BSES Yamuna Power Limited

Capital Investment Plan

For FY 2007-2011

CONTENT

1. Background

BSES Yamuna Power Limited (BYPL), a joint venture between BSES Limited and the government of NCT of Delhi had taken over the distribution of electric power in the area of East & Central Delhi from Delhi Vidyut Board (DVB) on July 2002.

For administrative purpose, BYPL is split into 14 business units on the basis of number of consumers. The various consumer touch points include Consumer Care Centers, Complaint Centers, Consumer Call Centers to facilitate commercial process such as new connection, billing related queries, solving the complaints etc,.

BYPL distributes electricity in East and Cental Delhi with a registered consumer base of around 8.4 lacs, a peak load of 940 MW and operation span across an area of 700 Sq. km.

Delhi Electricity Regulatory Commission (**DERC**) has proposed to implement the 'Multi Year Tariff' (MYT) framework, applicable from 1st April '07 for the control period 2007-2011. Accordingly, yearly capital investment plan for the control period is required for determination of Tariff for the control period.

In view of above a Capital investment plan has been developed, structured and phased out taking into consideration the key issues such as the upcoming Load Growth, Commonwealth Games - 2010, DDA Master Plan, Governments commitment to make Delhi a world class City etc. While developing the investment plan due weight-age has been given to facets such as reduction of AT&C loss , strengthening of existing system, automation, and routine up-gradation for development of distribution network with the aim to maintain a reliable and quality power supply to its consumer.

2. Load Growth Projections:

The following methodologies have been used for assessing the load growth.

2.1 The Historical Data

The maximum demand met from Year 1992 – 2001 and Year 2002 – 2006 has been taken for analyzing growth rate trend. The annual compounded growth rate in rolling five years blocks have shown from 8.4% in the period 1992-1997 to 7.0% in 1996-2001.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Peak Demand met in Delhi (MW)	1536	1616	1820	1976	2048	2303	2422	2580	2670	2879
Year Wise Growth (%)- Actual		5.2%	12.6%	8.6%	3.6%	12.5%	5.2%	6.5%	3.5%	7.8%
Rolling 5 Year Growth (%)- Actual						8.4%	8.4%	7.2%	6.2%	7.0%

Table – 1 – Peak demand of Delhi 1992-2001

The unrestricted demand for 2002-2006 shows annual compounded growth rate in 4 years rolling block is 4.38%

Year	2002	2003	2004	2005	2006
Peak Demand met in Delhi (MW)	3347	3417	3558	3738	3973
Year Wise Growth (%) - Actual		2.1%	4.1%	5.1%	6.3%
Rolling 4 Year Growth (%)- Actual					4.38%

Table – 2 - Peak demand of Delhi 2002-2006

2.2 Master Plan DDA_Delhi 2021

As per the master plan of DDA the load by 2021 is estimated at 8800 MW i.e. at 5.08% growth per annum.

2.3 Analysis of MW growth as per GDP Projections

Growth in Electricity demand is linked to GDP growth rate and the relation is expressed through Electricity –GDP Elasticity factor. Electricity-GDP elasticity during 1991-2000 was 1.213 based on CMIE (Centre for Monitoring Indian Economy) data. Using the references provided, the Electricity-GDP elasticity factor for the period mentioned are projected as under:

1992-2002 - 1.21

2003-2004 - 0.90

2005-2010 - 0.85

2010-2012 - 0.80

Analysis of Past Data

1992-97		1992-93	1993-94	1994-95	1995-96	1996-97
GDP		4	6.2	7.2	7.2	7.5
Electricity-GDP Elasticity Factor		1.2	1.2	1.2	1.2	1.2
Calculated Demand Rise %		4.8	7.44	8.64	8.64	9
Cumulative Increment in Demand	1	1.05	1.13	1.22	1.33	1.45
Total Increment in Demand-Projected	44.90%					
Total Increment in Demand-Actual	44.00%					
Per annum increment Demand-Projected	7.50%					
Per annum increment in Demand-Actual	7.30%					

1997-2002		1997-98	1998-99	1999-00	2000-01	2001-02
GDP		5	6.8	6.4	5.2	5.4
Electricity-GDP Elasticity Factor		1.213	1.2	1.2	1.2	1.2
Calculated Demand Rise %		6.065	8.16	7.68	6.24	6
Cumulative Increment in Demand	1	1.54	1.66	1.79	1.9	2.02
Total Increment in Demand-Projected	39.74%					
Total Increment in Demand-Actual	40.50%					
Per annum increment Demand-Projected	6.60%					
Per annum increment in Demand-Actual	6.80%					

2002-07		2002-03	2003-04	2004-05	2005-06	2006-07
GDP		6	8.5	7.5	8	7
Electricity-GDP Elasticity Factor		0.9	0.9	0.85	0.85	0.85
Calculated Demand Rise %		5.22	7.65	6.375	6.8	6
Cumulative Increment in Demand	2	2.13	2.29	2.44	2.6	2.76
Total Increment in Demand-Projected	36.34%					
Total Increment in Demand-Actual	35.46%					
Per annum increment Demand-Projected	6.10%					
Per annum increment in Demand-Actual	5.90%					

From the above it can be seen that the growth rate Electricity is quite close to the projection by GDP references.

Projections for 2007-12

2007-12		2007-08	2008-09	2009-10	2010-11	2011-12
GDP		7	7	7	7	7
Electricity-GDP Elasticity Factor		0.85	0.85	0.85	0.8	0.8
Calculated Demand Rise %		5.95	5.95	5.95	5.6	6
Cumulative Increment in Demand	2.76	2.92	3.1	3.28	3.47	3.66
Total Inc in Demand-Projected	32.63%					
Per annum increase in Demand-Projected	5.44%					

The projected Demand of Delhi by above method works out to 5.44% say 5.5%.

2.4 Conclusion

Considering the BYPL area and upcoming Commonwealth Games 2010, etc annual load growth is expected to be 1.0% more than above analysis (i.e. 6.5 %). But with the extensive drive of AT & C loss reduction, Energy Conservation, Demand Side Management etc., the growth rate will have a downward pressure, forcing the demand to go down by about 1 – 1.5 %.

Summarizing, an annual growth rate of 5.0% for planning, the Sub-Transmission and Distribution Network would be a good & reasonable estimate.

The projected load growth is given in **Table-3.**

Year	2007-08	2008-09	2009-10	2010-11
Expected Peak Demand in BYPL (MW)	987	1036	1088	1143
Year Wise Growth (%)	5.0%	5.0%	5.0%	5.0%
Rolling 4 Year Growth (%)				5.0%

Table – 3 - Peak demand of Delhi for 2007-2011

3. Sub-Transmission & Distribution Capacity

3.1 Installed Capacity (2002 -2006):

BYPL has added 7 No. Grids, 779 MVA Transformation Capacity at EHV system and 495 MVA Capacity at Distribution system during 2002-2006. The detail of installed capacity of the Sub-transmission and Distribution system since July 2002 is given in Table-4.

S.No.	ITEMS	Capacity as on 2002-03	Capacity as on 2006-07
1	No. of Grids	40	47
2	No. of Power Transformers	98	130
3	EHV Capacity (MVA)	1863	2642
4	EHV Cable Laid (KM)	363	716
5	No. of 66 & 33 kV Feeders	89	129
6	Shunt Capacitors (MVAr)	573	850
7	No. of Distribution Transformer	2657	3120
8	Distribution Transformers Capacity (MVA)	1704	2199
9	No. of 11 kV Feeders	476	650
10	11 KV Cables laid (Kms)	1303	1721
11	11 KV Lines laid (Kms)	145	245
12	Total No. of LT Feeders	10193	13092
13	LT Lines laid (Kms)	4589	5414

Table – 4 – Installed Capacity of BYPL

3.2 Planned Capacity (2007-2011)

Proposed capacity addition during the control period is shown as Table-5.

Year	2007-08	2008-09	2009-10	2010-11
Expected Peak Demand in BYPL (MW)	987	1036	1088	1143
Increase in Peak Demand (MW)	47	49	52	54
Required addition in Installed Capacity (MVA) for BYPL	99	104	109	114

Table – 5- Proposed Installed Capacity for 2011

4. Capital Investment :

4.1 Capital Investment made since July 2002

BYPL has invested 1107 Crs for strengthening of its existing system, automation, Reduction of AT&C loss and routine up-gradation for development of distribution network with the aim to maintain a reliable and quality power supply to its consumer, after taking over DVB on July 2002. The same is delineated below.

4.1.1 AT&C Loss reduction

4.1.1.1 Electrification of Colonies

Un-electrified colonies have been located where high theft causes higher AT&C losses in Delhi electricity supply system. In the view to curb the electricity theft, BYPL has taken the following initiative.

(a) High Voltage Distribution System

BYPL has electrified 82 no of colonies (JJ/UC/LOP) where around 37 thousand consumers into billing net.

(b) Low Voltage System using LT ABC

By using LT AB Cable, BYPL has electrified approx. 110 no of colonies (JJ/UC/LOP) where 20 thousand consumers into billing net.

(c) Replacement of O/H Conductor to LT ABC

In addition to electrification of new colonies, BYPL has also been replacing O/H conductor to LT AB Cable to curb illegal hook on bare conductor where electricity theft is considerably very high. Thus AT&C losses can be brought into reasonable level in particular area.

4.1.1.2 Replacement of meters

Electromechanical meters, which are more prone to tampering and have the tendency to slow down due to aging and contribute to high loss, are being replaced with static meters. These meters are tamper proof, highly accurate and have the features to record reactive power, power factor, demand, etc.

4.1.1.3 Installation of Capacitor Bank

The BYPL system has an average of power factor of 0.82. To improve its average power factor, BYPL has added 277 MVAr Capacity by installing capacitor banks at 33 KV level &11 KV level and LT APFC panels at distribution transformers.

4.1.2 System Reliability Improvement

BYPL has primarily focused in Reliability and Quality of supply in the last five years. The network optimization study (Reliability Analysis Study) has been conducted on district wise network drawings modeled in CYME and using Reliability module of CYMEDIST has carried out Reliability Analysis Study. The concept of N-1 reliability was being implemented at 66 KV, 33 KV and 11 KV level, which shall be achieved fully in near future. Many types of non–repairable equipment have been replaced by new state – of –art equipments. The old existing equipments which were obsolete and used to break down frequently resulting in long outage durations have been replaced by new equipments with SCADA compatible for remote operations for future requirements

Major initiatives taken by BYPL for improving reliability are mentioned below

4.1.2.1 SCADA and DMS

A Supervisory Control and Data Acquisition (SCADA) system for the Delhi Distribution network has been envisioned for centralized control and monitoring of the network for optimum and synergized usage of resources,

SCADA & Distribution Management System will be used as enterprise-wide management of the BYPL networks. It will provide for efficient operations, enhance operational outputs and translate into economic

benefits. Installing SCADA System is seen to be a major initiative to improve quality and reliability of Power Supply to the consumer. There are many applications in SCADA & DMS as delineated below.

- *Supervisory Control:* This function normally includes remote device control and local device tagging. Activities normally start with device selection and complete with feedback of status.
- *Improved Visibility*: All the Indications like Fault Condition, Breaker Status, etc. Measured Values like Load Current, Voltage, Active and Reactive Power etc. are available on the same screen providing all the required information to carry out remote operation.
- *Data Acquisition*: SCADA accumulates data from the chain of field devices (IEDS, substation data and protective devices, via RTUs or substation controllers). Operators get the data in scan groups, so that polling and updating can be used for maximum efficiency
- *SCADA Events:* Event in SCADA is any spontaneous change in system. All the events are logged and historically preserved.
- *SCADA Alarms:* Using different knowledge-based parameters, alarms are generated or suppressed on a need-to-know basis, confident that all events (alarms being a subset of events) will be logged and historically preserved
- *SCADA Tagging:* SCADA allows tagging of Isolators and Switches. A comment line is assigned to each tag which shows the date & time and also provides space to assign comments.

4.1.2.2 GIS

The GIS which will contain details of all assets of the Distribution Network and shall be used for asset management and with integration of GIS with other enterprise systems like ERP, SCADA, AMR, and Trouble Call Management will provide a strong base as well as user friendly tool for management of assets, outages, crew management, etc.

Applications in GIS as delineated below.

- Provides common Spatial Data Format
- Promotes Data Sharing
- Enhances Communication

- Facilitates Decision Making
- Getting Geographical locations and other details of various Facilities of the organization
- Equipment Failure Analysis
- Load Forecasting
- Optimal Substation load allocation and transformer Sizing
- Power Flow route tracing
- Outage Management in conjunction with IVR System
- Determination of Location wise Load Density
- Automatic reconfiguration of the Network and updating the inventory in the database when equipment is added or removed

4.1.2.3 AMR & DT Metering

BYPL has been also establishing the first of its kind Automatic Meter Reading (AMR) system for all its Grid Feeders, Distribution Transformers and KCC & MLCC consumers. The following benefits are achieved through this project.

- Full-fledged energy audit at Grid/feeder level.
- Division wise Energy audit.
- Computation of load profile and Energy demand by studying the pattern.
- Pin pointing the theft prone areas, whereby concerted efforts can be made in thwarting thefts on specific feeders, which shall enable reduction of commercial losses.
- Human errors involved in the reading shall be eliminated, which will result in accurate measurement of energy requirement:
- Reactive Energy management shall be possible by measurement of Reactive Energy at each feeder and at each Grid station.

4.1.2.4 Replacement of Old Cables/ Switchgear

(a) Replacement of old HT panels by RMU

BYPL has done a survey for all the grid and distribution sub-stations. Based on the results of Survey, it was decided to replace the old oil type 11 KV switchgear with SF6 type RMU/ HT Panels with SCADA compatible.

(b) Replacement of sick Cables

Old 11KV underground cables (PILCA) having so many joints and frequent faults have been replaced to ensure reliable and uninterrupted power supply.

(c) Other LT Works

Other works such as installation or replacement of LT Cables, LT ACB, and old 11KV switchgear have been carried out to improve system reliability.

4.1.3 Load growth

BYPL has added 7 No New Grid Sub Stations in its EHV system to cater load growth. Further addition and augmentation of Power transformers, Distribution Transformers, OH/UG Lines (66KV, 33KV & 11KV) have also been carried out.

4.1.4 Infrastructure development

To give better service for consumers, BYPL has renovated many Customer Care Centers with digital communication facility, comfortable sitting arrangements. Better tools, tackles and safety equipments are being used which will also lead to systematic and proper execution of maintenance of main equipments. As the possibility of accidents reduces with the use of proper equipment, the safety and life of equipment will also increase. Further the safety of manpower also increases which cannot be put in terms of monitory benefits.

4.2 Capital Investment Plan 2007-2011.

The capital investment will be made against following areas.

4.2.1 AT&C loss reduction

4.2.1.1 Electrification of Colonies

It is planned to electrify 0.60 Lacs Consumers in Unauthorized Colonies / JJ Clusters in a phased manner over a period of next 4 years as follows:

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
1	Electrification of Unauthorized Colonies/JJ Clusters	DUs	30000	10000	10000	10000

Table – 6- Electrification Colonies for 2007-11

4.2.1.2 Replacement of O/H conductor

In addition to electrification of colonies, it is provisioned to replace 900 kms of existing O/H bare conductor to LT ABC and 330 kms of existing bare conductors with U/G Cables as given in Table-12.

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
1	Conversion of O/H Bare Conductor to LT ABC	KM	900	0	0	0
2	Conversion of O/H Bare Conductor to U/G Cables	KM	0	110	110	110

Table – 7- Conversion of O/H Bare Conductor to LT ABC for 2007-11

4.2.1.3 Replacement/Installation of Meters

BYPL has been replacing electro-mechanical meters with electronic meters further it is proposed to implement Pre-paid system, Group metering system and Remote control metering system for reducing AT&C losses. The proposed systems are delineated below:

4.2.1.3.1 Electronic Meters

Energy meter is a device to measure the consumption of Electrical energy. There are two categories for Energy meters, electro-mechanical or electronic. Electro-mechanical meters offer a level of comfort, familiarity and simplicity, but are limited in functionality. However, due to following parameters it is observed that mechanical meters record less consumption:

- High Starting current
- Friction Losses
- Aging process

Electronic meters are more accurate & reliable and can perform more functions than electro-mechanical meters. The best electro-mechanical meter can have an accuracy of 0.5% whereas electronic meters are available up to accuracy of 0.005%. Electronic meters compared to traditional electro-mechanical meters offer several additional advantages. The advantages are:

- Wide range
- Low starting current
- Better reliability
- Better accuracy
- Ease of calibration
- Anti-tampering protection
- Automated meter reading
- Security
- Advanced billing

4.2.3.1.2 Pre-paid Metering

The pre paid metering system will have following advantages over conventional metering system:

- **Improved operational efficiencies:** The prepaid meters are likely to cut the cost of meter reading, as no meter readers are required. In addition, they eliminate administrative hassles associated with disconnection and reconnection. Prepaid meters could help control appropriation of electricity in a better way than conventional meters.
- **Reduced financial risks:** Since the payment is up-front, it reduces the financial risk by improving the cash flows and necessitates an improved revenue management system.
- **Better customer service:** The system eliminates billing delay, removes cost involved in disconnection/reconnection, enables controlled use of energy, and helps customers to save money through better energy management.
- **Controlling non-technical losses:** Metering errors, tampering with meters leading to low registration and calibration related frauds are some of the key components of non-technical losses. It has been reported that prepaid meters control non-technical losses better than conventional ones.

4.2.3.1.2 Group Metering System

This is not exactly a meter but a concept. 8~12 Metering units are packed in a box with common communication system. Since lot of feature e.g. AMR etc are common so this help in reduction of accessories cost. Mostly these units are installed at Pole/ Feeder level and thus further make tampering difficult.

- Group metering system are available with various add on feature like split display unit, GSM based communication, remote disconnection etc.
- Meter reading is much easier in this metering system.

4.2.3.1.3 Remote Control Metering system

This is system, which is advance version of AMR and normally used for single phase metering system. Apart from meter reading, meter supply can also be disconnected using remote command. Further in case of any abnormal event the unit can send an alarm to main computer.

Being a remote disconnection provision, this metering system can be used as pre-paid system also, but cheaper than pre-paid meter and without compromising on security.

The plan for replacement / installation of meters in a phased manner over a period of next 4 years is as under.

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
1	1 Ph Electro-Mechanical Meter with new Electronic Meters	No	175000	25000	12500	-
2	3 Ph mechanical meter with new electronic meters	No	500	250	100	100
3	1 Ph pre paid meters and metering system	No	1500	5000	-	-
4	3 Ph pre paid meters and metering system	No	-	1500	-	-
5	Group metering unit for JJ, weekly market, in HVDS area etc.	No	500	10000	5000	-
6	Replacement of burnt/aged meters	No	10000	12500	15000	17250
7	Street light meter and controller	No	2750	-	-	-
8	New CMRI	No	750	-	-	-

Table – 8- Replacement/Installation of Meters for 2007-11

4.2.1.4 Installation of Capacitor

NRPC has carried out study for installation of Capacitor Bank during the year 2007-08 in the Northern Region in order to have Voltage at all the intersection points with in the prescribed limit and minimize the reactive drawl. As per the study report of NRPC 274 MVAR capacitor banks are to be installed during the year 2007-08 in Delhi system Based on expected load growth and NRPC report, the Capacitor Banks for the capacity as shown in Table-9 is planned during the period of FY 2007-11.

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
1	Capacitor Banks	MVAr	17	19	19	19

Table – 9- Installation of Capacitors for 2007-11

4.2.1.5 AT&C Loss reduction plan

BYPL have made following considerations while formulating targets for AT&C loss reduction

- Large number of Un-authorized colonies and SPD's.
- Relatively Old network.
- Higher geographic spread.
- Improvement of on account of
    I. Deployment of CISF.
    II. Amendment in Electricity Act –2003.
    III. Provision for replacement of mechanical meters with electro-mechanical meters.

As per our Energy Audit estimate, the losses between interfaces of distribution network to supplier end would be around 14%.

Considering above we have projected AT&C loss reductions based on Abraham Committee report which are at variance vis-à-vis projections given in MYT regulation. We would however strive to improve our targets.

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
1	AT&C loss	%age	36.03	33.03	30.03	27.03
2	Yearly Reduction	%age	3.00	3.00	3.00	3.00

Table – 10- AT&C loss reduction plan for 2007-11

4.2.2 System Reliability Improvement

4.2.2.1 EHV System

(a) Planning Criteria

- Replacement of old outlived switchgears at EHV Grid Station for SCADA compatibility.
- Replacement of old outlived PILCA cables, which are prone to faults and are leading to additional technical losses.
- New 66/33KV feeders for existing Grid Sub Station to improve the system reliability and effective utilization of DTL's proposed 220KV Grid Stations.

(b) Plan

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
A	**Replacement of old outlived Cables/Conductors**					
1	66KV PLICA Cables	KM	3	3	3	3
2	33KV PLICA Cables	KM	9	9	9	9
B	**Replacement of old outlived Switchgears**					
1	33KV Switchgears (Oil Circuit Breaker)	No	16	16	16	16
2	11KV Switchgears (Oil Circuit Breaker)	No	11	11	11	11

Table – 11- Replacement/Addition of Cables/Switchgears at EHV level for 2007-11

4.2.2.2 Distribution System

(a) Planning Criteria

- Old Outlived HT Cables will be replaced, on the basis of age, no of faults, current loading, and type of load.
- Old Overhead HT Conductor will be replaced for load bifurcation, on the basis of age, no of faults, current loading, and type of load.
- Replacement of old outlived switchgears at FSS for SCADA /DMS compatibility.
- Replacement of old outlived LT switchgears/Feeder Pillars on the basis of age, no of faults, and current loading.
- LT feeders on which breakdowns occur very frequently will be replaced on the basis of age, no of faults, and current loading

(b) Plan

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
1	11 KV Feeder Replacement	KM	85	87	90	90
2	11kV Conductor Replacement	KM	10	11	12	14
3	Old 11 KV Panels/RMUs Replacement	No	90	95	100	105
4	LT Switchgears Replacement	No	95	90	105	95
5	LT Feeder Replacement	KM	10	12	14	15
6	Feeder Pillars	No	60	60	62	45

Table – 12- System Upgradation at Distribution level for 2007-11

4.2.2.3 SCADA & DMS

Implementation of SCADA has been completed for all existing Grid Stations except Shastri Park(DMRC) and B G Road Grid Station. However, work for DMS is still in progress for which the expenditure shall be of Rs. 34.87 Crs. is planned during the period 2007-11. All new Grid Stations shall be SCADA compatible and 11 KV Sub Stations will follow DMS philosophy.

4.2.2.4 GIS

About 42% of total project has been completed. The remaining project will be completed by 2010 for which the expenditure shall be incurred around Rs. 5.65 Crs

4.2.2.5 AMR & DT Metering

Approx. 660 Feeder meters, 138 Grid meters and 2567 KCC meters have been facilitated with automatic meter reading (AMR) and 500 meters have been installed at 11KV Sub Stations with AMR facility. Further, BYPL is proposing to implement the AMR for KCC, MLCC, domestic consumers and DT metering.

4.2.3 Load growth

4.2.3.1 EHV System

(a) Planning Criteria

- The required Installed Power Transformation Capacity has been taken as 2.1 times the expected peak demand.
- Redundancy of (n-1) has been taken for planning any EHV GSS.
- The average in-feed length has been considered as 5 kms.
- Capacity of the Grid Stations has been decided based on the Load Centers requirement. The Grid Stations shall be located near/close to the Load Centers.
- Each Grid-Station will have preferably dual in-feeds from independent sources.

- The Voltage Level of the Grid-Stations shall be based on the operating Voltage level in the surrounding network. Dual Transmission Ratio shall be minimized to reduce the Transformation Losses.
- 66/11 kV Transformers shall be 20/25 MVA ONAN/ONAF type.
- 33/11 kV Transformers shall be 20 MVA ONAN type.
- In-feed shall be through U/G Cables of 1C x 630 / 1000 sq.mm for 66 kV level and 3C x 400 sq.mm for 33 kV level.
- Grid Stations shall have adequate Reactive Power Compensation at 11 kV bus.

(b) Plan

The installed capacity year wise requirement is given in Table-6

Year	2007-08	2008-09	2009-10	2010-11
Capacity Addition by Augmentation/Addition of Transformers at existing Grids (MVA)	54	14	19	24
Capacity Addition by New Grid S/Stns (MVA)	45	90	90	90
Total Capacity Addition (MVA)	99	104	109	114
No of New Grid Sub/Stns Proposed	1	2	2	2

Table – 13- Installed Capacity Required at EHV level for 2007-11

4.2.3.2 Distribution System

(a) Planning Criteria

- The required Installed Distribution Transformation Capacity has been taken as 2.3 times the expected peak demand.
- Each 11 kV Feeder shall have a capacity shall be typically 4.0 MVA and average length 3 kms.
- Each 11 kV Feeder shall on an average feed 6 Nos Distribution Transformers.
- 5 Nos (average) of LT Feeders shall be taken out from each Distribution Transformer, having an average length of 250 m.

(b) Plan

Year	2007-08	2008-09	2009-10	2010-11
Capacity Addition by Augmentation of Transformers at existing S/Stns (MVA)	34	37	39	35
Capacity Addition by Sub/Stns (MVA)	74	77	80	90
Total Capacity Addition (MVA)	108	114	119	125
No of New Sub/Stns Proposed	58	61	64	72

Table – 14- Installed Capacity Required at Distribution level for 2007-11

4.2.4 Infrastructure development

4.2.4.1 IT and Communication

The following items are to be executed or installed during the period of FY 2007-11.

a) SAP - ISU

b) Data Storage Consolidation

c) VM Ware Implementation

d) Citrix

e) Disaster Site Management

f) Data Center Renovation / New Setup

g) IP/MPLS Network

h) Wi Max

i) IPS / Internet Caching

j) Telecom Up-gradation / IP Phones / Web or Video Conferencing / IP Soft Phone

k) Mobile Computing

l) Voice and Video Surveillance for CCC

m) Training Infrastructure -- VC/ Recording

n) Learning Management System

o) Computers/Printers/Laptop/UPS

p) High Speed scanners

4.2.4.2 Land / Building and Renovation of offices

BYPL plans to carry out up-gradation of Customer Care Centers, offices and other infrastructure during the Control period for which an amount of about 2 Crs per annum will be spent.

4.2.4.3 Vehicle

BYPL intents to replace old vehicles for which the life cycle is completed based on mileage and condition of the vehicle, This includes FLC, Tower Wagons, Cash Vans, HT& LT breakdown vehicles etc. for which an amount of Rs. 2.72 Crs will be spent over entire Control period..

4.3 Capex Plan

S No	Description	UoM	2007-08	2008-09	2009-10	2010-11
A	**AT & C Loss reduction**					
1	Electrification of Unauthorized Colonies/JJ Clusters	Crs	22.50	7.50	7.50	7.50
2	Conversion of O/H Bare Conductor to LT ABC	Crs	74.28	0.00	0.00	0.00
3	Conversion of O/H bare conductor to U/G Cables	Crs	0.00	22.00	22.00	22.00
4	Replacement of Meters	Crs	36.80	28.76	13.16	2.62
5	Installation of Capacitor	Crs	1.21	1.34	1.34	1.34
	Total (A)		**134.79**	**59.60**	**44.00**	**33.46**
B	**System Improvement Works**					
1	*EHV System*					
a	Replacement of old outlived Cables/Conductors	Crs	5.61	5.61	5.61	5.61
b	Replacement of old outlived Switchgears	Crs	1.46	1.46	1.46	1.46
	Sub Total		***7.06***	***7.06***	***7.06***	***7.06***
2	Distribution System	Crs	25.48	26.42	27.64	28.04
3	SCADA & DMS	Crs	1.96	22.88	7.03	3.00
4	GIS	Crs	2.81	2.47	0.27	0.10
5	AMR & DT Metering	Crs	1.10	8.76	14.80	10.00
	Total (B)		**38.41**	**67.59**	**56.80**	**48.20**
C	**Load Growth**					
1	*EHV System*					
a	New Grids	Crs	20.29	40.58	40.58	40.58
b	Addition/Augmentation of Transformers	Crs	23.19	6.55	8.07	10.41
	Sub Total		***43.48***	***47.13***	***48.65***	***50.99***
2	Distribution System	Crs	25.23	25.69	26.28	27.90
	Total ('C)		**68.71**	**72.82**	**74.93**	**78.88**
D	**Infrastructure Development Works**					
1	IT and Communication	Crs	8.60	7.60	6.70	6.20
2	Land & Buildings and Offices	Crs	2.00	2.00	2.00	2.00
3	Vehicles	Crs	0.10	0.27	0.73	1.72
4	Test Equipments	Crs	1.25	1.25	1.25	1.25
	Total (D)		**11.95**	**11.12**	**10.68**	**11.17**
E	**Deposit Works**					
1	EHV System	Crs	20.00	20.00	20.00	20.00
2	Distribution System	Crs	23.49	33.00	35.35	37.43
	Total (E)		**43.49**	**53.00**	**55.35**	**57.43**
Grand Total (A+B+C+D+E)			**297.35**	**264.13**	**241.76**	**229.15**

Table – 15- Capex plan for 2007-11

4.4 Capitalization Schedule

Sr No	FY	UoM	Opening CWIP	Expenditure	Capitalization	Closing CWIP
1	2007-08	Crs	269.19	178.41	376.08	71.52
2	2008-09	Crs	71.52	317.04	302.15	86.41
3	2009-10	Crs	86.41	247.36	263.29	70.48
4	2010-11	Crs	70.48	232.30	237.66	65.12
Total				**975.11**	**1179.17**	

Table – 16- Capitalization Schedule for 2007-11

4.5 Financing Plan

BYPL proposes to find the capital expenditure through internal accruals, domestic loans, consumer contribution, depreciation etc.