	08	74.30
2020-2021 (June to October)	11KV Sanguem	135	3	02	26	35	41	83	27	18	66.01

6.1.37 In order to minimise the down time and to improve the reliability of power supply to the areas fed through this feeder, it is proposed to lay underground cabling system for ring feeding the overhead feeder so that during fault in the overhead line, power will be restored through ring feed system by sectionalizing the overhead feeder.

6.1.38 The total invested cost can be recovered within a period of 6-7 years.

A8: Estimate for the work of Conversion of existing 11KV overhead network to underground cabling network of 11KV Ponsamol Feeder emanating from 1 x 6.3MVA, Xelpem Sub-Station under the jurisdiction of Sub-division III, Sanguem, Division – VII, Curchorem in Sanguem Constituency.

6.1.39 The existing overhead 11KV Ponsamol feeder emanating from Xelpem 33/11 KV Sub-Station feeds power supply to the area of V.P Kalay and is in service for more than 40 years. This is the lengthiest feeder from 33/11KV Xelpem Substation which runs total distance of 37Kms. Presently, 30Kms of this is converted into Aerial Bunched Cable system and the remaining 7Kms is an overhead network.

6.1.40 The said 11KV feeder passes mostly through forest area and coconut plantation & water logged areas, resulting in frequent interruption of supply by snapping of conductor due

to falling of trees, branches or coconut leaves and it is difficult to restore the supply. Most of the portion of the said feeder is inaccessible by vehicle and has to be patrolled on foot which is time consuming, resulting in delay in restoration of supply. Since the line passes through forest area, there are restrictions on cutting the branches, due to which the interruptions are frequent and difficult to restore the line within a short time frame.

6.1.41 A statement showing the duration of interruption and for the monsoon period from June to October for the year 2019-20 and 2020-21 are tabulated as under.

Year	Name of Feeder	Transient Fault			Breakdown			Shutdown			Total Nos. of Hours
		No.	Total Duration		No.	Total Duration		No.	Total Duration		
			Hrs	Mins		Hrs	Mins		Hrs	Mins	
2019-2020 (June to October)	11KV Ponsamol	238	6	28	73	61	26	136	26	00	93.54
2020-2021 (June to October)	11KV Ponsamol	122	4	28	37	36	25	116	14	14	55.08

6.1.42 In order to resolve the issue & to improve the reliability of power supply to the areas fed through this feeder, it is proposed to lay underground cabling system for ring feeding the overhead feeder so that during fault in the overhead lines, power will be restored through ring feed system by sectionalizing the overhead feeder.

A9: Estimate for the work of Supply, Erection, Testing and Commissioning of 11KV, 3 Core, XLPE armoured cable of size 300sqmm for Conversion of existing overhead 11KV Mandrem feeder emanating from 33/11KV Tuem Substation to underground system under the jurisdiction of Sub-division III, Agarwada, Pernem, Division – XVII, Mapusa in Mandrem Constituency.

6.1.43 The existing 11KV overhead Mandrem feeder emanating from 33/11 KV Tuem Sub-Station is in service for more than 25 years and the line passes through the area covered with dense jungle trees, coconut plantations and water logged/ marshy areas. The structural materials, most of the poles, stay sets, cross arm and clamps etc. are in deteriorated condition and due to ageing, the conductor snaps frequently. At present Mandrem feeder feed power supply to the part of V. P. Korgao, V. P. Mandrem and part of V. P. Arambol. These areas are rapidly growing commercially due to Tourism and Urbanization. Therefore, to supply uninterrupted power supply with more reliability and better voltage regulation, the work of underground cabling is proposed which will cater the future demand.

6.1.44 The consumers from these areas face problems due to poor quality of supply such as

frequent fluctuations, low voltage, sudden interruptions etc., which damages their household appliances. With the underground system the voltage fluctuations will be eliminated, interruptions will be drastically reduced and voltage profile will be improved.

6.1.45 A statement showing the duration of interruption and for the monsoon period from June to October for the year 2019-20 and 2020-21 are tabulated as under.

Year	Name of Feeder	Transient Fault			Breakdown			Shutdown			Total Nos. of Hours
		No.	Total Duration		No.	Total Duration		No.	Total Duration		
			Hrs	Mins		Hrs	Mins		Hrs	Mins	
2019-20	Mandrem feeder	234	6	15	273	76	36	11	46	45	129:36
2020-21	Mandrem feeder & Ashvem cable feeder	268	8	55	146	155	23	47	169	1	333:19

6.1.46 With proposed conversion of the 11 KV Mandrem feeders in part of V.P. Corgao, V. P. Mandrem & part of V.P. Arambol areas from overhead to underground cabling, the line losses will be reduced considerably as the resistance of the overhead conductor (ACSR Weasel / Raccoon) is much higher than the cable (300sq.mm). Thus, the I2 R losses will be reduced which will in turn reduce technical losses. Presently the overhead losses for the Siolim area is about 10% approximately in different feeders. With the proposed conversion it will be brought down well below 5%. Thus there will be additional revenue generation.

6.1.47 Intermittent 3-way load break switches (DEOS-oil type) are also proposed for accommodating the existing tapping which shall contribute to minimizing damage and repair to infrastructure such as roads etc. The said underground cabling is proposed along the road side and hume pipes will be provided at road crossing. The work is designed in such a way that the tail ends of the feeders are linked to some other feeder, thereby ensuring ring feeding of power supply even during cable fault.

SCOPE OF WORK:

1) SLTC of 3 core, 300 sq.mm aluminium, XLPE insulated armoured, 11KV (earthed neutral) Cable in trench. ……..…58850 Meters.
2) SLTC of 3 core, 95 sq.mm aluminium, XLPE insulated armoured cable……..…..1020 Meters.
3) SETC of 11KV Ring Main Unit oil cooled type suitable for usage of 11KV 50 Hz 350 MVA effectively earthed system Type – FRMU……..68 Nos.
4) SETC of 11KV Ring Main Unit oil type two way on load system switch Type - DEOS…….....……08 Nos.

A10: Estimate for the work of Supply, Erection, Testing and Commissioning of 11KV, 3 Core, XLPE armoured cable of size 300sqmm for Conversion of existing overhead 11KV Sodiem feeder emanating from 33/11KV Mapusa Substation to underground system under the jurisdiction of Sub-division III, Agarwada, Pernem, Division – XVII, Mapusa in Siolim Constituency.

6.1.48 The existing overhead 11KV Sodiem feeder emanating from 33/11KV Mapusa Substation is proposed for conversion to Underground system. The said feeder supplies power in areas of V.P. Sodiem –Siolim, V. P. Oxel Siolim & part of V.P. Marna Siolim where ACSR conductor is very old and is due for replacement. The consumers of Siolim area consists of Village Panchayat Siolim Marna, Village Panchayat Sodiem and Village Panchayat Oxel are fed through 11 KV Siolim feeder and 11 KV Sodiem Feeder emanating from the 33/11KV Mapusa Sub Station. Both these 11 KV feeders run parallel up to Mapusa Housing Board road near Hill slap at Marna Siolim and thereafter the 11 KV Siolim feeder runs along the road and feeds power supply to major areas of Village Panchayat Siolim Marna.

6.1.49 The 11 KV Sodiem feeder passes through the water logged field area and feeds power supply to village Panchayat Sodiem Siolim, Village Panchayat Siolim Oxel and few wards of Village Panchayat Marna., Khairat Ward of V.P. Camurlim. The field area is water logged throughout the year and the line staff faces major problem in maintaining the 11 KV line. In case of major fault at night, it is highly dangerous to enter the field areas due to the fear of crocodile and snakes in the field. It is also learnt from the locals that due to the presence of these dangerous animals the people have stopped cultivating their fields.

6.1.50 A statement showing the duration of interruption and for the monsoon period from June to October for the year 2019-20 and 2020-21 are tabulated as under.

Year	Name of Feeder	Transient Fault			Breakdown			Shutdown			Total Nos. of Hours
		No.	Total Duration		No.	Total Duration		No.	Total Duration		
			Hrs	Mins		Hrs	Mins		Hrs	Mins	
2019-20	Sodiem feeder	504	16	30	587	121	56	4	7	50	146:16
2020-21	Sodiem feeder	132	11	2	81	80	12	14	68	2	159:16

6.1.51 With proposed conversion of the 11KV Sodiem feeders in V.P. Sodiem –Siolim, V. P. Oxel

Siolim & part of V.P. Marna Siolim areas from overhead to underground cabling, the line losses will be reduced considerably as the resistance of the overhead conductor (ACSR Weasel / Raccoon) is much higher than the cable (300sq.mm). Thus, the I2 R losses will be reduced which will in turn reduce the technical losses. Presently the overhead losses for the Siolim area is about 10% approximately in different feeders. With the proposed conversion it will be brought well below 5%. Thus, there will be additional revenue generation making the investment financially viable.

6.1.52 The consumers from these areas face problems due to poor quality of power supply such as frequent fluctuations, low voltage, sudden interruptions etc., which damages their household appliances. With the underground system the voltage fluctuations will be eliminated, interruptions will be drastically reduced and voltage profile will be improved.

SCOPE OF WORK:

1) SLTC of 3 core, 300 sq.mm aluminium, XLPE insulated armoured, 11KV (earthed neutral) Cable in trench. ……25366 Meters.
2) SLTC of 3 core, 95 sq.mm aluminium, XLPE insulated armoured cable……814 Meters.
3) SETC of 11KV Ring Main Unit oil cooled type suitable for usage of 11KV 50 Hz 350 MVA effectively earthed system Type – FRMU……..35 Nos.
4) SETC of 11KV Ring Main Unit oil type two way on load system switch Type - DEOS……11 Nos.

A 11: Estimate for the work of Improvement of 11KV HT network of Undir and Durbhat feeder in the village Wadi Talaulim, Durbhat, Bandora, part of Curti and part of Borim inhabited by the Scheduled Tribes population under Tribal Sub Plan by converting 11KV HT overhead lines to Underground cable under the jurisdiction of Sub Division -I, Division X, Ponda.

6.1.53 The 11 KV Undir Feeder emanating from 33/11 KV Madkai S/S and 11 KV Durbhat Feeder emanating from 33/11 KV Curti-Ponda substation feed power supply to these villages inhabited by the Scheduled Tribes population. Conversion of the above 11KV overhead feeders to underground network will facilitate uninterrupted quality power supply to the areas predominantly inhabited by ST population.

6.1.54 The existing 11 KV HT lines of these feeders, feeding to these areas are more than 40 years & passes through Coconut plantations, dense jungle, hilly terrain, fields, and thickly populated areas and needs to be renovated immediately. The existing poles & other line material of these HT lines are damaged due to ageing and is under deteriorated and dilapidated condition due to aging and salinity. The Aluminium Conductor of these HT lines are worn out, weakened due to oxidation and aging & having many joints and often

snaps on transient faults attributing prolonged power interruptions and danger to the public. It takes long time to restore the snapped conductor as these lines pass through fields & forest areas & is difficult to patrol these lines & to attend the line during faults at night time and in rainy season. Last year there were many interruptions on these feeders due to Conductor snapping, natural calamities, falling of tree branches and coconut leaf. The proposed underground cabling system will minimize these type of interruptions and will help in maintaining better voltage profile & better service to the tribal areas.

6.1.55 The overhead lines being more than 40 years old and in a dilapidated condition is no more suitable to cater the rapid growing load demand. Renovating the existing overhead network neither be a useful arrangement nor achieve any long-lasting benefit with upgradation of the overhead line network on old infrastructure with limited line capacity. The growing power demand would conveniently be catered with underground cable network having rated capacity double the overhead lines and very safe to the line staff who can attend the fault at ground level efficiently for restoring the power supply in case of breakdowns.

6.1.56 The load growth of these villages is estimated 10% annually with the major land developments for residential and commercial establishment being taken up. The underground system having higher capacity & reliability advantage would be able to cater the existing and growing load demand of future 25 years easily with quality power supply to the consumers which will ensure enhanced revenue to the department.

6.1.57 To overcome all the difficulties, this estimate has been framed which will bring benefit to the ST populated areas by providing uninterrupted power supply. The interruption will be minimal and there will be reduction in line loss.

Scope of work involves the following:

1) Conversion of 11KV overhead HT line of Undir feeder to UG cable – 15 Kms
2) Conversion of 11KV overhead HT line of Durbhat feeder to UG cable – 15 Kms
3) Supply, Erection and testing of 11 KV, Ring Main Unit – 45 Nos

A12: Estimate for the work of conversion of 11KV HT electrical network of Khadpabandh, Ponda - I, Bazar and part of Durbhat, Farmagudi & Curti feeders by converting 11KV HT overhead lines to underground cable, under the jurisdiction of Sub Division-I, Division X, Curti Ponda.

6.1.58 The existing 11KV Khadpabandh, Ponda - I, Bazar and part of Durbhat, Farmagudi & Curti feeders, feeding to Ponda Town are more than 40 years & pass through coconut

plantations, dense jungle, hilly terrain, fields, and thickly populated areas and needs to be renovated. The existing poles & other line materials of these HT lines are damaged due to ageing and is under deteriorated and dilapidated condition due to ageing. The Aluminium Conductor of these HT lines are worn out, weakened due to oxidation & having many joints and often snaps on transient faults attributing prolonged power interruptions and danger to the public. It takes long time to restore the snapped conductor as these lines passes through fields & forest areas and it becomes difficult to patrol the line, during faults at night time and also in rainy season. Last year there were many interruptions on these feeders due to conductor snapping, natural calamities, falling of tree branches and coconut palms. The proposed underground cabling system will minimize these type of interruptions and will help in maintaining better voltage level to the Ponda City and surrounding areas.

6.1.59 Some sections of these O/H feeders pass through hilly terrain where there is no vehicle approach. It is proposed to bring the above section of line along the road by underground cable system.

6.1.60 The overhead lines being more than 40 years old and in a dilapidated condition is no more suitable to cater the rapid growing load demand of approximately 400KW per month. Renovating the existing overhead network will neither be a useful arrangement nor achieve any long-lasting benefit with upgradation of the overhead line network on old infrastructure with limited line capacity. The growing power demand would conveniently be catered with underground cable network having rated capacity double the overhead lines and very safe to the line staff, who can attend the fault at ground level efficiently for restoring the power supply in case of breakdowns.

6.1.61 The load growth of Ponda Town/City is approximately 400KW per month with the major land developments for residential and commercial establishment coming up. The underground system having higher capacity & reliability advantage would be able to cater the existing and growing load demand of future 25 years easily with quality power supply to the consumers which will ensure enhanced revenue to the Department. Ponda is centrally located city of vital importance for tourism point of view, and is a Temple city of Goa having famous temples, thousands of tourist visiting daily. Also there are various prestigious educational institutions, Military Headquarters, Prime Agriculture markets, Government offices and rapidly developing city requiring 24 x 7 quality of power supply.

6.1.62 Underground system will also give relief to the people of Ponda by reducing interruptions caused due to tree falling, bird hits and other overhead faults. The above proposal will also reduce the number of staff required for maintenance there by diverting to other needy areas.

Scope of work involves the following:

- Conversion of 11KV overhead HT line of Khadpabandh feeder to UG cable along with part of 11 KV Durbhat and 11 KV Farmagudi feeder – 16.2 Kms.
- Conversion of 11KV overhead HT line of Ponda – I feeder to UG cable along with part of 11 KV Bazar, 11 KV Farmagudi, 11KV Curti, 11 KV Durbhat, 11 KV Khadpabandh feeder – 10.4 Kms.
- Conversion of 11KV overhead HT line of Bazar feeder to UG cable along with part of 11 KV Shantinagar feeder – 9.5 Kms.
- Supply, Erection, Testing and commissioning of plinth mounted 200 KVA distribution transformers – 6 Nos.
- Supply and erection of 11KV, 630 Amps, Outdoor, SF6 Ring Main Unit – 207 Nos.

B) PROJECTS WITH EXPENDITURE FINANCE COMMITTEE APPROVAL

The new projects, which have already received the administrative approval from the Government and the approvals from the expenditure committee approval has also been received, have been covered under this classification:

Table 6-3: New Projects with Administrative & Finance Committee Approval (Rs.Crore)

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
Projects Approved by EFC				
1	Conversion of existing O/H 11KV HT network to underground (U/G) cabling for Vasco Town under the Jurisdiction of Sub Division-I(U), Vasco,	37.64	9.41	-
2	Work of conversion of O/H HT network to underground HT network of 33KV Xeldem - Xelpem feeder in order to provide uninterrupted m power supply to Salaulim water works and Domestic consumers of Bhati, Uguem, Kalay V.P. areas and Sanguem Municipal areas in Sanguem Constituency.	29.71	7.43	-
3	Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-1 and Nessai-11 feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station.	23.07	5.77	-
4	Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-111 and Nessai-IV feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station.	22.92	5.73	-
5	Work of supply, erection, testing and commissioning of 33/11kV, 2x 10 MVA, Indoor type Sub-Station (Electrical and Civil Works) at Mandrem under Sub Division-III Agarwada, Div XVII Mapusa.	36.62	9.16	-
6	Conversion of existing O/H 11 kV Balli feeder into undergound cabling system emerging from 33/11 kV Cuncolim Substationunder the jurisdiction of Elect. O&M Sub. Div-IV, Div-XVI, Cuncolim.	44.49	11.12	-
7	Work of conversion of O/H HT network to undergorund HT network in Chinchinium, Dharmapur & Sarzora area of Velim Contituency under the jurisdiction of Subdivision-II Chinchinim, Division-XVI Margao, in South Goa District.	26.73	6.68	-
8	Worth of Design, Supply, Erection & Commissiong of 33 kV, 2x3 Core, 400 Sq.mm XLPE Cable from Cable from Ponda Sub-Station to Banastarim for a distance of 18.5 kms and	20.12	5.03	-

S.No	Name of scheme	CAPEX BUSINESS PLAN FY 2022-23 TO FY 2024-25 Capital expenditure		
		FY 2022-23 Projected	FY 2023-24 Projected	FY 2024-25 Projected
	1x3 Core 185 Sq.mm XLPE Cable for a distance of 1.95 kms for providing reliable supply to kundaim, Marcel area and Industries of Kundaim Industrial Estate.			
9	Work of conversion of Existing 11 KV (HT) overhead lines to underground cabling network for 11 KV Mandop feeder, 11 KV MES feeder, 11 KV Navelim feeder, emanating from 33/11 KRC Substation and provision for additional 11 KV Navelim Express feeder under Subdivision III, Navelim, Division IV, Margao Goa under Infrastructure Development Fund.	52.26	13.07	-
10	Work of upgrading of 220 KV PXR line by replacement of existing ACSR Drake Conductor with HTLS ACCC DRAKE Conductor from Ponda 220KV Ponda Sub-Station to 220KV Xeldem Sub-Station and replacement of polymer suspension insulator of 220KV AP-II Circuit from Ponda S/S to Kardi point.	38.74	9.69	-
11	Work of conversion of the existing overhead 11 KV line of Bicholim City, Assonora, Bordem and Bicholim IDC feeder emanating from 33/11 kV Bicholim Sub-station to underground cable system in the jurisdiction of Sub Division-I(U), Bicholim-Goa.	23.22	5.80	-
12	Work of conversion of existing LT O/H line of 11KV Kakoda Feeder & 11 KV Town-II feeder into underground cabling system in Curchorem Constituency.	31.82	7.95	-
13	Work of conversion of existing 33KV SC overhead Virdi II feeder to Double Circuit line with HTLS Conductor from 220 KV Amona Sub Station, under Sub Division – I(U), Bicholim.	27.38	6.85	-
	Total	**414.72**	**103.68**	**-**

B1: Conversion of existing O/H 11KV HT network to underground (U/G) cabling for Vasco Town under the Jurisdiction of Sub Division-I(U), Vasco. (Estimated amount: ₹ 4705.5 lakhs).

6.1.63 The existing 11KV O/H lines feeding Vasco Town, emanating from two existing 33/11KV substations at Kadamba & Harbour having a loading capacity of 3 x 6.3 MVA and 2 x 6.3 MVA respectively, are more than 40 years old, aged due to corrosion and deterioration and hence, unsuitable to support future load growth in a fast developing town. A total of 7 feeders supply power to the entire town. The last monsoon period recorded interruptions to the extent of more than 450, with major interruptions reported being snapping of conductors during peak hours.

6.1.64 The proposed U/G system is designed ensuring provision for flexibility to supply power to healthy sections of other feeders in the event of failure of any linked feeder through the ring main configuration of the U/G cable network, thus increasing reliability and quality of power. Additional benefits like considerable reduction in distribution losses, higher loading capacity in comparison to Overhead (O/H) lines, in turn, provision to cater future load demands.

6.1.65 The load growth in the area is around 5-6 % per annum. The average revenue generated per year is Rs. 6 Crores approximately, which will reflect a payback period, approximately within 7 years.

Benefits arising after Execution:

6.1.66 U/G cables are not susceptible to corrosion & natural calamities and hence the U/G system will ensure stable, reliable, and ensure quality power supply to the consumers. Additionally, it will support the growing power demands.

B2: Work of conversion of O/H HT network to underground HT network of 33KV Xeldem - Xelpem feeder in order to provide uninterrupted power supply to Salaulim water works and Domestic consumers of Bhati, Uguem, Kalay V.P. areas and Sanguem Municipal areas in Sanguem Constituency. (Estimated amount: ₹ 3713.22 lakhs)

6.1.67 The proposed conversion of the 33KV overhead (O/H) line to underground (U/G) network would benefit the Salaulim Water works including consumers befalling in areas under the jurisdiction of Village Panchayats of Bhati, Uguem, Kalay and Sanguem Municipal areas in Sanguem Constituency. The existing 33KV O/H lines are more than 50 years old and aged due to corrosion and deterioration. Besides this, the line passes through thick vegetation and water logged areas and exposed to saline atmosphere. It is reported that a total of 43 major interruptions were recorded during the 5 months monsoon period last year. The lines being lengthy are vulnerable to tree/ branch falling during heavy winds. Back feeding or ring feed system for providing alternate power supply arrangements in the event of line fault is not possible on O/H system and hence, no flexibility. The feeder being lengthy affects larger group of consumers in the event of shutdown / faults ensuing more time for clearance of faults and restoring power supply to affected consumers.

6.1.68 The total load on proposed 33 KV underground Xeldem – Xelpem feeder is 3A. The average load growth is 165 KVA per year. Average revenue generated per year is Rs.69 Crores approximately. The payback period would be approximately 1 year.

6.1.69 The proposed U/G system is designed ensuring provision for flexibility to supply power to healthy sections of other feeders in the event of failure of any linked feeder through the ring main configuration of the U/G cable network, thus increasing reliability and

quality of power. Additional benefits like considerable reduction in transmission and distribution losses, higher loading capacity in comparison to Overhead (O/H) lines, in turn, provision to cater future load demands, U/G cables being underground are not susceptible to corrosion & natural calamities.

B3: Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-I and Nessai-II feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station. (Estimated amount: ₹ 2883.66 lakhs).

6.1.70 The existing 33KV overhead lines (O/H) are more than 40 years old and aged due to corrosion and deterioration. The lines cannot be loaded to its full capacity due to degradation over the years of service. In the recent past, interruption in power supply is frequent with faults mainly jumper opening at cut points and snapping of conductors especially in the event when loading on the feeder is increased beyond 60% of its rated capacity thereby interrupting supply to substations connected to it downstream. The supporting line materials are also in corroded and worn out state due to ageing.

6.1.71 The existing conductor strung on the two circuits NESSAI I & II is ACSR RACOON which due to its deteriorated state can be loaded safely upto 60% of its full rated loading capacity. The Department proposes to replace the existing conductor with HTLS conductor having higher loading capacity of 450 amps. This enhanced loading capacity installed on the feeders would support future load demands in addition to the existing load demand ensuring stable, reliable and quality power supply to the areas fed for a projected period of 7-8 years. Besides that, additional benefits like considerable reduction in transmission and distribution losses, permanent lifting of load shedding, improvement in voltage profile, safe guard to equipment and increase in revenue collection. The Payback period would be 5-6 years. The consumers of Cuncolim, Velim, Navelim, Margao, Fatorda and Benaulim Constituencies shall benefit.

B4: Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-III and Nessai-IV feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station. (Estimated amount: ₹ 2865.07 lakhs).

6.1.72 The existing 33KV overhead lines (O/H) are more than 40 years old and aged due to corrosion and deterioration. The lines cannot be loaded to its full capacity due to degradation over the years of service. In the recent past, interruption in power supply is frequent with faults mainly jumper opening at cut points and snapping of conductors especially in the event when loading on the feeder is increased beyond 60% of its rated capacity thereby interrupting supply to substations connected to it downstream. The supporting line materials are also in corroded and worn-out state due to ageing.

6.1.73 The existing conductor strung on the two circuits NESSAI III & IV is ACSR RACOON which

due to its deteriorated state can be loaded safely up to 60% of its full rated loading capacity. The Department proposes to replace the existing conductor with HTLS conductor having higher loading capacity of 450 amps. This enhanced loading capacity installed on the feeders would support future load demands in addition to the existing load demand ensuring stable, reliable and quality power supply to the areas fed for a projected period of 7-8 years. Besides that, additional benefits like considerable reduction in transmission and distribution losses, permanent lifting of load shedding, improvement in voltage profile, safe guard to equipment for continuous interruptions and increase in revenue collection. The Payback period would be 5-6 years. The consumers of Cuncoilm, Velim, Navelim, Margao, Fatorda and Benaulim Constituencies shall benefit from this proposal.

B5: Work of supply, erection, testing and commissioning of 33/11kV , 2 x 10 MVA, Indoor type Sub-Station (Electrical and Civil Works) at Mandrem under Sub Division-III Agarwada, Div XVII Mapusa. (Estimated amount ₹ 4577.56 lakhs).

6.1.74 The land developments in Mandrem Constituency especially in Village Panchayat areas of Mandrem, Morjim, Arambol, Keri, Palye, Agarwada, Chopdem are growing at rapid pace. Commercial Establishments are mushrooming in these areas since tourism being the main focus in this coastal belt area followed by urbanization leading to Residential and Commercial hubs for Multi Dwellings, Housing complexes. Consequently, the upward trend in load demand is increasing at a rapid rate. With the upcoming Mopa Airport nearing completion and being in this vicinity, further rise in land developments are expected during the short span. The present arrangement of power supply network to Village Panchayat areas of Mandrem, Morjim , Arambol, Keri, Palye, Parsem, Tuem, Tuem I.D.C., Agarwada, Chopdem is catered from the 33/11KV Tuem Substation which in turn, is fed from 33KV feeders of Pernem I & II (double circuit line) emanating from Tivim Substation, and are more than 25 years in service and the only source of supply to Tuem Substation. In the present set up, in the event of any fault on these 33KV Pernem I & II circuit, the entire Pernem Taluka is affected. Therefore, it is imperative that a provision for a reliable power supply to these areas be proposed. The proposed 33/11KV, 2 x 10 MVA Mandrem Substation will cater sufficiently to the existing as well as cater to future load demand in the area.

6.1.75 The proposed 33 KV, 400 Sq.mm. cable for 33/11 kV, 2 x 10 MVA Mandrem Substation is proposed from the proposed ESDM Cluster Sub Station at Tuem via existing 33/11 KV Tuem Substation which will assist for ring-feed arrangements to existing Tuem Substation and Pernem Substation. This will have a provision to provide alternate supply to Tuem Substation, improving reliability of power supply to both Tuem and the proposed Mandrem Substation.

6.1.76 The Mandrem Substation will be provided with 5 Nos of 11 KV feeders arrangement directed towards the coastal belt which will considerably reduce radial length of feeders and thereby reducing transmission and distribution losses with an improvement in voltage profile. The payback period would be 24 months. The Mandrem Substation shall ensure reliable, stable and quality power supply to the entire area. The revenue collections will also substantially increase.

B6: Conversion of existing O/H 11KV Balli feeder into underground cabling system emerging from 33/11KV Cuncolim Substation under the jurisdiction of Elect. O&M Sub. Div – IV, Div – XVI, Cuncolim. (Estimated amount: ₹ 5560.96 lakhs).

6.1.77 The existing 11KV O/H Balli line network is more than 40 years old and aged due to corrosion and deterioration. The lines pass through thick vegetation and water logged areas. A total of 122 interruptions were recorded during the monsoon period last year. The existing line network is lengthy, extending up to 105 Kms in length in hilly terrain and vulnerable to tree / branch falling during heavy winds. Besides, in this existing network setup, there is no provision to arrange alternate supply for healthy sections. Being a lengthy feeder, outage time is therefore prolonged in the event of line faults, affecting larger number of consumers. In addition, the upcoming residential projects at Balli and Fatorpa, are kept on hold due to poor voltage regulation and the inability of the aged overhead lines to support future growing power demands in the area.

6.1.78 The hurdles and frequency of power interruption in the areas concerned was brought to the notice of the Department in the Gram Sabha meetings held by the Panchayats. The Department decided to take up this work on priority. The areas of Village Panchayats Balli, Fatorpa, Morpilla and Padi-Barcem in Quepem Constituency would benefit from these arrangements resulting in improvement in power supply quality and reliability.

6.1.79 The average load growth on 11KV Balli feeder is 200 KVA per year. The total load of 140 A shall be diverted on the proposed underground (U/G) Balli feeder. The average revenue generated per year is Rs. 5.93 Crores approximately which will reflect a payback period, approximately within 10 years.

6.1.80 Also, the proposed U/G system is so arranged that it will be able to feed part load on Betul feeder at Betul and that of Cuncolim feeder at Cumbeabhat and vice versa in the event of failure of any of these feeders The ring main configuration of the U/G network will provide flexibility to transfer the load from one feeder to another. Transmission and Distribution losses are considerably reduced with the use of U/G cable system. Major parts of Quepem Constituency will be benefited from this arrangement.

6.1.81 Besides, U/G cable networks have higher loading capacity as compared to Overhead (O/H) lines and will be able to cater future load demands. The U/G cable networks are

not susceptible to corrosion or natural calamities. The U/G system will therefore, ensure stable, reliable, and quality power to the consumers in the areas covered.

B7: Work of conversion of O/H HT network to underground HT network in Chinchinim, Dharmapur & Sarzora area of Velim Constituency under the jurisdiction of Subdivision-II Chinchinim, Division-XVI Margao, in South Goa District. (Estimated amount: ₹ 3341.53 lakhs).

6.1.82 The proposed conversion would benefit areas under the jurisdiction of Village Panchayats of Chinchinim, Dharmapur and Sarzora. The existing 33KV O/H lines are more than 40 years old and aged due to corrosion and deterioration. Besides this, the lines passes through thick vegetation and water logged areas and exposed to saline atmosphere. It is reported that a total of 166 major interruptions were recorded during the 5 months monsoon period last year. The lines are also lengthy and therefore, vulnerable to tree/ branch falling during heavy winds. Presently, with no provision for any back feeding or ring feed system, alternate power supply arrangements in the event of line fault is not possible, The entire feeder has to be kept under shutdown until clearance of the fault and restoration of the power supply, affecting all connected consumers in the area.

6.1.83 The total load on proposed 11 KV underground Chinchinim feeder is 140A. The average load growth is 170 KVA per year. Average revenue generated per year is Rs.5.93 Crores approximately. The payback period would be approximately 8 years.

6.1.84 The present overhead lines being aged and more than 40 years in service are not suitable to cater the growing power demands in the area. Underground cables will support additional capacity as compared to Overhead lines. They are also not susceptible to rust or other natural calamities as they are not exposed. The underground cables are so proposed with a provision for ring feeding healthy section in the event of any faulty feeder or section. The Cable network would reduce power outages and improve quality and reliability of power supply. The distribution losses are also considerably reduced.

B8: Work of Design, Supply, Erection & Commissioning of 33KV, 2 x 3Core, 400Sq.mm XLPE Cable from Ponda Sub-Station to Banastarim for a distance of 18.5Kms and 1 x 3 Core 185 Sq.mm XLPE Cable for a distance of 1.95Kms for providing reliable supply to Kundaim, Marcel area and Industries of Kundaim Industrial Estate. (Estimated amount ₹ 2514.94 lakhs)

6.1.85 The existing 33/11KV Kundaim Substation and 33KV HTC's in Kundaim Industrial Estate are presently fed on 33KV Panaji – I Corlim Double Circuit overhead feeder. This feeder is in service for more than 35 years due to which the existing line materials are deteriorated due to ageing and saline climatic conditions. The feeder is prone to frequent

faults/ breakdowns like line snapping/ breaking of poles in the event of natural calamities such as cyclone, monsoons and rough weather like fog/ smog which lead to falling of trees/ branches on the lines, since the feeder passes through thick vegetation area. The feeder supply is also extended to Panaji city and Corlim Ind. Estate, Bicholim during shutdowns availed by 110KV Kadamba S/S, 220KV Amona S/S and 220KV Tivim S/S.

6.1.86 It is proposed to provide 33KV Underground cable network from Ponda substation to Kundaim substation extending up to Basnastarim 9 pole structure feeding supply to Industrial Estate of Kundaim, Marcela & Kundaim areas with a provision for backup supply to Corlim and surrounding nearby areas.

6.1.87 This project is planned to provide overall system stability, reliability, improvement in safety levels, minimize operation / change overs ensuing reduction in power outages leading to indirect benefit in social cost.

B9: Work of conversion of Existing 11 KV (HT) overhead lines to underground cabling network for 11 KV Mandop feeder,11 KV MES feeder,11 KV Navelim feeder, emanating from 33/11 KRC Substation and provision for additional 11 KV Navelim Express feeder under Subdivision III, Navelim, Division IV, Margao - Goa under Infrastructure Development Fund. (Estimated amount: ₹ 6533.04 lakhs)

6.1.88 The proposed conversion would benefit areas under the jurisdiction of Mandopa, Davorlim, MES, Telaulim, Dicarpali, Navelim, most of which are covered with dense vegetation leading to occurrences of frequent snapping of conductor, failure of insulators due to falling of tree branches etc. The overhead lines are 40 years old and hence not suitable to cater the rapid growing load demands in these areas. There are nearly 20,000 consumers on the network. Upgradation of line network on aged infrastructure together with limitations on overhead conductor capacity would not give a positive & long-lasting benefit. Besides, there is overcrowding and congestion of various circuits in the system. The entire area is imposed with load shedding presently, limiting the loading to safe limits on the aged conductors & lines. With the present network setup, quality and reliability of power supply cannot be maintained which can lead to damage of household appliances.

6.1.89 The decision to convert 11 KV Overhead system to underground system in the Navelim Constituency is taken since it is adjacent to the Margao city & is a emerging rapid development spot with educational institutions & Government offices springing up requiring 24x7 power supply.

6.1.90 The underground cable network capable of rated capacity higher than overhead lines would conveniently cater existing as well as the future load demands eliminating the need for load shedding and in turn give an aesthetic look to the surroundings. There will

be considerable reduction in the technical losses, increase in the reliability of the network and improvement of the voltage profile which in turn will increase revenue collection. The proposed underground system would eliminate voltage fluctuations, reduce power outage and improve voltage profile leading to consumer satisfaction. The underground cabling network is so designed with ring feed arrangements, so that alternate power supply feed can be arranged to healthy sections in the event of cable fault, thereby ensuring minimum outage time & continuity in power supply to consumers in the areas to the maximum extent. The Underground system will definitely ensure stable, reliable, and quality power to the consumers in turn boosting revenue collection.

6.1.91 The load growth in the area as estimated from last years figures as 6-7% in the Constituency with major land developments for residential & commercial establishments being taken up. Load demand sanctioned is on an upward trend. Present total load of 11KV Navelim, Mandopa, MES and Davorlim feeders is 6.5 MW. Average Peak loading of 11KV Navelim, Mandopa, MES and Davorlim feeder is 95 Amps. The Average total Load growth on 11KV Navelim, Mandopa, MES and Davorlim feeders is 1000 KVA per year. The cost benefit analysis display a total revenue recovery of 5.12 crore per year. The payback period will be 12-13 years.

6.1.92 The scope of the work involves laying of 11KV Underground Cable for 91.3 Kms, Erection of 25 plinth mounted 400KVA DTC's, erection of 40 plinth mounted 200KVA DTC's, Dismantling of existing 11KV O/H line 41.48 Kms.

6.1.93 Upgradation of existing distribution transformers will improve voltage and quality due to present Distribution Transformers catering under overload conditions. The removed Distribution Transformers and usable removed infrastructure shall be utilized for new/maintenance works.

B10: Work of upgrading of 220KV PXR line by replacement of existing ACSR Drake Conductor with HTLS ACCC DRAKE Conductor from 220KV Ponda Sub-Station to 220KV Xeldem Sub-Station and replacement of polymer suspension insulator of 220KV AP-II Circuit from Ponda S/S to Kardi point. (Estimated amount ₹ 4842.86 lakhs)

6.1.94 The existing 220KV PXR line with ACSR Drake conductor was erected & commissioned in the year 1991 & it is in service for almost 30 years due to which the existing Drake conductor has become brittle & weak due to ageing and would hence, not support loading to its full capacity of 700Amp. The PXR line is intended to independently cater loads of 160-170 MW covering entire South-Goa in emergencies / outages. However, in the present condition, PXR line can feed only around 100 MW and does not support full loads.

6.1.95 The present proposal aims to cater entire loads of South Goa through this 220KV PXR

circuit in emergencies or in the event of 220KV AP-I line outage conditions. Provision for instant switching over power supply to Xeldem sub-station from AP-II circuit through this PXR line via newly constructed 220KV SR bay at Ponda will be made possible without any grid diversion, thereby saving on overdrawal / underdrawal penalty and load restrictions during the process.

6.1.96 The project work of upgrading of 220KV PXR line by replacement of existing ACSR Drake Conductor with HTLS ACCC DRAKE Conductor from 220KV Ponda Sub-Station to 220KV Xeldem Sub-Station and replacement of polymer suspension is aimed to achieve system stability, minimize loss of time in changeovers, saving cost/penalty involved in Grid diversion, thus keeping power outages in South Goa to the bare minimum under such emergency conditions.

6.1.97 The scope of work involves removal of the existing Drake conductor of 220KV PXR line along with all line materials and stringing new HTLS ACCC Drake conductor with polymer based insulators & hardware, except at cut point of Ponda section i.e. TL 220 to TL 268 since insulators are already recently replaced with new olectra green silicon rubber insulators. The work also involves replacing of all the existing disc and suspension insulators with new polymer insulators at Ponda section of 220KV PXR line (TL 220 Dhrabandora to TL 268 Ponda), on 220KV AP-II circuit from TL 154 Anmod Ghat up to TL 268 Ponda Substation, and on 220KV Ambewadi- Xeldem line (AP-I) in Xeldem section (i.e. TL 1 to TL 64 Xeldem S/S). Existing old bay equipment of 220KV PXR & AP-II bays at Ponda S/S viz CTs, PTs, LAs & isolators shall be replaced with new latest equipments.

6.1.98 As per cost benefit analysis, average annual loss of Rs.8.65 Crore will be saved on completion of this project. The payback period will be 67 months. Besides, there will be benefits like reduction in outages, very low maintenance cost, improvement of safety levels, considerable reduction in transmission losses, ease of operations, remote monitoring of equipment at bay level. This will ensure entire control, reliability, stability and quality power transmitted to South Goa via the 220 KV PXR line.

B11: Work of conversion of the existing overhead 11 KV line of Bicholim City, Assonora, Bordem and Bicholim IDC feeder emanating from 33/11KV Bicholim Sub-station to underground cable system in the jurisdiction of Sub Division-I(U), Bicholim-Goa (Estimated amount: ₹.2902.45 lakhs)

6.1.99 The proposed conversion would benefit areas befalling within jurisdiction of Bicholim Municipality, V. P. Mulgao, and V. P. Assonora. The existing 11KV overhead lines in these areas are more than 40 years old due to which the line materials including rail poles and RCC poles including structural and line materials are deteriorated and in dilapidated condition due to ageing and salinity. The overhead conductors due to corrosion and salinity have weakened over the years of service and presently cannot be utilized to its

full rated capacity. The lines pass through thick vegetation, coconut plantations, dense jungle, hilly terrain and thickly populated areas. Most of the line sections are lengthy and vulnerable to tree/ branch falling during heavy winds or natural calamities. Some sections of the existing feeders pass through hilly terrain and agricultural areas, where there is no access by vehicles. The present overhead lines being aged and more than 40 years in service are not suitable to cater the growing power demands in the area.

6.1.100 The underground cable network capable of rated capacity higher than overhead lines would conveniently cater existing as well as the future load demands for 15 years period. They are also not susceptible to rust or other natural calamities as they are not exposed. The underground cables are so arranged with a provision for ring feeding healthy section in the event of any faulty feeder or section, thereby ensuring minimum outage time & continuity in power supply to consumers in affected areas to the maximum extent. It will allow for flexibility for future expansion and introduction of latest equipment and control in the system. Cable network will considerably reduce technical losses, transmission and distribution losses, increase reliability of network and improve voltage profile leading to consumer satisfaction which in turn will increase revenue collection. The Underground system will definitely ensure stable, reliable, and quality power to the consumers and in turn boost revenue collection. The consumers of Bicholim City, Mulgao, Assonora, Sirgao and Bicholim Industrial Estate would benefit on completion of the project.

6.1.101 The average load growth of Bicholim and surrounding areas is estimated at 10% annually considering major land developments being taken up for residential and commercial establishments. The 11 KV IDC overhead feeder caters to Industrial Estate, Bicholim. Around 2.2 Kms of the said feeder from Bicholim Substation to IDC office is already converted to Underground system and balance stretch is proposed to be converted into underground system in this estimate.

B12: Work of conversion of existing LT O/H line of 11KV Kakoda Feeder & 11KV Town-II feeder into Underground cabling system in Curchorem Constituency. (Estimated amount: ₹ 3977.03 lakhs).

6.1.102 The proposed conversion would benefit areas befalling within jurisdiction of Kakoda, Soliem, Kadebag, Vodlemeol, Madhegal, Govt. Polytechnic, Dhangarwada, Ghadiwada, Chiraknally, Pala Farm, Karmaliwada, Udel, Pongirwal, Pontemol, Durganandnagar, Kamral, Dabamol. The frequency of power interruptions in these areas were brought to the notice of the Department in Gram Sabha meetings held by the Panchayats. Hence, an estimate for conversion of LT Overhead electrical network to underground system for Kakoda & Town-II areas was framed with the intention to provide uninterrupted power supply to the public in the area. A total of 2600 Nos. of LT consumers will be benefitted on completion of this project.

6.1.103 The existing LT overhead lines in the area are more than 40 years old and aged due to corrosion and deterioration. Besides, the lines pass through thick vegetation and waterlogged areas, coconut plantations and exposed to saline atmosphere. It is reported that a total of 1000+ major interruptions were recorded during the 5 months monsoon period last year. Around 2450 interruptions are recorded annually on an average. The lines are vulnerable to tree/ branch falling during heavy winds and natural calamities. Presently, with no provision for any back feeding or ring feed system, alternate power supply arrangements in the event of line fault is not possible, until clearance of the fault and restoration of the power supply, affecting all connected consumers in the area. Some sections of the line passes through areas where mining activities are undertaken due to which oxidization of conductor and MS line materials occurs at a faster pace. There are also occurrences of mining trucks causing damage to the poles and associated lines thereby, increasing jointing points on conductors which in turn lead to the carbonization and weakening of conductors and thereby, snapping of conductors.

6.1.104 The proposed conversion will cover Kakoda & Town-II area covering a total of 51.37 Kms of LT Overhead line including 22 DTC's and associated 1Ph & 3 Ph service connection. The peak loading of the 11KV Kakoda feeder is 40 amps where 11KV Town II feeder is around 60 amps. Average revenue generated per year is Rs.4.38 Crores approximately. The payback period would be approximately 11 years.

6.1.105 The present overhead lines being aged and more than 40 years in service are not suitable to cater the growing power demands in the area which involve land developments for residential buildings some of which are nearing completion in areas at Pontemol, Kakoda & Vodlemol. Underground cables will support additional capacity as compared to Overhead lines and would be able to cater the existing as well as future growing load demands in the area. They are also not susceptible to rust or other natural calamities as they are not exposed. The underground cables are so arranged with a provision for ring feeding healthy section in the event of any faulty feeder or section thereby ensuring minimum outage time & continuity in power supply to consumers in affected areas to the maximum extent. Cable network will considerably reduce distribution losses, increase reliability of network and improve voltage profile leading to consumer satisfaction which in turn will increase revenue collection. The Underground system will definitely ensure stable, reliable, and quality power to the consumers and in turn boost revenue collection in upward trend.

B13: <u>Work of conversion of existing 33KV SC overhead Virdi II feeder to Double Circuit line with HTLS Conductor from 220 KV Amona Sub Station, under Sub Division – I(U), Bicholim.. (Estimated amount ₹ 3422.64 lakhs).</u>

6.1.106 The upgradation of the existing 33KV feeders, Virdi I & II emanating from Amona 220/33

KV substation would assist in diverting around 16 MVA load presently supplied from Tivim 220/110/33 KV Substation to Bicholim Substation and thus, relieve the overloaded Power Transformers at Tivim Substation. Around 80% load of North Goa is supplied from Tivim substation and the balance 20% from Amona Substation. Tivim substation is presently loaded to its peak (around 160 MW). Loading beyond this limit and considering the age of the power transformers and fluctuations of variable loads on feeders, it will be detrimental to the life and safety of the Power Transformers. Further, there is no scope for expansion and no spare transformation capacity in the event of failure of any Power Transformer. To safeguard the Power Transformers and to maintain loading within tolerable limits, the Department is compelled to impose load shedding during peak hours to prevent considerable damage to the system. With the continuous uptrend in demand witnessed in Pernem and Bardez Talukas it is imperative that the loading of the Tivim Substation be diverted to the extent possible as in the present situation Amona Substation is loaded to only 50% of its rated capacity. Load shedding causes great hardships to consumers and industries, thereby affecting their livelihood and production respectively. In addition, there will be a drop in the revenue collection, if load shedding is resorted to for industries and the commercial establishments which constitute maximum revenue.

6.1.107 Presently, the total demand of Bicholim Sub-division is 30 MVA. The 33/11kV Bicholim substation has a provision to be supplied from either Thivim or Amona substation. In the present set up, Bicholim Substation draws 16 MVA from Thivim substation and the balance 14 MVA from Amona substation through 33kV Virdi II feeder. However, presently, due to limitations in loading of Virdi II feeder being more than 50 years in service, hence, outlived its full service life and which is partly Racoon (5 km) and Tiger conductor (8 km), can draw a maximum of only 200-220 amps, due to the ageing conductor limitations. The 220/33KV, 2X50 MVA Amona substation is loaded only up to 50% of its capacity i.e 50 MVA and can be additionally loaded by another 30 MVA.

6.1.108 In order to partially resolve the above power crises in Bardez and Pernem Talukas, it is proposed to shift part load from Thivim Substation to Amona Substation which can be achieved with the upgradation of 33KV Virdi I & II feeders, with HTLS Conductor having a current carrying capacity of 450 amps as compared to the limited 200 amps capacity with the aged conductors. This arrangement will enable to divert 16 MVA load of Bicholim substation presently fed from Tivim substation to Amona substation, thus keeping spare transformation capacity available at Tivim Substation. On the other hand, Bicholim Substation will be able to draw total requirement of 500 Amps i.e almost 30 MVA load from Amona substation after the upgradation of the aforesaid 33KV feeders and diversion of load from Tivim substation. This arrangement will also benefit Sakhali substation which is connected on the same 33 KV feeders. This will also maintain redundancy in the system.

C) PROJECTS TENDERED (TO START NEXT YEAR)

The new projects, which have already received the administrative approval from the Government, the approvals from the expenditure finance committee has also been received and the projects have been tendered or are in the process of being tendered i.e. they are supposed to start from next year, have been covered under this classification:

Table 6-4: Projects tendered (To start next year) (Rs.Crore)

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
Projects tendered (To start next year)				
1	Tender No. 19(2020-21)/CSC: Tender for the Work of conversion of 11KV overhead network of Torla feeder to 11KV underground system along the road side from 33/11KV Shiroda substation under Sub Division II, Div. X, Ponda in Shiroda constituency	3.00	1.00	-
2	Tender No. 22(2020-21)/CSC: Work of conversion of 11KV S/C OH St. Cruz feeder to UG network by laying 11KV, 3 Core 300sq.mm. aluminium armoured XLPE cable for a distance of 14.5 Kms along with associated equipments.	6.00	2.00	-
3	Tender No. 23(2020-21)/CSC: Work for conversion of 11KV SC OH Diwar feeder, Diwar and Chorao section in the jurisdiction of Sub Division-I, Division-I, Panaji.	12.00	7.00	-
4	Tender No. 24(2020-21)/CSC: Work of Supply, Laying, Testing & Commissioning of 33KV Core 400 sq.mm. XLPE U/G cable from 220/33KV Amona S/S for providing alternate power supply to 33/11KV Sankhali S/S.	8.00	2.00	-
5	Tender No. 25(2020-21)/CSC: Work of Supply and Laying of 33KV, 3C X 400sq.mm. XLPE Aluminium cable from Sonshi to Amona S/S.	2.00	-	-
6	Tender No. 26 (2020-21)/CSC: Work of conversion of 11KV S/C O/H Merces feeder to UG network by laying 11KV, 3Core 300sq.mm. Aluminium Armoured XLPE cable for a distance of 13Kms along with associated equipments.	6.00	1.50	-
7	Tender No. 27(2020-21)/CSC: Work of conversion of existing 11KV overhead Industry feeder, 11KV cable Industry feeder and 33KV Unichem feeder to underground system and providing new 11KV feeder at Pilerne Industrial Estate, Pilerne under Sub Division-II, Porvorim.	5.00	2.50	-

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
8	Tender No. 29(2020-21)/CSC: Work of conversion of overhead 11KV Industry-IV feeder to 11KV underground system along the road from 33/11KV Kundai Sub-Station in Priol Constituency under Sub Division-III, Division-X, Ponda.	2.30	-	-
9	Tender No. 30(2020-21)/CSC: Work of conversion of overhead 11KV of Shiroda feeder to 11KV underground system along the road side from 33/11KV Bethora Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	2.74	-	-
10	Tender No. 33(20-21)/CSC: Tender for the work of conversion of 11KV Industry-I/II/III feeder to 11KV underground system along the road from 33/11KV Kundai Sub-Station in Priol Constituency under Sub Division-III, Division-X, Ponda.	4.00	1.00	-
11	Tender No. 37(20-21)/CSC: Tender for the work of conversion of overhead 11KV Sulcorna feeder to underground network from 33/11KVQuinamol, Rivona Sub-Station to Devrem transformer center under the jurisdiction of Sub Division-II, Division-VII, Curchorem.	8.00	4.00	-
12	Tender No. 38(20-21)/CSC: Tender for the work of conversion of overhead 11KV Mollem feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	8.00	5.00	-
13	Tender No. 39(20-21)/CSC: Tender for the work of conversion of overhead 11KV Dhat feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	7.00	4.00	-
14	Tender No. 40(20-21)/CSC: Tender for the work of conversion of overhead 11KV Panchawadi feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	6.00	4.00	-
15	Tender No. 07(2021-22)/CSC: Tender for the Work of conversion of existing 33KV MES single circuit line to double circuit line emanating from 220/33KV Cuncolim substation to 33/11KV KRC substation under Div. IV, Margao	3.40	-	-
16	Tender No. 10(2021-22)/CSC: Work of Supply, Erection, Testing and Commissioning 11KV 3Core, XLPE armoured Cable of size 300 Sq. mm. for conversion of existing overhead 11KV Morjim Feeder to underground system under the jurisdiction of Sub-Division-III, Agarwada, Div XVII - Mapusa.	8.00	8.00	-

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
17	Tender No. 12(2021-22)/CSC: Supply, Laying, Testing and Commissioning of 33KV, 3 Core, 400 Sq.mm. XLPE cable double circuits (Velim-I & Velim-II) from 220/33KV Cuncolim substation to 33/11KV Velim substation	5.00	15.00	6.00
18	Tender No. 34(20-21)/CSC: Tender for the work of conversion of 11KV overhead network of Borim feeder to 11KV underground system along the road side from 33/11KV Shiroda Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	5.00	5.00	-
19	Tender No. 35(20-21)/CSC: Tender for the work of conversion of 11KV overhead network of Nirankal feeder to 11KV underground system along the road side from 33/11KV Bethora Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	2.50	-	-
	TOTAL	**103.94**	**62.00**	**6.00**

C1: Conversion of 11 KV overhead network of Torla feeder to 11 KV underground system along the road side from 33/11 KV Shiroda substation under Sub Div II, Div X Ponda in Shiroda Constituency.

6.1.109 The existing 11KV overhead Torla feeder is in dilapidated condition as the conductor and supporting structure has become weak and brittle due to saline atmosphere. The said line passes through jungle and thick vegetation thereby causing lots of breakdown. During monsoon, due to heavy rain, lightening and cyclonic wind, the trees/branches fall on the line which results in short circuit, snapping of line conductors and breaking of poles which takes longer time to attend, resulting in long duration interruptions to consumers. In order to provide reliable and uninterrupted power supply to the consumers and to meet the future power demand for next 20 years, the work is proposed for conversion of the 11 KV Torla overhead line to Underground network.

6.1.110 As per the Circular issued by the Public Works Department (P.W.D.) vide no.3-3-05/SSW-PWD/VOL.I/2020-21/135 dt. 23/06/2020 stating that the work of road reinstatement will be taken up by their Department.

C2: Estimate for conversion of 11KV S/C overhead St. Cruz feeder to underground network by laying 11KV, 3 Core 300sq.mm Aluminium Armoured XLPE cable for a distance of 14.5kms. alongwith associated equipment's.

6.1.111 The existing overhead 11 KV St. Cruz feeder is lengthy and passing through thickly vegetated area and in the thickly populated area. Any breakdown of this feeder in the night makes it almost impossible for the line staff, to patrol line and rectify the fault delaying restoration of power supply. Further the breakdown occuring due to falling of trees particularly during rainy season thereby interrupting power supply and invites severe criticism from the general public. These areas are just on the outskirts of the capital city of Panaji and developing at rapid pace with multiple of housing complexes coming up.

6.1.112 In order to avoid frequent breakdowns and to provide un-interrupted quality power supply, it is prposed for conversion of 11KV S/C overhead St. Cruz feeder to underground network by laying 11KV, 3 Core 300sq.mm Armoured Aluminium XLPE cable for a distance of 14.5kms. alongwith associated equipments.

C3: Work for conversion of 11 kV S/C overhead Diwar feeder, Diwar and Chorao section in the jurisdiction of Sub-Division I, Division I Panaji.

6.1.113 The existing 11kV Diwar feeder network supplying Diwar and Chorao village is fed from 33/11 kV Corlim Sub-Station and is more that 45 years old and hence become fragile due to saline condition conditions, ageing, and natural calamities. The existing 11 kV network is prone to interupptions as existing weasel conductor has multiple joints due to snapping. The poles are predominantly 9 mtrs RCC pole which too have developed cracks at bottom, cross arms as well as stays are also corroded due to longer duration of service.

6.1.114 In order to ensure realiable and uniteruppted power supply to the consumers and meet the future power demands for next 20 years, it is proposed for conversion of the existing 11 kV overhead line to underground network.

C4: Estimate for the work of Supply, Laying, Testing and Commissioning of 33KV 3 Core 400sq.mm XLPE Underground Cable from 220/33KV Amona Sub-Station for providing alternate power supply to 33/11KV Sankhali Sub-Station.

6.1.115 At present the existing Sankhali 33/11 KV Sub-Station is fed from 220/33KV Amona Sub-Station through Sankhali underground cable and 33KV Virdi-I overhead line. The 33KV Virdi-I overhead line is about 40 to 45 years in service and the conductor has become very weak. A portion of the said line passes through thick vegetation and marshy area and there are frequent incidents of opening of jumpers, snapping of conductor and it becomes difficult to maintain stable power supply, especially during rainy season. Moreover, in the event of any fault on the underground cable, the power supply situation becomes critical as the overhead line is prone to breakdowns and ultimately, the consumers have to suffer. In order to improve the reliability of power supply to Sankhali Sub-Station and the consumers fed from it, it is proposed to lay 33KV underground cable

from 220/33KV Amona Sub-Station to 33/11KV Sankhali Sub-Station as an alternate source of power supply which will, also, be utilized to feed Podoshe Water Treatment Plant and Ravindra Bhavan at Sankhali.

6.1.116 The said cable will be terminating at Amona Sub-Station to existing 33KV Virdi-I circuit through RMU, which will also, keep the existing circuit live. This additional cable will provide more flexibility in combating emergency situations and will provide more stable and reliable power supply to the consumers.

6.1.117 Hence the work is proposed for Supply, Laying, Testing and Commissioning of 33KV 3 Core 400sq.mm XLPE Underground Cable from 220/33KV Amona Sub-Station for providing alternate power supply to 33/11KV Sankhali Sub-Station.

C5: Supply and laying of 33KV, 3C x 400sqmm XLPE Aluminium cable from Sonshi to Amona Sub-Station

6.1.118 There is a dedicated 33KV Valpoi – I and Valpoi – II double circuit overhead line from 220/110/33/11KV Amona sub-station to 33/11KV Valpoi sub-station. A part of the Valpoi -II overhead line i.e. from 2 pole structure at Sonshi to 33/11KV Valpoi sub-station was converted from overhead to underground by laying 3 C x 240 sq.mm cable. The estimate is now proposed to lay a 33KV underground cable from 2 pole structure at Sonshi to the 220/110/33/11KV Amona sub-station for a distance of 4.5Kms.

6.1.119 It is reported that there are frequent occasions of power failure due to dashing of vehicle on electric poles due to movement of heavy vehicles on the Amona –Sonshi road, which is a mining area. Further during a fault on any one of the 33KV feeder between Sonshi to Amona sub-station, line clearance for both the feeders is to be taken thereby causing unnecessary outage to the healthy feeder.

6.1.120 The existing 33KV Valpoi – II overhead line will be retained for using as a standby circuit for 33KV Valpoi – I feeder.

C6: Estimate for conversion of 11KV S/C overhead Merces feeder to underground network by laying 11KV, 3 Core 300sq.mm Aluminium Armoured XLPE cable for a distance of 13kms. alongwith associated equipment's.

6.1.121 The existing Merces feeder is lengthy and passing through thickly vegetated and in the thickly populated area. Any breakdown of this feeder in the night makes it almost impossible for the line staff, to patrol line and rectify the fault delaying restoration of power supply. Further the breakdown occuring due to falling of trees particularly during rainy season cause interruptions in power supply and invite severe critism from the general public. These areas are just on the outskirts of the capital city of Panaji and

developing at rapid pace with multiple of housing complexes coming up.

6.1.122 In order to avoid frequent breakdowns and to provide un-interrupted quality power supply, it is proposed for conversion of 11KV S/C overhead Merces feeder to underground network by laying 11KV, 3 Core 300sq.mm armoured Aluminium XLPE cable for a distance of 13 kms alongwith associated equipments.

C7: Estimate for the work of conversion of existing 11KV overhead Industry feeder, 11KV cable Industry feeder and 33KV Unichem feeder to underground system and providing new 11KV feeder at Pilerne Industrial Estate, Pilerne under Sub Div-II, Porvorim.

6.1.123 The proposal for the work of conversion of existing 11KV overhead Industry feeder, 11KV cable Industry feeder and 33KV Unichem feeder to underground system and providing new 11KV feeder emanating from Saligao Substation at Pilerne Industrial Estate, Pilerne. The area witnesses' interruptions in power supply thereby affecting the Industrial units. The proposed underground cabling will help in improving supply voltage, thereby reducing line losses and being as underground system, shall be less prone to breakdown, especially during the monsoon season, thereby increasing the reliability of the power supply to the Industrial consumers. The outage for a longer period also results in substantial revenue loss to the Department. The proposed work will enable to generate additional revenue and also take care of the additional load coming up in the Industrial Estate.

C8: Work of conversion of overhead 11KV Industry IV feeder to 11KV underground system along the road from 33/11KV Kundai SS in Priol Constituency under Sub Division III, Division X Ponda.

6.1.124 The proposed work is for conversion of 11 KV overhead Industry – IV feeder to underground network, emanating from 33/11KV Kundai substation. The Government had emphasized that the Industrial Estates should be provided reliable and uninterrupted power supply especially the Kundaim Industrial Estate. During monsoon due to heavy rain, lightening and cyclonic wind, trees/branches fall on the line which results in short circuit, snapping of line conductors and breaking of poles. These incidences take longer time to attend, resulting in long duration interruptions to consumers of the industrial estate, thereby causing huge revenue loss to the industries and Government. It is therefore proposed to convert the 11 KV overhead Industry – IV feeder to underground network.

C9: Conversion of overhead 11KV Shiroda feeder to 11 KV underground system along the road side from 33/11 KV Bethora substation in Shiroda Constituency under Sub Division II, Division X Ponda.

6.1.125 The work proposed is for conversion of 11 KV overhead Shiroda feeder to underground network, emanating from 33/11KV Bethora substation in the jurisdiction of Sub Division II Ponda, Division X, Ponda. The partial Bonbag area from Village Panchayat Bethora and Village Panchayat Borim is presently fed electricity supply through single circuit overhead 11 KV Shiroda feeder which was erected around 30 – 32 years back. The existing line network materials are deteriorated due to ageing and saline climatic condition. This line passes through thick Bamboo clusters and forest areas having thick vegetation. There are frequent breakdowns due to line snapping/brakeage of poles etc, on the event of falling of trees/tree branch on the line. This results in delay in attending the line breakdown and prolonged outages for the consumers fed on this feeder. In order to provide reliable and uninterrupted power supply to the consumers and to meet the future power demands, it is proposed for conversion of the 11 KV overhead Bethora feeder to Underground network.

C10: Administrative approval for conversion of overhead 11KV Industry I, II, III feeder to 11KV underground system along the road from 33/11KV Kundai SS in Priol Constituency under Sub Division III, Division X Ponda.

6.1.126 The work is proposed for conversion of 11 KV overhead Industry – I, Industry – II, and Industry – III feeder to underground network, emanating from 33/11KV Kundai substation, as per the Government directives to provide reliable and uninterrupted power supply to the industrial consumers of Kundaim Industrial Estate.

6.1.127 During monsoon due to heavy rain, lightning and cyclonic wind, there is falling of trees/branches on the line which results in short circuit, snapping of line conductors and breaking of poles. These incidences take longer time to attend, resulting in long duration interruptions to consumers of the industrial estate, thereby causing huge revenue loss to the industries and Government. The prolonged duration of outage also results in revenue loss to the Department. It is therefore proposed for conversion of 11 KV overhead Industry – I, Industry – II, and Industry – III feeder to underground network.

C11: Administrative approval for the work of conversion of existing overhead 11 KV line of Sulcorna, emerging from 1x3.15 MVA, 33/11KV Quinamol substation into underground cabling system, under the jurisdiction of Sub Division II Quepem, Division VII Curchorem in Quepem Constituency.

6.1.128 The work is proposed for conversion of 11 KV overhead Sulcorna feeder to underground network, emanating from 1x3.15 MVA, 33/11KV Quinamol substation under the jurisdiction of Sub Division II Quepem, Division VII Curchorem. The existing 11 KV feeder is in service for more than 40 years and passes through thick vegetation, paddy fields, marshy areas and coconut plantation. Also most portion of the feeder passes through forest and river crossing, hence the line has to be patrolled by walking thereby causing

delay in locating and rectification of fault.

6.1.129 The existing line network materials are deteriorated due to ageing and saline climatic condition. There are frequent breakdowns due to line snapping/breakage of poles etc., on event falling of trees/tree branch on the line. There is delay in attending the line breakdown and prolonged outages especially during monsoon as the line is passing through paddy fields/water logged/marshy areas.

6.1.130 In order to provide reliable and uninterrupted power supply to around 3500 nos LT consumers in Muscaurem, Kevona, Sulcorna, Don Bosco, Cazur, Devrem, Curla which are fed from this 11 KV Sulcorna feeder and to meet the future power demands, it is proposed for conversion of the 11 KV overhead line to Underground network.

C12: Administrative approval for the work of conversion of existing overhead 11 KV line of Mollem feeder, emerging from 1x6.3MVA, 33/11 KV Shigao substation into underground cabling system, under the jurisdiction of Sub Division IV, Division VII Curchorem in Sanvordem Constituency.

6.1.131 The proposed work is for conversion of 11 KV overhead Mollem feeder, emanating from 1x6.3MVA, 33/11 KV Shigao substation under the jurisdiction of Sub Division IV, Division VII, Curchorem to underground cabling. The existing 11 KV feeder is in service for more than 40 years and due to ageing and saline conditions, the existing network has become fragile. The line passes through thick forest and coconut plantation, thereby causing lots of breakdown. During monsoon due to heavy rain, lightening and cyclonic wind, the trees/branches fall on the line which results in short circuit, snapping of line conductors and breaking of poles and it takes lot of time to attend, rectify the fault and restore power supply.

6.1.132 In order to provide reliable and uninterrupted power supply to the consumers of Mollem Bazar, Bimbol, Metawada, Pimpolmol, Navawada area and to meet the future power demand for next 20 years, it is proposed for conversion of the 11 KV Mollem overhead line to Underground network.

C13: Work of conversion of existing overhead 11 KV line of Dhat feeder, emerging from 1x6.3MVA, 33/11 KV Shigao substation into underground cabling system, under the jurisdiction of Sub Division IV, Division VII Curchorem in Sanvordem Constituency.

6.1.133 The proposed work is for conversion of 11 KV overhead Dhat feeder, emerging from 1x6.3MVA, 33/11 KV Shigao substation under the jurisdiction of Sub Division IV, Division VII, Curchorem. The existing 11 KV feeder is in service for more than 40 years and due to ageing and saline conditions, the existing network has become fragile. The line passes through thick forest and coconut plantation, thereby causing lots of breakdown. During

monsoon due to heavy rain, lightening and cyclonic wind, the trees/branches fall on the line which results in short circuit, snapping of line conductors and breaking of poles and it takes lot of time to attend, rectify the fault and restore power supply.

6.1.134 In order to provide reliable and uninterrupted power supply to the consumers of Velipwada, Cariamol, Shigao School, Fomento, Azrekar, Dairy farm, Kajumol Suktolim area and to meet the future power demand for next 20 years, it is proposed for conversion of the 11 KV Dhat overhead line to Underground network.

C14: Work of conversion of existing overhead 11 KV line of Panchwadi feeder, emerging from 2x10 MVA, 33/11 KV Pontemol substation into underground cabling system, under the jurisdiction of Sub Division IV, Division VII Curchorem in Sanvordem Constituency.

6.1.135 The proposed work is for conversion of 11 KV overhead Panchwadi feeder, emerging from 2x10 MVA, 33/11 KV Pontemol substation under the jurisdiction of Sub Division IV, Division VII, Curchorem. The existing 11 KV feeder is in service for more than 35 years and due to ageing and saline conditions, the existing network has become fragile. The line is passing through thick forest and coconut plantation, thereby causing lots of breakdown. During monsoon due to heavy rain, lightening and cyclonic wind, the trees/branches fall on the line which results in short circuit, snapping of line conductors and breaking of poles and it takes lot of time to attend, rectify the fault and restore power supply.

6.1.136 In order to provide reliable and uninterrupted power supply to the consumers and to meet the future power demand for next 20 years, it is proposed for conversion of the 11 KV Panchawadi overhead line to Underground network.

C15: Conversion of existing 33KV MES single circuit line to double circuit line emanating form 220/33KV Cuncolim substation to 33/11KV KRC substation under Division IV Margao.

6.1.137 The proposed work is for conversion of existing 33KV MES single circuit line to double circuit line emanating from 220/33KV Cuncolim substation to 33/11KV KRC substation under Division IV Margao. It is informed by the Executive Engineer Division IV Margao that numerous developments, new residential/commercial projects are coming up in the jurisdiction of Margao, Navelim, Benaulim, Colva and surrounding areas under Division IV and XVI Margao, due to which there will be increase in load demand.

6.1.138 At present Xeldem Substation is feeding power supply to 33/11KV Margao, Nessai and Benaulim substation through 4 nos of 33KV overhead circuits and 2 nos 33KV underground circuit. During failure of Xeldem connectivity, the existing network cannot cater to full load. The 220/33KV Cuncolim substation is having capacity of 3 x 50MVA and presently loaded to 63MW only. The existing 33KV MES feeder is emanating from

220/33KV Cuncolim substation and is feeding power supply to 33/11 KV KRC substation Margao, which is in service for around 25 years. Hence it is proposed to renovate/strengthen the 33KV MES circuit by replacing of existing conductor and conversion of existing 33KV single to double circuit line from Cuncolim substation to KRC substation Margao, in order to cater the future demand of Margao, Nessai, Navelim and Benaulim area.

6.1.139 This proposed work will also provide reliable and uninterrupted power supply to the consumers during failure of supply from Xeldem substation.

C16: Work of supply, erection, testing and commissioning of 11 KV 3 core XLPE armoured cable of size 300 sq.mm for conversion of existing overhead 11 KV Morjim feeder to underground system, under the jurisdiction of Sub Division III Agarwada, Division XVII Mapusa.

6.1.140 The proposed work is for conversion of 11 KV overhead Morjim feeder to underground network, emanating from 33/11 KV Tuem substation under the jurisdiction of Sub Division III - Agarwada, Division XVII - Mapusa. The existing 11 KV feeder is in service for more than 25 years and passes through coconut plantation, thick vegetation, paddy fields, and water logged arears. The existing line network materials are deteriorated due to ageing and saline climatic condition. There are frequent breakdowns due to line snapping/brakeage of poles etc., on the event of falling of trees/tree branch on the line. There is delay in attending the line breakdown and prolonged outages specially during monsoon as the line passes through paddy fields/water logged/marshy areas.

6.1.141 In order to provide reliable and uninterrupted power supply to the consumers and to meet the future power demands, it is proposed for conversion of the 11 KV overhead Morjim feeder to Underground network.

C17: Work of conversion of 33 KV overhead Velim I & II circuits to underground network with 3C x 400 sq.mm. cable, under the jurisdiction of Sub Division-II, Chinchinim, Division- XVI Margao, in South Goa District *(Estimated amount ₹ 2681.87 lakhs)*

6.1.142 The proposed conversion of 33 KV overhead Velim I & II circuits to underground network with 3C x 400 sq.mm. cable would benefit the coastal belt of Salcette particularly as regards the Tourism related Industries by providing stable power supply in the area.

6.1.143 The existing 33KV O/H lines are more than 30 years old and aged due to corrosion and deterioration, besides the lines pass through thick vegetation and water logged areas and exposed to saline atmosphere. It is reported that a total of 140 major interruptions were recorded during the 5 month monsoon period last year. The lines are also lengthy and therefore, vulnerable to tree/ branch falling during heavy winds. Presently, with no provision for any back feeding or ring feed system, alternate power supply arrangements,

in the event of line fault, is not possible, keeping the entire feeder under shutdown, until clearance of the fault and restoration of the power supply, affecting all connected consumers in the area.

6.1.144 The total load on proposed underground Velim I & II feeder is 150A per feeder. The average load growth on Velim I & II feeder is 0.17 MVA per year. Average revenue generated per year is Rs. 7 Crores approximately (from 33 KV Consumers). The payback period is around 4 years.

6.1.145 The present overhead lines being aged and more than 15 years are not suitable to cater the growing power demands in the area. Underground cables will support additional capacity as compared to Overhead lines. They are also not susceptible to rust or other natural calamities as they are not exposed. The underground cables are so arranged with a provision for ring feeding healthy section in the event of any faulty feeder or section. Cable network would reduce power outages and provide quality and reliable power supply. The cable network would cater to future load demands. The distribution losses are considerably reduced.

C18: Work of conversion of 11 KV overhead network of Borim feeder to 11 KV underground system along the road side from 33/11 KV Shiroda substation in Shiroda Constituency

6.1.146 The existing 11KV overhead Borim feeder is in dilapidated condition as the conductor and supporting structure has become weak and brittle due to saline atmosphere. The existing line network materials are deteriorated due to ageing and there is frequent line snapping/brakeage of poles etc. on the event of falling of coconut palm leaves/tree branch on the line. This results in delay in attending the line breakdown and prolonged outages for the consumers fed on this feeder. In order to provide reliable and uninterrupted power supply to the consumers and to meet the future power demands, it is proposed for conversion of the 11 KV Borim overhead line to Underground network.

C19: Administrative approval for conversion of overhead 11KV overhead network of Nirankal feeder to 11 KV underground system along the road side from 33/11 KV Bethoda substation in Shiroda Constituency.

6.1.147 The proposed work is for conversion of 11 KV overhead Nirankal feeder to underground network, emanating from 33/11KV Bethoda substation in the jurisdiction of Sub Division II Ponda, Division X, Ponda. The area under Village Panchayat Bethoda, Nirankal, Conxem, Codar in Shiroda constituency, is fed from this Nirankal feeder.

6.1.148 The existing 11 KV overhead line is around 8 Kms and passes through thick Bamboo clusters and forest areas having thick vegetation. The existing line network materials are deteriorated due to ageing and there is frequent line snapping/brakeage of poles etc.,

on the event of falling of trees/tree branch on the line. This results in delay in attending the line breakdown and prolonged outages for the consumers fed on this feeder.

6.1.149 In order to provide reliable and uninterrupted power supply to the consumers and to meet the future power demands, it is proposed for conversion of the 11 KV overhead Nirankal feeder to Underground network.

D) NEW EHV WORKS

Further, the Department also proposed some new projects for EHV works to improve the robustness and reliability of the Transmission network. The projects covered under this classification are as under:

Table 6-5: New EHV Works in Control Period (Rs. Crore)

1	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
EHV Schemes				
1	Saligao 3/63 MVA 2X33 kV S/s at Saligao & Associated D/C Lines	25.00	75.00	150.00
2	Verna 2 x 63 MVA 220/33 KV S/s and associated D/C Lines.	20.00	60.00	120.00
3	Upgradation of PONDA EHV S/s project	23.36	5.84	-
4	Tuem Project	22.50	22.50	-
	Total	**90.86**	**163.34**	**270.00**
	Sub-Total	**969.25**	**868.10**	**520.25**

D1: Saligao 3/63 MVA 2X33 kV S/s at Saligao & Associated D/C Lines

6.1.150 A 220/33 KV Gas Insulated Sub-Station is also being undertaken at Saligao in the coastal belt of North Goa to cater to the increasing load of the coastal belt areas which have been facing acute shortage of power owing to unavailability of capacity at the 33 KV level to feed the Sub-stations in the areas. The ED-Goa has moved forward in the direction of making a ring system of power system at the 220 KV level.

D1: Upgradation of PONDA EHV S/s project (Work of Design, Supply, Erection, Testing and Commissioning of 1 x 63MVA, 220/33KV Power Transformer in replacement of failed 30MVA, 110/33KV Power Transformer at 220/110/33KV Ponda Sub-Station)

6.1.151 One 30 MVA, 110/33KV Power Transformer, commissioned in year 1970, failed on 02/07/2020 due to wear and tear under continuous loading, ageing and other technical issues which after various tests and analysis was diagnosed as not feasible and not economical for repairs. The aforesaid transformer was in continuous operation at the Ponda Substation since commissioning in 1970.

6.1.152 Now, in view of shortage of capacity and to meet the existing load and growing demand in the area besides, redundancy from operational point, a new 63 MVA Power Transformer is proposed to be installed in place of the failed 30 MVA Power Transformer at Ponda Sub-station. The proposed works under this project are aimed to provide overall system stability, reliability, strengthen protection system, improve safety levels, minimize operation/ change over time. The additional capacity would support already sanctioned and pending Industrial connections to be released at Kundaim, Madkaim, Bethora and Verna Industrial Estates with sufficient capacity to cater future load demands. The commissioning of the new power transformer will give much needed boost for investment, growth and development in the industrial areas of Ponda taluka. Considering the rapid growing demand in the area, the payback period is expected to be around 5-6 years.

6.1.153 The transformer (now failed) was catering to loads of 33KV Panaji-II, 33KV Pale-II feeders and a modified old 110/33KV 30 MVA Power transformer converted to 33/11KV (which had failed in July 1991, was converted due to winding issues and charged after conversion in May 2005) totaling to around 31MW. This load is now temporarily shifted to existing 2 x 40 MVA Power Transformers running in parallel at the Ponda Substation, presently catering to optimum loading of 53 MW, which is now subjected to beyond 90% loading, thereby laying further stress on these transformers and putting them at high risk. These transformers are also nearing completion of their service life and being subjected to heavy fault currents in the existing system with further deteriorate their condition and lead to failure for which there is no spare capacity to support these loads in future. It is also felt that since, this failed 30 MVA power transformer has already completed its full service life of 50 years of continuous operation, it is technically and commercially non-viable to carry out any further repairs on it.

6.1.154 The scope of the work involves design, supply, erection, testing and commissioning of 1 x 63MVA 220/33KV Power Transformer along with Digital Bay, its associated 245KV & 36KV Hybrid outdoor switchgear module & other equipments, Upgradation of Earthing system, rejuvenation of existing earth pits, providing periphery earthing & new lightning

protection system, supply erection testing and commissioning of new potential transformers for 5nos.110KV feeders, replacement of existing current transformers & lightning arrestors of 40MVA transformer bays, replacement of porcelain disc insulator strings with composite silicon rubber polymer insulators & retrofitting of new isolators, supply erection testing and commissioning of new 33KV outdoor feeder bay along with associated equipments & a 33KV, 630A, 4way Ring Main Unit. The work also involves dismantling of failed 30MVA, 110/33KV Power Transformer, Bay level structures, equipments, busbar materials, etc.

6.1.155 The Ponda Substation feeds 25MW of Power to 110/33KV Verna Substation at 33KV level apart from the main 110KV line. After failure of the 30MVA transformer, this 25MW load is diverted to the 110 KV line thereby overloading the 110KV system between Ponda and Verna Sub-stations. Recently, the 110KV connectivity between the incoming stations of Ponda Sub-Station and Xeldem Sub-Station with Verna Sub-Station has been strengthened by replacement of existing conductor with HTLS high current carrying conductor facilitating Verna and Xeldem to draw additional load from Ponda station in the event of failure of 220KV AP-I or PXR lines to Xeldem Sub-Station. This arrangement has lead to increase in the reliability of the 110 KV system and thereby protects the State revenue during failure of Interstate Lines i.e. AP-I or AP-II which is the only source of power for South Goa. However, additional 25MW loading (i.e. Verna 33KV loads) do not permit full loading of 110KV system in such emergencies. Hence, under such circumstances, it is urgently required to upgrade the capacity at the Ponda Sub-Station for catering future load demands due to Industrial Estates and Units located at South Goa. Considering the rapid growing demand in the area, the payback period is expected to be around 5-6 years.

D2: Work of Design, Supply, Erection, Testing and Commissioning of 1 x 63MVA, 220/33KV power transformer at Tivim and 2x20MVA, 33/11 KV Sub-station at Tuem [Electronic System Design & Manufacturing (ESDM)] along with two runs of 33 KV underground cables from Tivim Sub-station to proposed Tuem Sub-Station.

6.1.156 The existing Power transformers at 110 KV level at Tivim Substation are catering to loads of entire Bardez, Pernem, Bicholim and part of Tiswadi Taluka and are hence, fully loaded to tolerance limits. In the event of any overloading of the power transformers beyond limits or occurrence of any fault, power supply to these entire areas are affected or load shedding on rotation basis is imposed to limit the load on the Power Transformers to safe levels. In addition, the 33KV feeders emanating from Tivim substation are fully loaded, thereby, no provision to cater additional load demand. To tide over the situation, the Department has proposed to install a new additional power transformer of 220/33 KV, 63 MVA at Tivim sub-station which will in turn cater to the new 2x20 MVA, 33/11 KV Sub-station proposed at Tuem for the ESDM Cluster and the dedicated feeder to the

proposed MOPA AIRPORT, besides, meeting power requirement of the upcoming Ayush Hospital at Dhargal, Pernem.

6.1.157 The State Govt. desires to provide World Class infrastructure for attracting investments in the Electronic System Design and Manufacturing (ESDM) sector in Goa, for which Govt. of Goa has identified Tuem village in Pernem Taluka as an ideal site to set up the ESDM project. It is therefore, requisite that provision for uninterrupted power supply (24x7) is ensured in the ESDM Cluster. In view of this, a new 2x20 MVA 33/11KV sub station is proposed at Tuem. The commissioning of this new 33/11 KV will give much needed boost for investment, growth and development in the area of Pernem Taluka. The payback period will be around 3 years. The new Substation will ensure reliability and quality power supply to the ESDM Cluster besides other nearby areas.

6.1.158 The scope of the work involves design, supply, erection, testing and commissioning of 2x20 MVA 33/11 KV GIS S/S at Electronic System Design & Manufacturing Cluster at Tuem, 2 runs of 33KV underground cable from Tivim to the new 2x20 MVA 33/11 KV GIS S/S at Tuem, providing illumination inside the yard at the new Tuem s/s, tools and plants, various Civil works and supply, erection, testing and commissioning of new 63 MVA 220/33 KV Power transformer at 220/110/33/11 KV Tivim S/S.

E) REVAMPED DISTRIBUTION SECTOR SCHEME

6.1.159 Revamped Reforms Based and Results Linked Distribution Sector Scheme has been formulated by Ministry of Power, Government of India, for supporting DISCOMs to undertake reforms and improve performance in a time bound manner. Scheme seeks to improve the operational efficiencies and financial sustainability, by providing financial assistance to DISCOMs for strengthening of supply infrastructure based on meeting pre-qualifying criteria and achieving basic minimum benchmarks in reforms. The Revamped Distribution Sector Scheme has the following parts:

Part A – Metering & Distribution Infrastructure Works:

- Facilitating in installing prepaid smart meters for all consumers along with associated AMI, communicable meters for DTs & Feeders, ICT including Artificial Intelligence (AI), Machine Learning (ML), etc. based solutions for power Sector and a unified billing and collection system;
- Distribution infrastructure works as required for strengthening and modernizing the system as well as measures for loss reduction. The infrastructure strengthening works will include separation of Agriculture feeders to enable implementation of the KUSUM

scheme, Aerial Bunch cables and HVDS for loss reduction, replacement of HT/LT lines as required, construction of new/ upgradation of substations, SCADA and DMS system etc. Each DISCOM/ State will draw up the scheme according to its requirement with the end objective of reducing losses and ensuring 24 x 7 supply.

Part B - Training & Capacity Building and other Enabling & Supporting Activities:

- Supporting and enabling components, such as Nodal Agency fee, enabling components of MoP (communication plan, publicity, consumer awareness, consumer survey and other associated measures such as third party evaluation etc.), up-gradation of Smart Grid Knowledge Centre, training and capacity building, awards and recognitions etc.

6.1.160 Schemes of IPDS, DDUGJY along with PMDP- 2015 for the erstwhile State of Jammu & Kashmir are being subsumed in this scheme to be implemented as per their extant guidelines and under their existing terms & conditions. No new projects will be sanctioned under these schemes but projects already sanctioned under IPDS & DDUGJY will be eligible to receive funds up to 31st March 2022 under this scheme.

6.1.161 The Revamped Reforms based and Results Linked Distribution Sector Scheme will have an outlay of Rs.3,03,758 crore with an estimated GBS from Central Government of Rs.97,631 crore. It is envisaged that about Rs. 200 crores will be spent by the State Governments towards reforms support in the form of consultancy.

Objectives of the Scheme:

- Improved Quality and Reliability of power supply to consumers
- Financially and operationally efficient distribution sector
    - Reduce AT&C losses to 12-15% by 2024-25*
    - Reduce ACS-ARR gaps to zero by 2024-25*
    - Developing Institutional Capabilities

Project Formulation and Approval

<u>Action Plan- salient features</u>

- Discom applications to be approved based on Action Plans and DPRs
- The Action Plan will be structured as below:

  - Part I - Metering & Distribution Infrastructure Works
  - Part II - Reform measures for financial viability
  - Part III - Results, Outcomes and Evaluation
- DPRs (only for Part A of Scheme) will be structured as below:
  - DPR for Component I –Metering
  - DPR for Component II, Part I –infrastructure works for loss reduction (50% share)
  - DPR for Component II, Part II –infrastructure works for network strengthening (50% share)
  - Action plan to be formulated by Discoms in consultation with Nodal Agency/ MoP; Plan to be approved by DRC and State Cabinet before submission
- Plan to include the state cabinet decision that If Discom is found ineligible as per the Results Evaluation Framework, the funding gap will be met by the Discom/State Govt.

Action Plan guidelines

Action Plan Part I (for loss reduction and network strengthening through metering and other works)

- Metering Plan to be spelled out, to target 100% metering as per targets below:
  - Feeder and DT metering (by June' 2023)
  - Agriculture DT metering (by Mar' 2025)
  - Prepaid consumer metering (by Mar' 2025)
- Plans for other infrastructure works including:
  - works targeted at loss reduction
  - works targeted at system strengthening
- Priority will be given to works focused on loss reduction
- Action plan to broadly include challenges, targeted infrastructure works and annual capital outlay

Indicative works – Part I of Action Plan

Other Infrastructure works focused on loss reduction and network strengthening under the scheme:

1. Augmentation of Substations

2. Provision of Armoured / Aerial bunched Cables (ABC) in high loss areas

3. Segregation / Bifurcation of feeders and other allied works

4. Replacement of conductors, which are old/frayed

5. Additional HT lines to improve quality of supply

6. IT/OT enablement works, Supervisory Control and Data Acquisition (SCADA) in all urban areas; and DMS in 100

urban centres above the population of 2.75 lakhs as per urban census 2011

7. Works like new feeders, capacitors, etc for loss reduction

8. High Voltage Distribution System (HVDS) in high loss areas

9. Distribution Works for system strengthening

Action Plan Part II (reforms for reduction of losses and ACS-ARR gap and improving Discom viability

- Root cause analysis of reasons for losses, ACS-ARR gap and other challenges, targeted reform measures, expected results and timelines
- This part will lay the road map for bringing down AT&C losses and reducing ACS-ARR gap to zero by 2024-25
- Plan to also include the financial support needed from state govt. (subsidy, govt. dues etc.)
- Clear mapping of problems and solutions
- Activities and reform to be finalized based on operational and financial data (accounts)

Indicative reforms – Part II of Action Plan

1. Mechanism for prompt payments by Govt. departments

2. Mechanism for ensuring consumption by the subsidized categories is accounted for properly and released to the DISCOM in

advance, credited to the consumer account via DBT

3. Tariff reforms, incl. annual tariff fixation, rationalization of consumer categories, no Regulatory Assets to be created

4. Progression towards cost reflective tariffs, including timely filing of tariff petitions, MYT and timely issuance of tariff orders

5. Preparation of and adherence to a roadmap for funding accumulated and current financial losses and clearance of part or whole of regulatory assets through tariff or state funding.

6. Corporate Governance reforms, private participation or through CPSUs/JVs of CPSUs

7. Distribution Franchisee arrangements in some areas of DISCOM

8. Setting up electricity police stations in line with the provisions of the Electricity Act, 2003

9. Training and Capacity Building of existing manpower, Creation of IT wing within DISCOM for management of IT/OT services or engaging knowledge partners / consultants for the same.

10. Laying down, publishing, and reporting of a monthly system of energy audits

11. Compliance of RPO trajectories

12. Publication of quarterly audited/unaudited reports in a standardized format circulated by PFC. Quarterly and Annual Accounts of DISCOMs need to explicitly include details of subsidy and Govt. Dept. dues. The annual accounts of the previous year would be published by DISCOMs latest by September 30th of the current year.

13. Initiation of performance linked transfer policy for DISCOM staff

14. Any other activity which serves to achieve the objective of the scheme.

<u>Action Plan Part III (results, outcomes and evaluation)</u>

- Action plan to include baseline data and annual targets (based on Part I and II plan) across following outcomes :
    - Financial Stability (AT&C, ACS-ARR, regulatory assets etc.)
    - Supply Reliability (hours of supply, SAIFI, DT failure etc.)
    - Infra. works progress (%metering, feeder segregation, AB cabling etc.)
    - Structural reforms progress (training, DBT, energy audit, tariffs etc.)
- Base year – FY 2019-20
- Targets/ parameters to be proposed for FY2021-22 to FY2025-26
- Plan to form basis for Result Evaluation Framework
- Indicative framework

Funding Pattern under revamped scheme:

S.No	Item Description	Quantity	Outlay (Rs. Crore)	Grant % (Max)	Grant (Rs. Crore)
1	Prepaid Smart metering (Consumer, DT, and feeder level)- January 2020 onwards	25 crore	1,50,000	15% (max. Rs.900 per meter for consumer meters only)	22,500
2	Other costs including (billing modules, data management, data analytics, and support to implementation etc.)	Lumpsum	800	100%	800
Sub-Total: Part A – Funding for Smart metering			1,50,800		23,300
3	Other Infrastructure works (e.g., SCADA, DMS, AB cables, feeder segregation etc.)		1,51,52	60% or 90%* as the case may be	73301
Sub-Total: Part B – Capacity building etc.			1430	100%	1030*
Total			3,03,758		97631

*90% for special category states- NE and hill states, J&K, Ladakh, A&N islands, Lakshadweep

- Metering (consumer, feeder and DT) to be carried out in TOTEX mode. Grant for metering is 15%. Remaining 85% costs are expected to be financed through improvement in billing and collections.
- State Government/DISCOM may also provide Budgetary support in TOTEX mode, including in hybrid mode. PPP partner to provide metering services in DBFOOT (Design Build Fund Own Operate & Transfer) or similar modes
- For other works under Part A, counterpart funding is to be provided by the DISCOM/ State Government. DISCOM can raise funds from PFC, REC, Banks and other Financial Institutions including bilateral/ multilaterals
- For PMA appointment, upto 1% of the project cost for both components of Part-A is eligible for 60%/ 90% Grant

6.1.162 ED-Goa is in the process of preparing the action plan and getting the approval from the Central Government for the scheme. ED-Goa envisages a capital expenditure of Rs. 930 Crores during the Control period under the revamped scheme.

Table 6-6: REVAMPED Distribution Projects (Rs.Crore)

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
REVAMPED Distribution Projects				
1	Smart Meter and AMI	10.00	35.00	35.00
2	SCADA upgradation, cabling connection, infra development, modernization	225.00	375.00	150.00
3	Training and Placement	20.00	40.00	40.00
	Total	**255.00**	**450.00**	**225.00**

6.1.163 In view of the above discussion, the proposed capital expenditure under new schemes to be carried out in the control period is as under:

Table 6-7: New Scheme/Projects proposed Capital Expenditure for Control Period (Rs. Crore)

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2023-24	FY 2024-25
		Projected	Projected	Projected
New Schemes				
A	**Projects with Administrative approval**	**93.37**	**77.73**	**19.25**
B	**Projects Approved by EFC**	**414.72**	**103.68**	**-**
C	**Projects tendered (To start next year)**	**103.94**	**62.00**	**6.00**
D	**New EHV Works**	**90.86**	**163.34**	**270.00**
E	**REVAMPED Distribution Projects**	**255.00**	**450.00**	**225.00**
F	**Sub-Total New Schemes**	**957.90**	**856.75**	**520.25**
G	**DEPOSIT WORKS**	**35.37**	-	-
	Total	**993.27**	**856.75**	**520.25**

6.1.164 Accordingly, the total proposed capital expenditure to be carried out in the control period is as under:

Table 6-8: Total proposed Capital Expenditure for Control Period (Rs. Crore)

S.No	Name of scheme	CAPEX		
		BUSINESS PLAN FY 2022-23 TO FY 2024-25		
		Capital expenditure		
		FY 2022-23	FY 2022-23	FY 2022-23
		Projected	Projected	Projected
Existing Schemes				
A1	Schedule Tribe Development Scheme (P)	55.86	28.83	-
A2	Infrastructure development through Electricity Duty (Plan)	107.78	39.01	-
A3	Erection and Augmentation of 33/11 KV S/S line (Plan)	5.00	5.00	5.00
A4	Normal Development Schemes (Plan)	6.00	6.00	6.00
A5	System Improvement Schemes (Plan)	17.23	3.00	3.00
A6	Construction of staff quarters and office buildings (Plan)	21.00	26.00	15.00
A7	Strengthening of 220 KV Transmission Network	15.00	-	-
A8	Erection of 220/110/33/11 KV Sub-Station at Verna (New)	-	-	-
A9	Restructured Accelerated Power Development and Reforms Programme Part A	18.00	18.00	18.00
A10	Underground Cabling	141.50	57.00	-
A11	R-APDRP Part B / IPDS	15.00	-	-
A12	EHV new Transmission / Sub-Station / Capacitor banks schemes	-	-	-
B1	Smart grid Development of existing network	-	-	-
B2	Sub-transmission and distribution improvement scheme	57.00	2.00	-
	Other Schemes			
	Public Lighting Scheme	0.10	-	-
	Sub- Total (existing schemes)	**459.47**	**184.84**	**47.00**
New Schemes				
A	**Projects with Administrative approval**	**93.37**	**77.73**	**19.25**
B	**Projects Approved by EFC**	**414.72**	**103.68**	**-**
C	**Projects tendered (To start next year)**	**103.94**	**62.00**	**6.00**
D	**New EHV Works**	**90.86**	**163.34**	**270.00**
E	**REVAMPED Distribution Projects**	**255.00**	**450.00**	**225.00**
F	**Sub-Total New Schemes**	**957.90**	**856.75**	**520.25**
G	**DEPOSIT WORKS**	35.37	-	-
	Sub- Total (New Schemes)	**993.27**	**856.75**	**520.25**
	GRAND TOTAL	**1,452.74**	**1,041.59**	**567.25**

6.2 Capitalization Schedule

6.2.1 The Capitalisation schedule as planned earlier during the last control period has thus been pushed forward to the next control period since the proposed Capital Projects could not be executed. The capitalisation has also been considered upon completion of the Projects. Most of the Capital intensive Projects will be completed during the new control period and thus there is significant Capitalisation proposed during the new control period. It is pertinent to mention here that a number of works have already been tendered and the major execution and expenditure incurred will happen during the new control period, thus Capitalisation.

Table 6-9: Proposed Capitalization for the Control period (Rs. Crore)

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
A1	Schedule Tribe Development Scheme (P)	68.36	34.83	-
A2	Infrastructure development through Electricity Duty (Plan)	156.78	39.01	-
A3	Erection and Augmentation of 33/11 KV S/S line (Plan)	5.00	5.00	5.00
A4	Normal Development Schemes (Plan)	11.00	6.00	6.00
A5	System Improvement Schemes (Plan)	31.23	3.00	3.00
A6	Construction of staff quarters and office buildings (Plan)	3.00	24.00	35.00
A7	Strengthening of 220 KV Transmission Network	20.00	-	-
A8	Erection of 220/110/33/11 KV Sub-Station at Verna (New)			
A9	Restructured Accelerated Power Development and Reforms Programme Part A	18.00	18.00	18.00
A10	Underground Cabling	166.50	122.00	-
A11	R-APDRP Part B / IPDS	22.00	-	-
A12	EHV new Transmission / Sub-Station / Capacitor banks schemes			
B1	Smart grid Development of existing network			
B2	Sub-transmission and distribution improvement scheme	72.00	2.00	-
	Other Schemes			
	Public Lighting Scheme	0.20	0.10	-
	Sub- Total (existing Schemes)	**574.07**	**253.94**	**67.00**
	New Schemes			
	A- Projects with Administrative approval			
	Estimate for the work of providing U/G cabling network for ring feeding 11KV Barazan feeder emanating from 1 x 6.3MVA Xelpem S/S under the jurisdiction of S/D-III, Sanguem, Div-VII, Curchorem in Sanguem Constituency.	11.09	11.09	5.55
	Estimate for the work of Design, Supply, Erection, Testing and Commissioning of new Outdoor Gas Insulated Hybrid	0.94	3.78	-

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
	Switchgears of 220KV Incomer line bays KP-I and TP-II at 220/110/33KV Ponda Sub-Station.			
	Estimate for the work of conversion of existing 11 KV overhead lines to underground system, coming under the jurisdiction of Sub Division-III, Division XIV Verna of areas under Cortalim Constituency and Nuvem Constituency.	13.41	13.41	6.70
	Estimate for the work of S.E.T.C. of 1 no. of 50MVA, 110KV/ 33KV Power transformer at 110KV/ 33KV Verna S/S.	4.43	1.90	-
	Estimate for the work of conversion of existing11KV O/H network to U/G cabling network of 11KV Bhati feeder emanating from 1 x 3.15 MVA, 33/11KV Waddem S/S under the jurisdiction of S/D-III Sanguem, Div-VII, Curchorem in Sanguem Constituency.	5.20	2.23	-
	Estimate for the work of conversion of existing 11KV O/H network to U/G cabling network of 11KV Sanguem feeder emanating from 1 x 6.3MVA, 33/11KV Xelpem S/S under the jurisdiction of S/D-III, Div-VII, Curchorem in Sanguem Constituency.	6.87	2.94	-
	Estimate for the work of conversion of existing 11KV overhead network to underground cabling network of 11KV Ponsamol feeder emanating from 1x6.3MVA, Xelpem Sub-Station under the jurisdiction of Sub Division-III, Sanguem, Division-VII, Curchorem in Sanguem Constituency.	14.00	14.00	7.00
	Estimate for the work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Mandrem feeder emanating from 33/11KV Tuem S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa in Mandrem Constituency.	10.54	10.54	-
	Estimate for the work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Sodiem feeder emanating from 33/11KV Mapusa S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa.	6.95	2.98	-
	Estimate for the work of improvement of 11KV HT network of Undir & Durbhat feeder in Village Wadi Talaulim, Durbhat, Bandora, pert of Curti & part of Borim inhabited by the Scheduled Tribes population under Tribal Sub-Plan by converting 11KV HT O/H lines to U/G cable under the jurisdiction of S/D-I, Div-X, Ponda	8.88	3.80	-
	Estimate for the work of conversion of 11KV HT electrical network of Khadpabandh, Ponda-I, Bazar and part of	11.06	11.06	-

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
	Durbhat, Farmagudi & Curti feeders by converting 11KV HT O/H lines to U/G cable, under the jurisidiction of S/D-I, Div-X, Curti-Ponda.			
	Total	**93.37**	**77.73**	**19.25**
	B-Projects Approved by EFC			
	Conversion of existing O/H 11KV HT network to underground (U/G) cabling for Vasco Town under the Jurisdiction of Sub Division-I(U), Vasco,	37.64	9.41	-
	Work of conversion of O/H HT network to underground HT network of 33KV Xeldem - Xelpem feeder in order to provide uninterrupted m power supply to Salaulim water works and Domestic consumers of Bhati, Uguem, Kalay V.P. areas and Sanguem Municipal areas in Sanguem Constituency.	29.71	7.43	-
	Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-1 and Nessai-11 feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station.	23.07	5.77	-
	Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-111 and Nessai-IV feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station.	22.92	5.73	-
	Work of supply, erection, testing and commissioning of 33/11kV, 2x 10 MVA, Indoor type Sub-Station (Electrical and Civil Works) at Mandrem under Sub Division-III Agarwada, Div XVII Mapusa.	36.62	9.16	-
	Conversion of existing O/H 11 kV Balli feeder into undergound cabling system emerging from 33/11 kV Cuncolim Substationunder the jurisdiction of Elect. O&M Sub. Div-IV, Div-XVI, Cuncolim.	44.49	11.12	-
	Work of conversion of O/H HT network to undergorund HT network in Chinchinium, Dharmapur & Sarzora area of Velim Contituency under the jurisdiction of Subdivision-II Chinchinim, Division-XVI Margao, in South Goa District.	26.73	6.68	-
	Worth of Decign, Supply, Erection & Commissiong of 33 kV, 2x3 Core, 400 Sq.mm XLPE Cable from Cable from Ponda Sub-Station to Banastarim for a distance of 185 kms and 1x3 Core 185 Sq.mm XLPE Cable for a distance of 1.95 kms for providing reliable supply to kundaim, Marcel area and Industries of Kundaim Industrial Estate.	20.12	5.03	-

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
	Work of conversion of Existing 11 KV (HT) overhead lines to underground cabling network for 11 KV Mandop feeder, 11 KV MES feeder, 11 KV Navelim feeder, emanating from 33/11 KRC Substation and provision for additional 11 KV Navelim Express feeder under Subdivision III, Navelim, Division IV, Margao Goa under Infrastructure Development Fund.	52.26	13.07	-
	Work of upgrading of 220 KV PXR line by replacement of existing ACSR Drake Conductor with HTLS ACCC DRAKE Conductor from Ponda 220KV Ponda Sub-Station to 220KV Xeldem Sub-Station and replacement of polymer suspension insulator of 220KV AP-II Circuit from Ponda S/S to Kardi point.	38.74	9.69	-
	Work of conversion of the existing overhead 11 KV line of Bicholim City, Assonora, Bordem and Bicholim IDC feeder emanating from 33/11 kV Bicholim Sub-station to underground cable system in the jurisdiction of Sub Division-I(U), Bicholim-Goa.	23.22	5.80	-
	Work of conversion of existing LT O/H line of 11KV Kakoda Feeder & 11 KV Town-II feeder into underground cabling system in Curchorem Constituency.	31.82	7.95	-
	Work of conversion of existing 33KV SC overhead Virdi II feeder to Double Circuit line with HTLS Conductor from 220 KV Amona Sub Station, under Sub Division – I(U), Bicholim.	27.38	6.85	-
	Total	**414.72**	**103.68**	**-**
	C- Projects tendered (To start next year)			
	Tender No. 19(2020-21)/CSC: Tender for the Work of conversion of 11KV overhead network of Torla feeder to 11KV underground system along the road side from 33/11KV Shiroda substation under Sub Division II, Div. X, Ponda in Shiroda constituency	3.00	1.00	-
	Tender No. 22(2020-21)/CSC: Work of conversion of 11KV S/C OH St. Cruz feeder to UG network by laying 11KV, 3Core 300sq.mm. aluminium armoured XLPE cable for a distance of 14.5 Kms along with associated equipments.	6.00	2.00	-
	Tender No. 23(2020-21)/CSC: Work for conversion of 11KV SC OH Diwar feeder, Diwar and Chorao section in the jurisdiction of Sub Division-I, Division-I, Panaji.	12.00	7.00	-
	Tender No. 24(2020-21)/CSC: Work of Supply, Laying, Testing & Commissioning of 33KV Core 400 sq.mm. XLPE U/G cable from 220/33KV Amona S/S for providing alternate power supply to 33/11KV Sankhali S/S.	8.00	2.00	-

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
	Tender No. 25(2020-21)/CSC: Work of Supply and Laying of 33KV, 3C X 400sq.mm. XLPE Aluminium cable from Sonshi to Amona S/S.	2.00	-	-
	Tender No. 26 (2020-21)/CSC: Work of conversion of 11KV S/C O/H Merces feeder to UG network by laying 11KV, 3Core 300sq.mm. Aluminium Armoured XLPE cable for a distance of 13Kms along with associated equipments.	6.00	1.50	-
	Tender No. 27(2020-21)/CSC: Work of conversion of existing 11KV overhead Industry feeder, 11KV cable Industry feeder and 33KV Unichem feeder to underground system and providing new 11KV feeder at Pilerne Industrial Estate, Pilerne under Sub Division-II, Porvorim.	5.00	2.50	-
	Tender No. 29(2020-21)/CSC: Work of conversion of overhead 11KV Industry-IV feeder to 11KV underground system along the road from 33/11KV Kundai Sub-Station in Priol Constituency under Sub Division-III, Division-X, Ponda.	2.30	-	-
	Tender No. 30(2020-21)/CSC: Work of conversion of overhead 11KV of Shiroda feeder to 11KV underground system along the road side from 33/11KV Bethora Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	2.74	-	-
	Tender No. 33(20-21)/CSC: Tender for the work of conversion of 11KV Industry-I/II/III feeder to 11KV underground system along the road from 33/11KV Kundai Sub-Station in Priol Constituency under Sub Division-III, Division-X, Ponda.	2.00	3.00	-
	Tender No. 37(20-21)/CSC: Tender for the work of conversion of overhead 11KV Sulcorna feeder to underground network from 33/11KVQuinamol, Rivona Sub-Station to Devrem transformer center under the jurisdiction of Sub Division-II, Division-VII, Curchorem.	-	12.00	-
	Tender No. 38(20-21)/CSC: Tender for the work of conversion of overhead 11KV Mollem feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	8.00	5.00	-
	Tender No. 39(20-21)/CSC: Tender for the work of conversion of overhead 11KV Dhat feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	7.00	4.00	-
	Tender No. 40(20-21)/CSC: Tender for the work of conversion of overhead 11KV Panchawadi feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	6.00	4.00	-

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
	Tender No. 07(2021-22)/CSC: Tender for the Work of conversion of existing 33KV MES single circuit line to double circuit line emanating from 220/33KV Cuncolim substation to 33/11KV KRC substation under Div. IV, Margao	3.40	-	-
	Tender No. 10(2021-22)/CSC: Work of Supply, Erection, Testing and Commissioning 11KV 3Core, XLPE armoured Cable of size 300 Sq. mm. for conversion of existing overhead 11KV Morjim Feeder to underground system under the jurisdiction of Sub-Division-III, Agarwada, Div XVII - Mapusa.	8.00	8.00	-
	Tender No. 12(2021-22)/CSC: Supply, Laying, Testing and Commissioning of 33KV, 3 Core, 400 Sq.mm. XLPE cable double circuits (Velim-I & Velim-II) from 220/33KV Cuncolim substation to 33/11KV Velim substation	-	20.00	6.00
	Tender No. 34(20-21)/CSC: Tender for the work of conversion of 11KV overhead network of Borim feeder to 11KV underground system along the road side from 33/11KV Shiroda Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	-	10.00	-
	Tender No. 35(20-21)/CSC: Tender for the work of conversion of 11KV overhead network of Nirankal feeder to 11KV underground system along the road side from 33/11KV Bethora Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	2.50	-	-
	TOTAL	**83.94**	**82.00**	**6.00**
	REVAMPED Distribution Projects			
	Smart Meter and AMI	10.00	35.00	35.00
	SCADA upgradation, cabling connection, infra develipement, mordernization	100.00	350.00	300.00
	Training and Placement	20.00	40.00	40.00
	Total	**130.00**	**425.00**	**375.00**
	New EHV Works			
	Saligao 3/63 MVA 2X33 kV S/s at Saligao & Associated D/C Lines	-	-	250.00
	Verna 2 x 63 MVA 220/33 KV S/s and associated D/C Lines.	-	-	200.00
	Upgradation of PONDA EHV S/s project	-	29.00	-
	Tuem Project	22.50	22.50	-
	Total	**22.50**	**51.50**	**450.00**
	Sub-Total	**1,318.61**	**993.85**	**917.25**

	Project Details			
	Name of scheme	Projections		
		FY 2022-23	FY 2023-24	FY 2024-25
	DEPOSIT WORKS	53.37	-	-
	GRAND TOTAL	**1,371.98**	**993.85**	**917.25**

6.3 Funding of Capital Expenditure

6.3.1 ED-GOA plans for funding majority of its capital expenditure is through the Government equity infusion and from the Electricity Duty fund of Government of Goa. The works carried out under R-APDRP (Part A) and IPDS / DDUGJY is funded by Ministry of Power, Government of India through Power Finance Corporation / Rural Electrification Corporation.

6.3.2 Further, for the Central government Revamped scheme, the funding pattern will be as under:

Table 6-10: the Funding pattern Central government Revamped scheme

S.No	Item Description	Grant % (Max)
	Part A – Funding for Smart metering	
1	Prepaid Smart metering (Consumer, DT, and feeder level)- January 2020 onwards	15% (max. Rs.900 per meter for consumer meters only)
2	Other costs including (billing modules, data management, data analytics, and support to implementation etc.)	100%
Part B – Capacity building etc.		
3	Other Infrastructure works (e.g., SCADA, DMS, AB cables, feeder segregation etc.)	60% or 90%* as the case may be

6.3.3 The EHV new Transmission / Sub-Station / Capacitor banks schemes have also been proposed to be taken up by availing loans from financial Institutions like REC/PFC. Loan repayment is proposed to be arranged through State's own resources.

Table 6-11: Source of financing for Capex scheme (Rs. Crore)

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Schedule Tribe Development Scheme (P)		84.69			
Infrastructure development through Electricity Duty (Plan)	146.79				
Erection and Augmentation of 33/11 KV S/S line (Plan)		15.00			
Normal Development Schemes (Plan)		18.00			
System Improvement Schemes (Plan)		23.23			
Construction of staff quarters and office buildings (Plan)		62.00			
Strengthening of 220 KV Transmission Network		15.00			
Erection of 220/110/33/11 KV Sub-Station at Verna (New)					
Restructured Accelerated Power Development and Reforms Programme Part A		54.00			
Underground Cabling		198.50			
R-APDRP Part B / IPDS		6.00	9.00		
EHV new Transmission / Sub-Station / Capacitor banks schemes					
Smartgrid Development of existing network					
Sub-transmission and distribution improvement scheme		59.00			
Other Schemes					
Public Lighting Scheme		0.10			
Total	**146.79**	**535.52**	**9.00**		
New Schemes					
A-Projects with Administrative approval					
Estimate for the work of providing U/G cabling network for ring feeding 11KV Barazan feeder emanating from 1 x 6.3MVA Xelpem S/S under the jurisdiction of S/D-III, Sanguem, Div-VII, Curchorem in Sanguem Constituency.		27.73			
Estimate for the work of Design, Supply, Erection, Testing and Commissioning of new Outdoor Gas Insulated Hybrid Switchgears of 220KV Incomer line bays KP-I and TP-II at 220/110/33KV Ponda Sub-Station.	4.72				

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Estimate for the work of conversion of existing 11 KV overhead lines to underground system, coming under the jurisdiction of Sub Division-III, Division XIV Verna of areas under Cortalim Constituency and Nuvem Constituency.	33.52				
Estimate for the work of S.E.T.C. of 1 no. of 50MVA, 110KV/ 33KV Power transformer at 110KV/ 33KV Verna S/S.		6.33			
Estimate for the work of conversion of existing11KV O/H network to U/G cabling network of 11KV Bhati feeder emanating from 1 x 3.15 MVA, 33/11KV Waddem S/S under the jurisdiction of S/D-III Sanguem, Div-VII, Curchorem in Sanguem Constituency.		7.44			
Estimate for the work of conversion of existing 11KV O/H network to U/G cabling network of 11KV Sanguem feeder emanating from 1 x 6.3MVA, 33/11KV Xelpem S/S under the jurisdiction of S/D-III, Div-VII, Curchorem in Sanguem Constituency.		9.81			
Estimate for the work of conversion of existing 11KV overhead network to underground cabling network of 11KV Ponsamol feeder emanating from 1x6.3MVA, Xelpem Sub-Station under the jurisdiction of Sub Division-III, Sanguem, Division-VII, Curchorem in Sanguem Constituency.		35.00			
Estimate for the work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Mandrem feeder emanating from 33/11KV Tuem S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa in Mandrem Constituency.		21.07			
Estimate for the work of supply, erection, testing & commissioning of 11KV, 3Core XLPE armoured cable of size 300sq.mm. for conversion of existing O/H 11KV Sodiem feeder emanating from 33/11KV Mapusa S/S to U/G System under the jurisdiction of S/D-III, Agarwada, Pernem, Div-XVII, Mapusa.		9.93			
Estimate for the work of improvement of 11KV HT network of Undir & Durbhat feeder in Village Wadi Talaulim, Durbhat, Bandora, pert of Curti & part of		12.68			

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Borim inhabited by the Scheduled Tribes population under Tribal Sub-Plan by converting 11KV HT O/H lines to U/G cable under the jurisdiction of S/D-I, Div-X, Ponda					
Estimate for the work of conversion of 11KV HT electrical network of Khadpabandh, Ponda-I, Bazar and part of Durbhat, Farmagudi & Curti feeders by converting 11KV HT O/H lines to U/G cable, under the jurisidiction of S/D-I, Div-X, Curti-Ponda.		22.11			
Total	**38.24**	**152.11**	**-**		
B- Projects Approved by EFC					
Conversion of existing O/H 11KV HT network to underground (U/G) cabling for Vasco Town under the Jurisdiction of Sub Division-I(U), Vasco,	47.06				
Work of conversion of O/H HT network to underground HT network of 33KV Xeldem - Xelpem feeder in order to provide uninterrupted m power supply to Salaulim water works and Domestic consumers of Bhati, Uguem, Kalay V.P. areas and Sanguem Municipal areas in Sanguem Constituency.	37.13				
Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-1 and Nessai-11 feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station.	28.84				
Work of conversion of existing overhead ACSR Racoon conductor to HTLS conductor of 33 KV Nessai-111 and Nessai-IV feeder from 220/33 KV Xeldem Sub-Station to 33/11KV KRC Sub-Station and Benaulim Sub-Station.	28.65				
Work of supply, erection, testing and commissioning of 33/11kV, 2x 10 MVA, Indoor type Sub-Station (Electrical and Civil Works) at Mandrem under Sub Division-III Agarwada, Div XVII Mapusa.	45.78				
Conversion of existing O/H 11 kV Balli feeder into undergound cabling system emerging from 33/11 kV Cuncolim Substationunder the jurisdiction of Elect. O&M Sub. Div-IV, Div-XVI, Cuncolim.		55.61			

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Work of conversion of O/H HT network to undergorund HT network in Chinchinium, Dharmapur & Sarzora area of Velim Contituency under the jurisdiction of Subdivision-II Chinchinim, Division-XVI Margao, in South Goa District.	33.42				
Worth of Decign, Supply, Erection & Commissiong of 33 kV, 2x3 Core, 400 Sq.mm XLPE Cable from Cable from Ponda Sub-Station to Banastarim for a distance of 185 kms and 1x3 Core 185 Sq.mm XLPE Cable for a distance of 1.95 kms for providing reliable supply to kundaim, Marcel area and Industries of Kundaim Industrial Estate.	25.15				
Work of conversion of Existing 11 KV (HT) overhead lines to underground cabling network for 11 KV Mandop feeder, 11 KV MES feeder, 11 KV Navelim feeder, emanating from 33/11 KRC Substation and provision for additional 11 KV Navelim Express feeder under Subdivision III, Navelim, Division IV, Margao Goa under Infrastructure Development Fund.	65.33				
Work of upgrading of 220 KV PXR line by replacement of existing ACSR Drake Conductor with HTLS ACCC DRAKE Conductor from Ponda 220KV Ponda Sub-Station to 220KV Xeldem Sub-Station and replacement of polymer suspension insulator of 220KV AP-II Circuit from Ponda S/S to Kardi point.	48.43				
Work of conversion of the existing overhead 11 KV line of Bicholim City, Assonora, Bordem and Bicholim IDC feeder emanating from 33/11 kV Bicholim Sub-station to underground cable system in the jurisdiction of Sub Division-I(U), Bicholim-Goa.		29.02			
Work of conversion of existing LT O/H line of 11KV Kakoda Feeder & 11 KV Town-II feeder into underground cabling system in Curchorem Constituency.	39.77				
Work of conversion of existing 33KV SC overhead Virdi II feeder to Double Circuit line with HTLS Conductor from 220 KV Amona Sub Station, under Sub Division – I(U), Bicholim.	34.23		-		

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Total	**433.77**	**84.63**			
C- Projects tendered (To start next year)					
Tender No. 19(2020-21)/CSC: Tender for the Work of conversion of 11KV overhead network of Torla feeder to 11KV underground system along the road side from 33/11KV Shiroda substation under Sub Division II, Div. X, Ponda in Shiroda constituency	4.00				
Tender No. 22(2020-21)/CSC: Work of conversion of 11KV S/C OH St. Cruz feeder to UG network by laying 11KV, 3Core 300sq.mm. aluminium armoured XLPE cable for a distance of 14.5 Kms along with associated equipments.	8.00				
Tender No. 23(2020-21)/CSC: Work for conversion of 11KV SC OH Diwar feeder, Diwar and Chorao section in the jurisdiction of Sub Division-I, Division-I, Panaji.	19.00				
Tender No. 24(2020-21)/CSC: Work of Supply, Laying, Testing & Commissioning of 33KV Core 400 sq.mm. XLPE U/G cable from 220/33KV Amona S/S for providing alternate power supply to 33/11KV Sankhali S/S.	10.00				
Tender No. 25(2020-21)/CSC: Work of Supply and Laying of 33KV, 3C X 400sq.mm. XLPE Aluminium cable from Sonshi to Amona S/S.	2.00				
Tender No. 26 (2020-21)/CSC: Work of conversion of 11KV S/C O/H Merces feeder to UG network by laying 11KV, 3Core 300sq.mm. Aluminium Armoured XLPE cable for a distance of 13Kms along with associated equipments.	7.50				
Tender No. 27(2020-21)/CSC: Work of conversion of existing 11KV overhead Industry feeder, 11KV cable Industry feeder and 33KV Unichem feeder to underground system and providing new 11KV feeder at Pilerne Industrial Estate, Pilerne under Sub Division-II, Porvorim.	7.50				
Tender No. 29(2020-21)/CSC: Work of conversion of overhead 11KV Industry-IV feeder to 11KV underground system along the road from 33/11KV Kundai Sub-Station in Priol Constituency under Sub Division-III, Division-X, Ponda.	2.30				

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Tender No. 30(2020-21)/CSC: Work of conversion of overhead 11KV of Shiroda feeder to 11KV underground system along the road side from 33/11KV Bethora Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	2.74				
Tender No. 33(20-21)/CSC: Tender for the work of conversion of 11KV Industry-I/II/III feeder to 11KV underground system along the road from 33/11KV Kundai Sub-Station in Priol Constituency under Sub Division-III, Division-X, Ponda.	5.00				
Tender No. 37(20-21)/CSC: Tender for the work of conversion of overhead 11KV Sulcorna feeder to underground network from 33/11KVQuinamol, Rivona Sub-Station to Devrem transformer center under the jurisdiction of Sub Division-II, Division-VII, Curchorem.	12.00				
Tender No. 38(20-21)/CSC: Tender for the work of conversion of overhead 11KV Mollem feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	13.00				
Tender No. 39(20-21)/CSC: Tender for the work of conversion of overhead 11KV Dhat feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	11.00				
Tender No. 40(20-21)/CSC: Tender for the work of conversion of overhead 11KV Panchawadi feeder to underground network under the jurisdiction of Sub Division-IV, Division-VII, Curchorem.	10.00				
Tender No. 07(2021-22)/CSC: Tender for the Work of conversion of existing 33KV MES single circuit line to double circuit line emanating from 220/33KV Cuncolim substation to 33/11KV KRC substation under Div. IV, Margao		3.40			
Tender No. 10(2021-22)/CSC: Work of Supply, Erection, Testing and Commissioning 11KV 3Core, XLPE armoured Cable of size 300 Sq. mm. for conversion of existing overhead 11KV Morjim Feeder to underground system under the jurisdiction of Sub-Division-III, Agarwada, Div XVII - Mapusa.	16.00				

Project Details	SOURCE OF FINANCING for Capex Scheme				
Name of scheme	Equity component		Capital Subsidies / grants	Loan	Consumer Contribution component
	Electricity Duty Fund	Equity infusion - EDG/GoG			
Tender No. 12(2021-22)/CSC: Supply, Laying, Testing and Commissioning of 33KV, 3 Core, 400 Sq.mm. XLPE cable double circuits (Velim-I & Velim-II) from 220/33KV Cuncolim substation to 33/11KV Velim substation	26.00				
Tender No. 34(20-21)/CSC: Tender for the work of conversion of 11KV overhead network of Borim feeder to 11KV underground system along the road side from 33/11KV Shiroda Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	10.00				
Tender No. 35(20-21)/CSC: Tender for the work of conversion of 11KV overhead network of Nirankal feeder to 11KV underground system along the road side from 33/11KV Bethora Sub-Station in Shiroda Constituency under Sub Division-II, Division-X, Ponda.	2.50				
Total	**168.54**	**3.40**			
D- REVAMPED Distribution Scheme					
Smart Meter and AMI		**68**	**12**		
SCADA upgradation, cabling connection, infra development, modernization		**300**	**450**		
Training and Placement			**100**		
Total					
E- New EHV Works		**368**	**562**		
Saligao 3/63 MVA 2X33 kV S/s at Saligao & Associated D/C Lines	250.00				
Verna 2 x 63 MVA 220/33 KV S/s and associated D/C Lines.	200.00				
Upgradation of PONDA EHV S/s project	29.20				
Tuem Project		**45.00**			
Total	**479.20**	**45.00**	**-**	**-**	**-**
Sub-Total New Scheme	**1,119.75**	**653.15**	**562**	**-**	**-**
DEPOSIT WORKS					35.37
GRAND TOTAL (Rs. Crore)	**1,266.54**	**1,188.67**	**571**	**-**	**35.37**

6.3.4 However, as per the JERC MYT Distribution Regulations 2019, the funding pattern is considered as Debt 70% and Equity 30%.

Table 6-12: Capex and Source of Financing as per JERC MYT Regulations (Rs. Crore)

S.No	Sources of Funds	FY 2022-23	FY 2023-24	FY 2024-25	Total
A	**Total Capital Expenditure (without deposit works)**	**1417.37**	**1041.59**	**567.25**	**3026.21**
B	Electricity Duty Fund	638.05	345.79	282.70	1266.54
C	Grant	165.50	270.25	135.25	571.00
D	**Total Capital Expenditure (excluding Electricity Duty Fund and Grant) (A-B-C)**	**613.82**	**425.55**	**149.30**	**1188.67**
E	Debt (%)	70%	70%	70%	70%
F	Equity (%)	30%	30%	30%	30%
G	**Normative Debt (D x E)**	**429.67**	**297.89**	**104.51**	**832.07**
H	**Equity (INR Cr) (D x F)**	**184.15**	**127.67**	**44.79**	**356.60**

7 NO. OF EMPLOYEES

As per Regulation 8 of the new MYT Regulations 2018 for the Control Period FY 2019-20 to FY 2021-22, the Business Plan shall cover as under:

Quote

"8.4 The Business Plan filed by Distribution Licensee shall inter-alia contain:

a) Capital Investment Plan for each Year of the Control Period commensurate with load growth, distribution loss reduction trajectory and quality improvement measures proposed in the Business Plan in accordance with Regulation 8.5;

b) Capital Structure of each scheme proposed and the cost of financing (interest on debt and return on equity), terms of the existing loan agreements, etc.;

c) Sales Forecast for each Consumer category and sub-categories for each Year of the Control Period in accordance with Regulation 8.6;

d) Power Procurement Plan based on the Sales Forecast and distribution loss trajectory for each Year of the Control Period in accordance with the Regulation 8.7;

e) Targets for distribution loss for each Year of the Control Period consistent with the Capital Investment Plan proposed by the Licensee;

f) ***Projections for number of employees during each Year of the Control Period based on***

proposed recruitments and retirement;

g) Proposals in respect of income from Other Business for each Year of the Control Period."

Unquote

7.1 No. of Employees

ED-Goa has forecasted the no. of employees on the basis of the retirements and recruitments in the control period.

Table 7-1: Proposed No. of Employees during the Control Period (Nos.)

S.No	Particulars	Actuals			Base Year Projections	Projections		
		FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
1	Number of employees as on 1st April	6,202	6,111	6,010	5883	5,722	5,586	5,422
2	Employees on deputation/ foreign service as on 1st April	594	593	509	491	486		
3	Total number of employees (1+2)	**6,796**	**6,704**	**6,519**	**6374**	**6,208**	**5,586**	**5,422**
4	Number of employees retired/ retiring during the year	157	153	127	182	136	164	142
5	Recruitment	66	52	-	21			
6	Number of employees at the end of the year (3-4+5+6)	**6,704**	**6,519**	**6,374**	**6208**	**5,586**	**5,422**	**5,280**

7.1.1 The employee expenses shall be covered in the MYT petition in terms of the MYT Regulations 2021.

8 NON-TARIFF INCOME

The Non-Tariff Income Estimated from FY 2021-22 to FY 2024-25 is provided in the following:

Table 8-1: Non-Tariff Income Actual & Projection

S.No.	Particulars	Actual	Actual	Projection	Estimated	Projection		
		FY 2020-21	FY 2021-22 (H1)	FY 2021-22 (H2)	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
1	2	3	4	5	6	7	8	9
1	Meter/service rent	11.30	6.02	6.41	12.43	12.91	13.41	13.93

S.No.	Particulars	Actual	Actual	Projection	Estimated	Projection		
		FY 2020-21	FY 2021-22 (H1)	FY 2021-22 (H2)	FY 2021-22	FY 2022-23	FY 2023-24	FY 2024-25
2	Late payment surcharge	-	-	-	-	-	-	-
3	UI Sales / Sales to Exchange	-	-	-	-	-	-	-
4	Sale Proceeds of dead stock, waste paper etc	2.43	1.27	2.80	5.50	5.71	5.93	6.16
5	Wheeling charges under open access	-	-	-	-	-	-	-
6	Income from trading	0.16	-	-	-	-	-	-
7	Income staff welfare activities	-	-	-	-	-	-	-
8	Misc. Receipts/income	8.38	1.13	3.80	11.27	11.71	12.16	12.63
9	Deferred Income (Electricity Development fund)	-	-	-	-	-	-	-
10	**Total income**	**22.27**	**8.42**	**13.01**	**29.20**	**30.33**	**31.50**	**32.72**
11	Add: Prior Period income	-	-	-	-	-	-	-
12	**Total Non-Tariff income**	**22.27**	**8.42**	**13.01**	**29.20**	**30.33**	**31.50**	**32.72**

9 DISTRIBUTION WIRES BUSINESS & RETAIL SUPPLY BUSINESS

9.1 The Commission has come with the new MYT Regulations 2021 and as per Regulation 8 of the new MYT Regulations 2021 for the Control Period FY 2022-23 to FY 2024-25, the Business Plan shall cover as under:

Quote

"8 Business Plan

8.1 The Transmission Licensee and Distribution Licensee shall file a petition, duly approved by the competent authority, for approval of Business Plan by the Commission for the entire Control Period, latest by May 15, 2021:

Provided that the Generation Company shall not be required to file a Business Plan for the Control Period.

8.2 The Business Plan filed by the Distribution Licensee shall contain separate sections on Distribution Wires Business and Retail Supply Business.

Unquote

9.2 Further, Regulation 49 of the MYT Regulations 2021 for the Control Period FY 2022-23 to FY 2024-25, provides for the allocation statement for segregation between the for-Distribution Wires Business and Retail Supply Business as under:

Quote

"48 Separation of Accounts of Distribution Licensee

48.1 Every Distribution Licensee shall segregate accounts for Distribution Wires Business and Retail Supply Business and shall prepare an Allocation Statement. The wheeling charges pertaining to Distribution Wires Business of the Distribution Licensee shall be determined by the Commission on the basis of these segregated accounts:

Provided that in case complete accounting segregation has not been done, the following Allocation Statement shall be applicable:

Table 9-1 : Allocation Statement for segregation of Distribution Wires Business and Retail Supply Business

Particulars	*Wire Business (%)*	*Supply Business (%)*
Power Purchase Expenses	*0%*	*100%*
Inter-State Transmission Charges	*0%*	*100%*

Particulars	*Wire Business (%)*	*Supply Business (%)*
Intra-State Transmission Charges	*0%*	*100%*
Employee Expenses	*40%*	*60%*
A&G Expenses	*50%*	*50%*
R&M Expenses	*90%*	*10%*
Capital Cost	*90%*	*10%*
Depreciation	*90%*	*10%*
Interest on Long Term Loan	*90%*	*10%*
Interest on Working Capital and Consumer Deposit	*10%*	*90%*
Bad Debts written off	*0%*	*100%*
Income Tax	*90%*	*10%*
Non-Tariff Income	*10%*	*90%*
Income from other Business	*50%*	*50%*

”

Unquote

9.3 Accordingly, ED-Goa has prepared the Business plan for Distribution Wires Business and Retail Supply Business separately using the allocation statement provided by the Commission.

10 PRAYERS TO THE COMMISSION

10.1 Prayers to Hon`ble Commission

10.1.1 The Electricity Department Goa (ED-Goa) respectfully prays to the Hon'ble Commission to:

(a) Admit the Business plan for the Control Period FY 2022-23 to FY 2024-25 in accordance with Regulation 8 and Regulation 17 of JERC (Generation, Transmission and Distribution Multi Year Tariff) Regulations, 2021.

(b) Approve the Business plan for the Control Period FY 2022-23 to FY 2024-25 in accordance with Regulation 8 and Regulation 17 of JERC (Generation, Transmission and Distribution Multi Year Tariff) Regulations, 2021.

(c) Approve the principles and methodology proposed by ED-Goa in the Business Plan.

(d) Approve the capital expenditure and source of funding as proposed by ED-Goa in the Business Plan.

(e) Approve the Demand and Sales Assessment and projections as proposed by ED-Goa in the Business Plan.

(f) Approve the Power Purchase Plan as proposed by ED-Goa in the Business Plan.

(g) Approve the Capital expenditure and source of funding as proposed by ED-Goa in the Business Plan.

(h) Pass any other Order as the Hon'ble Commission may deem fit and appropriate under the circumstances of the case and in the interest of justice.

(i) Grant any other relief as the Hon'ble Commission may consider appropriate.

(j) Condone any error/omission and to give opportunity to rectify the same.

(k) Permit ED-Goa to make further submissions, addition and alteration to this Business Plan as may be necessary from time to time.

11 ANNEXURES

11.1 Annexure 1: Administrative Approvals

11.2 Annexure 2: Projects approved by Expenditure Finance Committee (EFC)

11.3 Annexure 3: Project tendered to Start Next Year i.e FY 2022-23