

CHAPTER-IV
WORKS/ INVESTMENTS REQUIRED FOR STRENGTHENING
AND IMPROVEMENT OF THE SUB-TRANSMISSION
AND DISTRIBUTION SYSTEM.

4.1 Objectives

The project proposals have been prepared with the following objectives:

- Commercial loss reduction
- Increase in revenue realization
- Increase in metered energy
- Increase in billing and revenue collection efficiencies:
- Reduction of outages
- Reduction in technical losses
- Improvement in voltage profile
- Improvement in quality and reliability of power supply
- To meet the growth in demand during 10th plan

4.2 Demand projections

The historical power demand and energy requirements alongwith growth rate during the last two years is as below:

Year	Peak demand (MW)	Energy Requirement (MkWh)	Growth rate %
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The projected power demand and energy requirements taking into account the plans of the town planning Department and historical growth trend are as below:

Year	Peak demand (MW)	Energy Requirement (MkWh)	Growth rate %
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4.3 Scope of works and investment proposals

The present Project report covers the following major areas:

- (i) Requirements for achieving 100% feeder metering as well as consumer metering
- (ii) R&M of grid sub-stations to minimize failure rate of transformers with increase in reliability of power supply.
- (iii) Addition/Augmentation of transformation capacity at sub-transmission and distribution level.
- (iv) Reconductoring/bifurcation/addition of 66 kV, 33 kV, 11 kV & LT lines.
- (v) Installation of 11 kV and LT capacitors

4.3.1 Metering requirements

T&D losses are one of the major factors affecting the performance of the power distribution network. In order to control the losses, it is necessary to have proper account of energy received, consumed and billed. For this, it is necessary to have meters at all levels i.e. EHT and HT sub-stations, 66 kV, 33 kV and 11 kV feeders as well as meters at consumer level. In order to assess the Phase-I requirement of meters survey was carried out at each sub-station and requirement worked out as below from details tabulated in Annex-III.

4.3.1.1 System metering

	Requirement of System works	Meter Requirement		
		Nos.	Meter type	Class of Accuracy
1.	66,33/11 kV transformers			
2.	66,33 kV feeders			
3.	11 kV feeders O/G			
4.	11/0.4 kV Distribution transformers			

4.3.1.2 Consumer metering

The requirement of consumer meters is as under:

	Type of consumer	Nos.	Meter type	Class of Accuracy
1.	Domestic			
2.	Commercial			
3.	Industrial LT			
4.	Industrial HT			
4.	Agriculture			
5.	Kutir Jyoti			
6.	Others			

4.3.1.3 Meter Test Benches

In order to maintain the quality and accuracy of meters, meter test benches are required. There are ----no. of existing test benches and ---no. of meter test benches at a cost of Rs.----lakhs are proposed to be procured.

4.3.1.4 Mobile testing kits

The requirement of mobile testing kits for checking the accuracy of meters on site is ----- and these are proposed to be procured at a cost of Rs. lakhs.

4.3.2 R&M of Sub-stations

4.3.2.1 R&M of 66, 33/11 kV Sub-stations

The 66, 33/11 kV are the backbone of the power distribution system and failure in any substation results in outages/load shedding in large areas. The requirement of materials for renovation and modernization of sub-stations has been worked out as under:

Name of equipment	Rating	Requirement
33 kV Breakers		
33 kV CTs'		
33 kV PTs'		
33 kV Isolators		
33 kV LA		
33 kV Control Panel		
Battery charger		
Battery		
11 kV Panel		
11 kV Breakers		
11 kV CTs'		
11 kV PTs'		
11 kV LA		
11 kV Capacitor rank		
11 kV Cables		
(i) Power cables with sizes		
(ii) Control cables with sizes		

4.3.2.2 R&M of Distribution Sub-stations/ transformer installations

The requirement of materials for Renovation and modernisation of distribution Sub-stations has been worked out as under:

Name of item	Rating	Quantity
11 kV GO switch		
Lightning Arrestor		
MCCB/ Fuse		
Structure		

4.3.3 Reactive compensation

Installation of capacitors at 33/11 kV sub-stations, 11 kV feeders and on LT bus of distribution transformers will improve the system Power factor and voltage which would help in reducing losses. The requirement of capacitors is as under

11 kV capacitors - No. and KVAR

LT Capacitors - No. and KVAR

4.3.4 Strengthening/ upgradation of Sub-transmission and Distribution System

4.3.4.1 Addition/Augmentation of Transformation Capacity at Sub-Transmission level

The connected load, Peak Load on the Sub-stations, diversity of load and growth in load in the coming 5 years were considered while working out the requirement of augmentation at various sub-stations. The details of 66, 33/11 kV transformers qualifying for augmentation are given below:

Sl. No.	Name of Sub-station	Existing capacity MVA	Proposed capacity MVA	Increase in capacity MVA
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4.3.4.2 Erection of 66, 33 kV 11 kV & LT feeders/ Reconductoring of feeders

In ---circles there are a number of 66, 33 kV, 11 kV, LT feeders, which are heavily, loaded causing poor voltage regulation and high energy loss. Further -----no. of new 66, 33/11 kV Sub-stations and ---- distribution sub-stations are being planned. It has, therefore, been found necessary to construct new lines and reconductor some existing lines as under:

(i)	Erection of new 66, 33 kV lines including	-----	Km
(ii)	Bifurcation		
(iii)	Reconductoring of 66, 33 kV lines	-----	Km
(iv)	Erection of new 11 kV lines including bifurcation	-----	Km
(v)	Reconductoring of 11 kV lines	-----	Km
(vi)	Erection of new LT line	-----	Km
(vii)	Reconductoring of LT lines	-----	Km
(viii)	Improvement in Service lines	-----	Km
(ix)	New Service lines	-----	Km

4.3.4.3 New Distribution Transformers/Augmentation

To improve the reliability of supply and to meet the load growth in the circle some new transformers are required while some would have to be augmented as detailed below:

Sl.No.	New Distribution Transformers			Augmentation of Distribution Transformers		
	Rating KVA	Nos.	Total KVA	Existing Rating KVA	Nos.	Proposed rating KVA

4.3.5 Modernisation works

In addition to the above primary works, following additional works need to be carried out:

- (i) Consumer Indexing
- (ii) Computerization of Billing
- (iii) Spot billing centres
- (iv) SCADA system
- (v) Communication system
- (vi) Call Centers

4.3.6 Scope of works

The network improvement proposals alongwith their costs are given below:

Sl. No.	Description of Items	Quantity	Estimated costs (Rs. lakhs)
I.	METERS AND METER TESTING FACILITIES ETC.		
	i) Meter Testing facilities		
	ii) 11 kV electronic/Trivector meters		
	iii) 1-Phase & 3-Phase meters		
II.	R&M OF SUB-STATIONS		
	R& M of 66,33/11 kV Sub-stations		
	R& M of Distribution Sub-stations		
III.	REACTIVE COMPENSATION		
	CAPACITORS At 11 kV		
	CAPACITORS AT LT		
IV.	STRENGTHENING AND UPGRADATION OF SUB-TRANSMISSION AND DISTRIBUTION SYSTEM		
A.	SUB-STATIONS		
	i) New Sub-stations		
	iii) Sub-station augmentation		
	iv) Extensions at Sub-stations		
	v) Extensions at Sub-stations		
B.	SUB-TRANSMISSION LINES		
	i) New lines		
	ii) Re-conductoring		
C.	HT LINES		

- i) New Lines
- ii) UG/Cables
- iii) Re-conductoring

D. LV LINES

- i) New lines
- ii) UG/Cables
- iii) Re-conductoring

E. DISTRIBUTION SUB-STATIONS

- i) New
- ii) Augmentation

F. IMPROVEMENT OF SERVICE LINES

V. MODERNISATION WORKS

NOTE : This is an indicative list and items may be deleted or added as per requirements.

4.4 Cost of works

The estimated cost of works has been taken as per the approved rates of the utility for the year 2001-2002. The abstract of cost of works is given in Annex-VIII. The estimated cost of the works is Rs. ---- lakhs.

4.5 Project implementation schedule

The project shall be implemented during 10th plan period. The phasing of works will be done keeping in view the following

- (i) Revenue potential of the feeder
- (ii) Criticality of the network element
- (III) Desired improvement in quality & reliability of the power supply

4.6 Cost Benefit analysis

Estimated cost of the scheme

Annual Benefit

Reduction in technical losses per annum

Increase in revenue due to increased energy consumption (Growth in load)

Increase in revenue due to improvements in metering, reduction of commercial losses

Total benefit

Pay back period

4.7 Benchmarks of Performance

The existing levels of performance and the targeted levels expected to be reached after the interventions shall be brought out as below:

Sl. No.	Benchmark parameter	Present level	Level to be achieved	Date by which parameter would be achieved
a)	Input Vs. metered energy			
b)	Revenue realization Efficiency (Amount collected to amount billed)			
c)	Transmission & Distribution losses			
d)	Number of Feeder outages in last year			
e)	Failure rate of DTs in last year			
f)	Number of consumer complaints			
g)	Consumer complaint disposal time			
h)	Progress of meter installation			
i)	HT/LT ratio			