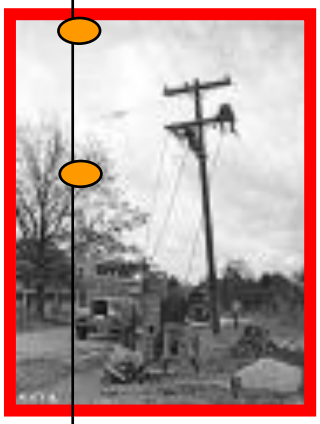
Final Report
on
Estimation and Segregation of Distribution Loss in Solapur Circle Electricity Distribution Network



Submitted to

MERC

Maharashtra Electricity Regulatory Commission

By

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1. Executive Summary

1.1 Overview of the Study

The entire urban and rural distribution network starting from 33kV feeder level and going up to distribution transformers was mapped and technical losses determined by performing load flow study. While power loss so determined corresponded to the date and hour on which Maharashtra experienced peak load in 2007-08, energy loss in individual feeders and their downstream distribution networks was calculated by applying annual loss load factor (LLF) of respective feeders. LLF of each feeder was calculated from the hourly logs obtained from MSEDCL. Commercial loss was determined by way of difference between distribution loss and technical loss.

Loss determination by load flow study was performed on LT networks of representative distribution transformers in urban and rural divisions. In addition to the indirect study performed by network simulation (load flow study), technical losses were determined on MIDC 33 kV substation and its downstream network in the urban division by direct study. Direct study could not be performed in the rest of urban distribution network owing to meters not being available in the remaining seven 33kV substations. Technical loss was determined by direct study on four representative 11kV feeders in the rural divisions.

Determination of energy consumption by unmetered agricultural consumers constituted a major part of the assignment. 418 agricultural consumers were randomly selected from across rural Solapur for the study. These included 206 consumers whose consumption was metered and 218 who had no meters and were billed on flat rate based on *Agricultural Consumption Index* (Ag Index) determined by MSEDCL every month based on data of metered consumers.

1.2 Segregation of Distribution Losses into Technical & Commercial Losses

Table 1: Segregation of Distribution Losses into Technical & Commercial Losses

Description	Rural Divisions		Urban Division	
	Energy (MU)	% of Input Energy	Energy (MU)	% of Input Energy
Energy input	2911.96	100.0%	366.53	100%
Energy metered and billed	1033.19	35.5%	300.39	0
Energy assessed for unmetered consumers	516.7	17.7%	0	0
Total energy billed	1549.89	53.2%	300.39	81.95%
Distribution loss	**1362.07**	**46.8%**	**66.14**	**18.05%**

	Head - Technical losses	Energy Loss (MU)	Percent of Technical Loss	Percent of Distribution Loss	Percent of Input Energy
	Technical loss	**561.54**	**19.3%**	**21.97**	**6%**
	Commercial loss	**800.53**	**27.5%**	**44.17**	**12.05%**

Salient Observations:

i. The above table shows a very high distribution loss in rural divisions primarily because the unmetered agricultural consumption has been determined to be 516.7 MUs by our calculations against 1033.19 MUs estimated by MSEDCL.

ii. In the urban division the estimated technical loss is not high and the commercial loss is also not high in relation to the loss levels prevailing in the country.

iii. Technical loss in the rural divisions is high chiefly on account of long feeder lengths – particularly LT overhead lines. High commercial loss in rural divisions is attributable chiefly to theft by direct tapping rather than due to slow or faulty meters or meter tampering.

1.3 Break-up of Technical Loss: Urban Division

Table 2: Break-up of Technical Loss: Urban Division

A	**Sub transmission Network**				
	33 kV line	0.44	2.00%	0.67%	0.12%
	33/11 kV transformation	0.41	1.87%	0.62%	0.11%
	Subtotal	0.85	3.87%	1.29%	0.23%
B	**Primary Distribution Network**				
	11 kV line	2.50	11.38%	3.78%	0.68%
	11/0.44 kV transformation	2.39	10.88%	3.61%	0.65%
	HT capacitor	0.01	0.04%	0.01%	0.00%
	Subtotal	4.90	22.30%	7.41%	1.34%
C	**Secondary Distribution Network**				
	Incomer cables	0.30	1.37%	0.45%	0.08%
	Distribution box fuse	0.80	3.64%	1.21%	0.22%
	Outgoing cables	0.10	0.46%	0.15%	0.03%
	Low tension line (Over head conductor)	8.90	40.51%	13.46%	2.43%
	Service cables	5.10	23.22%	7.71%	1.39%
	Board wiring	0.60	2.73%	0.91%	0.16%
	Metering	0.42	1.91%	0.64%	0.11%
	Subtotal	16.22	73.83%	24.52%	4.43%
	Total Technical losses	21.97	100.00%	33.21%	5.99%

The above table shows that over 40% of total technical losses are attributable to losses in overhead conductors. This corresponds to 2.43% of input energy out of total technical loss of 6% of input energy. I^2R losses in meters, service cables, distribution box fuses etc. are quite small, as expected.

1.4 Break-up of Technical Loss: Rural Divisions

Table 3: Break-up of Technical Loss: Rural Divisions

	Head - Technical losses	Energy Loss (MU)	Percent of Technical Loss	Percent of Distribution Loss	Percent of Input Energy
A	**Sub transmission Network**				
	33 kV line	84.89	15.12%	6.23%	2.92%
	33/11 kV transformation	9.59	1.71%	0.70%	0.33%
	Subtotal	94.48	16.83%	6.94%	3.24%
B	**Primary Distribution Network**				
	11 kV line	45.55	8.11%	3.34%	1.56%
	11/0.44 kV transformation	42.57	7.58%	3.13%	1.46%
	HT capacitor	0.02	0.00%	0.00%	0.00%
	Subtotal	88.14	15.70%	6.47%	3.03%
C	**Secondary Distribution Network**				
	Incomer cable	6.19	1.10%	0.45%	0.21%

	Distribution box fuse	2.97	0.53%	0.22%	0.10%
	Outgoing cable	3.79	0.67%	0.28%	0.13%
	Low tension line (Over head conductor)	348.66	62.09%	25.60%	11.97%
	Service wire	16.47	2.93%	1.21%	0.57%
	Panel wiring	0	0.00%	0.00%	0.00%
	Metering	0.87	0.15%	0.06%	0.03%
	Subtotal	378.95	67.48%	27.82%	13.01%
	Total Technical losses	**561.57**	**100.01%**	**41.23%**	**19.29%**

The above table shows that over 42% of total technical losses are attributable to losses in overhead conductors. This corresponds to 11.97% of input energy out of total technical loss of 19.29% of input energy. I^2R losses in meters, service cables, distribution box fuses etc. are quite small, as expected.

1.5 Break-up of Commercial Loss: Urban Division

Table 4: Break-up of Commercial Loss: Urban Division

	Head - Commercial losses	Energy Loss (MU)	% of Commercial Loss	% of Distribution Loss	% of Input Energy
1	Theft of energy by tampering meter	2.74	6.20%	4.14%	0.75%
2	Inaccurate Meters	17.2	38.91%	26.01%	4.69%
3	Low average of faulty meters	4.93	11.15%	7.45%	1.35%
4	Theft of energy - illegal / direct use	19.33	43.73%	29.23%	5.27%
	Total Commercial losses	44.2	100.00%	66.83%	12.06%

Commercial loss in the urban division is not high as noted earlier with theft of energy accounting for the highest contribution to commercial loss. Incidence of meter tampering is quite small.

1.6 Break-up of Commercial Loss: Rural Divisions

Table 5: Break-up of Commercial Loss: Rural Divisions

	Head - Commercial Loss	Energy Loss (MU)	Percent of Commercial Loss	Percent of Distribution Loss	% of Total Input Energy
1	Low Billing average - Faulty meters	39.64	4.95%	2.91%	1.36%
2	Inaccurate Meters	69.46	8.68%	5.10%	2.39%
3	Theft of energy – illegal / direct use	691.43	86.37%	50.76%	23.75%
	Total Commercial Loss	800.53	100.00%	58.77%	27.49%

As noted earlier, theft of energy by direct tapping is overwhelmingly responsible for high commercial loss in rural divisions – contributing over 87% of commercial loss, and 23.75% of input energy. Conversion to HVDS appears to be the best solution to minimise direct tapping of LT overhead conductors.

1.7 Assessment of Energy Consumption by Unmetered Agricultural Consumers

A survey was carried out on energy consumption by 206 randomly chosen agricultural consumers having energy meters installed at their end. Initial and final readings were taken for periods ranging from three weeks to one month. Consumption was normalised for a month (30 days) by assuming pro-rata consumption. The total of energy consumption (kWh) during the month by all consumers divided by the aggregate sanctioned load (HP) yielded *Agricultural Consumption Index* (*Ag Index*) for Metered Consumers in *kWh/HP/month*.

The sample size of 206 would give results within precision level (margin of error) of 7% with a confidence level of 95%. The statistical formulae and table used are discussed in detail at Section 8.7.5.1.

Agricultural (Ag) Index was calculated at **34.37 kWh/ HP / month** for the month of **September** when the study was carried out. Ag Index for the remaining eleven months of the year was calculated by multiplying the Ag Index for the month of September by the ratio of energy supplied to the rural divisions during a given month by the energy supplied in the month of September. The underlying assumption is input energy is proportional to agricultural consumption, which is a valid assumption since agricultural consumers account for 82% of rural electricity consumption in Solapur.

Based on Ag Index so calculated, the annual energy consumption by unmetered agricultural consumption was estimated at 516.7 MUs.

2. Introduction

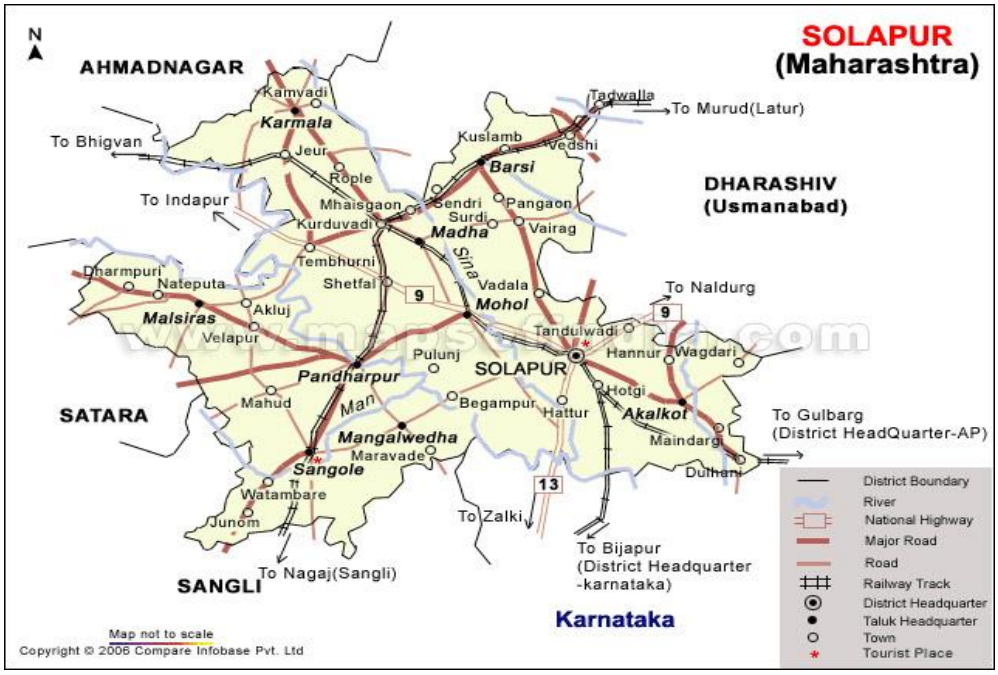
Solapur is one of the major towns of Maharashtra, located in south eastern part of the state, near the state borders with Karnataka and Andhra Pradesh. It is a point where Marathi, Kannada and Telegu languages meet. It is the administrative headquarter of Solapur district, and a municipal corporation runs its civic affairs.

In the administrative hierarchy of MSEDCL, Solapur circle is coterminous with Solapur district. The eleven talukas of Solapur district comprise of two urban talukas and nine rural talukas. The two urban talukas come under the Urban Division of Solapur circle, while the nine rural talukas are divided between the following four rural divisions of Solapur circle:

- Akluj Division
- Barshi Division
- Pandharpur Division
- Solapur Rural Division

Solapur is a predominantly agricultural district.The average annual rainfall in the district is 545 mm and the rainfall pattern does not greatly vary between one taluka and another. Out of a total cultivable area of 11480 sq. km., the irrigated area is 2961 sq. km., amounting to 26% of cultivable area.

Figure 1: Solapur District



3. The Assignment

Maharashtra State Electricity Distribution Company Limited (MSEDCL) have been in the process of implementing various measures for network strengthening, system improvement, reduction of technical and commercial losses, and improvements in metering and bill delivery and collection processes. However, attempts to find a break-up of distribution loss between (a) technical and (b) commercial loss components have not yielded results that could be relied upon.

With the promulgation of Electricity Act 2003 and various policy initiatives arising therefrom, there has been increasing pressure on the distribution licensees to identify the factors responsible for losses and to reliably determine their respective contributions to the total distribution losses. This requires determination not only of the broad break-up of distribution loss between technical and commercial loss components but also to estimate the contribution of sub-components that together add up to technical loss, and commercial loss respectively.

Maharashtra Electricity Regulatory Commission (MERC) have appointed Feedback Ventures Private Limited as the third party evaluator to estimate the technical and commercial losses within Solapur district, and to identify and estimate the factors contributing to losses. An important part of the assignment requires estimation of energy supplied to unmetered agricultural consumers.

4. Objectives and Scope of Study

The Terms of Reference (ToR) mentioned in the order of this assignment are given as below:

- Assess/ estimate the un-metered agricultural Consumption and distribution loss in sample area.

- Segregate Distribution loss in Technical and Commercial losses.

- Identify various components/ factors contributing technical losses and commercial losses and estimate their contribution in technical or commercial and total distribution losses.

- Arrive at benchmarking values of every component of technical and commercial losses by way of appropriate comparison with similar conditions of network load / consumer profile but better performance in India or globe whatever is applicable upon.

- Evaluate impact of implementation of APDRP schemes in terms of following aspects: (a) Reduction in distribution loss; (b) Improvement in quality of supply and system performance. Evaluation shall be done by comparison of base line data with targets set under the scheme vis-à-vis targets achieved after implementation of scheme.

- Observations on prudence of new schemes proposed by MSEDCL

- Suggest remedial actions for improvement in quality of supply, standard of performance and reduction in distribution losses.

The revised scope and terms of reference required Feedback Ventures Private Limited to carry out the assignment as an independent third party consultant.

Feedback Ventures Private Limited in consortium with KLG Systel deployed teams of qualified technical persons with adequate experience in the related field to identify data requirement for the study, to collect / measure various data required for study, analyse the data and to check its authenticity in Sample 1) Solapur Urban Division and Sample 2) rest of the four Divisions under Solapur Circle of MSEDCL. The network analysis study has been performed by our consortium partner M/S KLG Systel on ETAP, the well known system study software.

Based on the study this report on estimation and segregation of distribution loss for Solapur urban division and rest of the four divisions of Solapur Circle has been prepared. This report consists of the chapters as mentioned below;

Section 1: Executive Summary

Section 2: Introduction

Section 3: The Assignment

Section 4: Objectives and Scope of Study

Section 5: Approach to the Study

Section 6: Sub-Transmission & Distribution Network: Solapur Circle

Section 7: Sampling (Selection of Representative Samples)

Section 8: Methodology for Technical and Commercial Loss Estimation

Section 9: Loss Segregation- Urban Division

Section 10: Loss Segregation- Rural Division

Section 11: Factors Contributing to Losses

Section 12: Benchmarking

Section 13: Way Forward - Remedial Actions

5. Approach to the Study

5.1 Solapur Urban Division

Solapur circle has been divided into four voltage levels as shown in figure 2

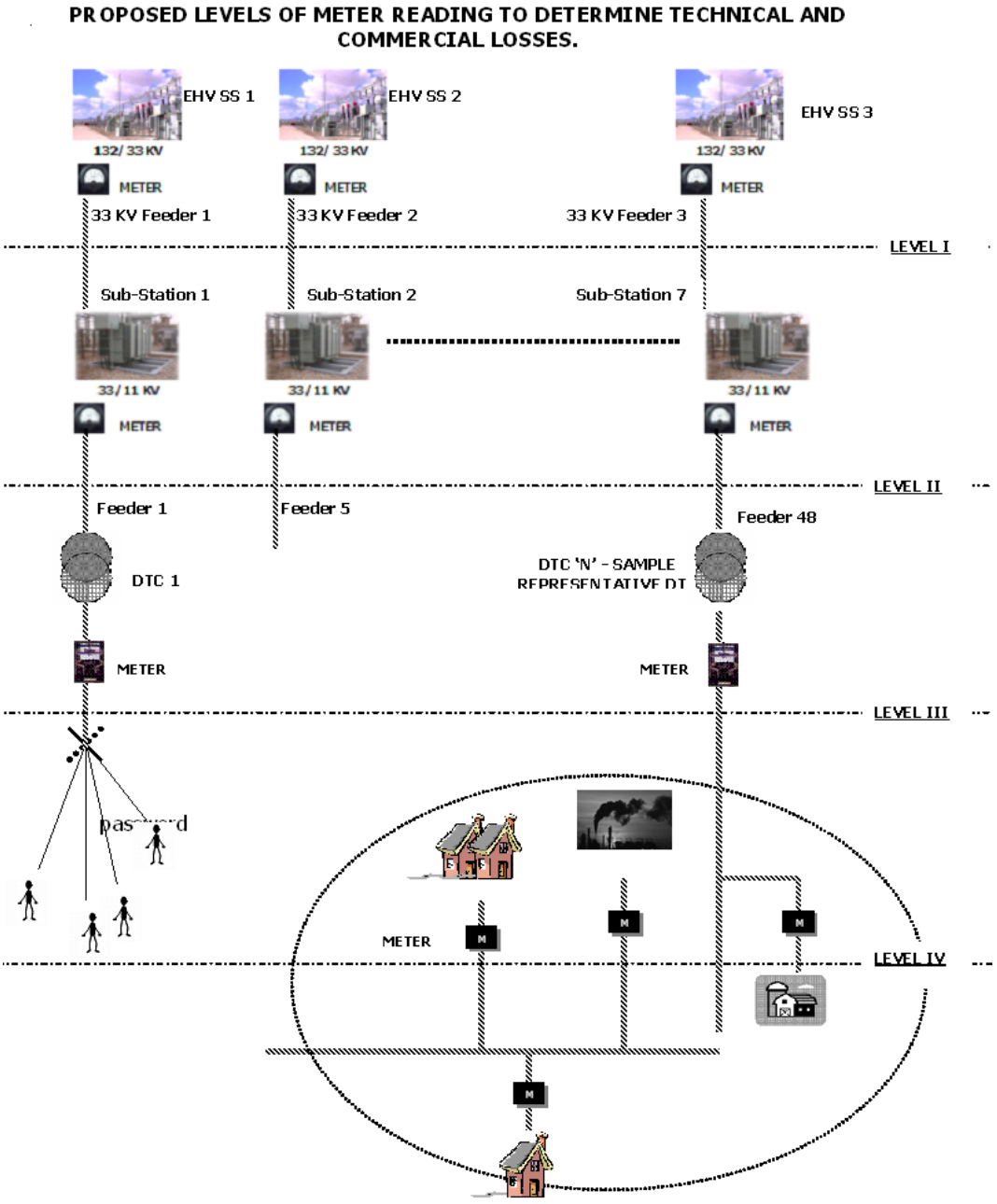


Figure 2: Voltage Levels for Loss Determination

The levels are:

- 33kV outgoing feeders at 132/33kV substations
- LV side of 33/11kV transformers/ outgoing 11kV feeders

- DTC LV side
- Consumer level

5.1.1 Technical Loss in HT Network

The electricity distribution network of Solapur urban division was studied in detail by visiting the offices and substations of MSEDCL. First, all 33kV energy input points to the division (Level 1) were identified. It was observed that except at the MIDC and Industrial Estate substations, metering at 33kV was out of order.

Next, the energy input points at 11kV were identified. During 2007-08, a few 11kV feeders had been added to the network, whence the number of 11kV feeders in the urban division went up from 48 to 54.

Finally, the DTC energy output points, i.e., all the 1051 nos. 11kV/415 V DTCs were identified.

The technical loss in HT network was assessed by two methods –by network simulation, i.e., modelling the network on a system study software and performing load flow study, and by direct reading method. The methodology for estimation of technical loss in HT networks by network simulation is discussed in Section 8.1 to 8.3, while the methodology for estimation of technical loss in HT networks by direct method is discussed in Section 8.4.

5.1.2 Distribution Loss in LT Network

Distribution loss in LT networks was determined on LT networks downstream of two representative distribution transformers in the urban division, and two representative transformers from amongst the four rural divisions. The methodology is discussed in Section 8.5

5.1.3 Technical Loss in LT Network

Technical losses in the sample LT networks were estimated by performing load flow study on the LT networks downstream of two distribution transformers from the urban division and on two distribution transformers from the four rural divisions. The detailed methodology is discussed in Section 8.6.

5.1.4 Study of O&M Practices

Interviews with meter readers and people manning the back office of billing department helped us understand the factors responsible for commercial losses.

5.2 Assessment of Demand of Unmetered Agricultural Consumers

The load supplied by the four divisions of Solapur is predominantly agricultural, and the majority of agricultural consumers are unmetered and are billed on flat rate basis. Hence assessment of unmetered agricultural consumers was done by random sampling. The methodology for assessment of energy consumed by unmetered agricultural consumers is discussed at Section 8.7

6. Sub-Transmission & Distribution Network – Solapur Circle

6.1 Solapur Urban Division

6.1.1 Power Source:

The power demand of Solapur Urban Division is 66MW. Solapur urban division receives power from three EHV substations of Mahatransco. These are:

i. 220/132/33 kV Bale Substation
ii. 132/33 kV Degaon Substation
iii. 132/33 kV MIDC Substation

Degaon and MIDC 132/33 kV substations are radially supplied from 220/132/33 kV Bale substation.

6.1.2 Sub-transmission & Distribution Network

There are eight 33/11kV substations of MSEDCL at load centres encompassing the five sub-divisions which further distribute power downstream at 11kV and below.

The 33kV sub-transmission network is interconnected. The network diagram of Solapur urban division at 33kV and above is shown in Figure 3.

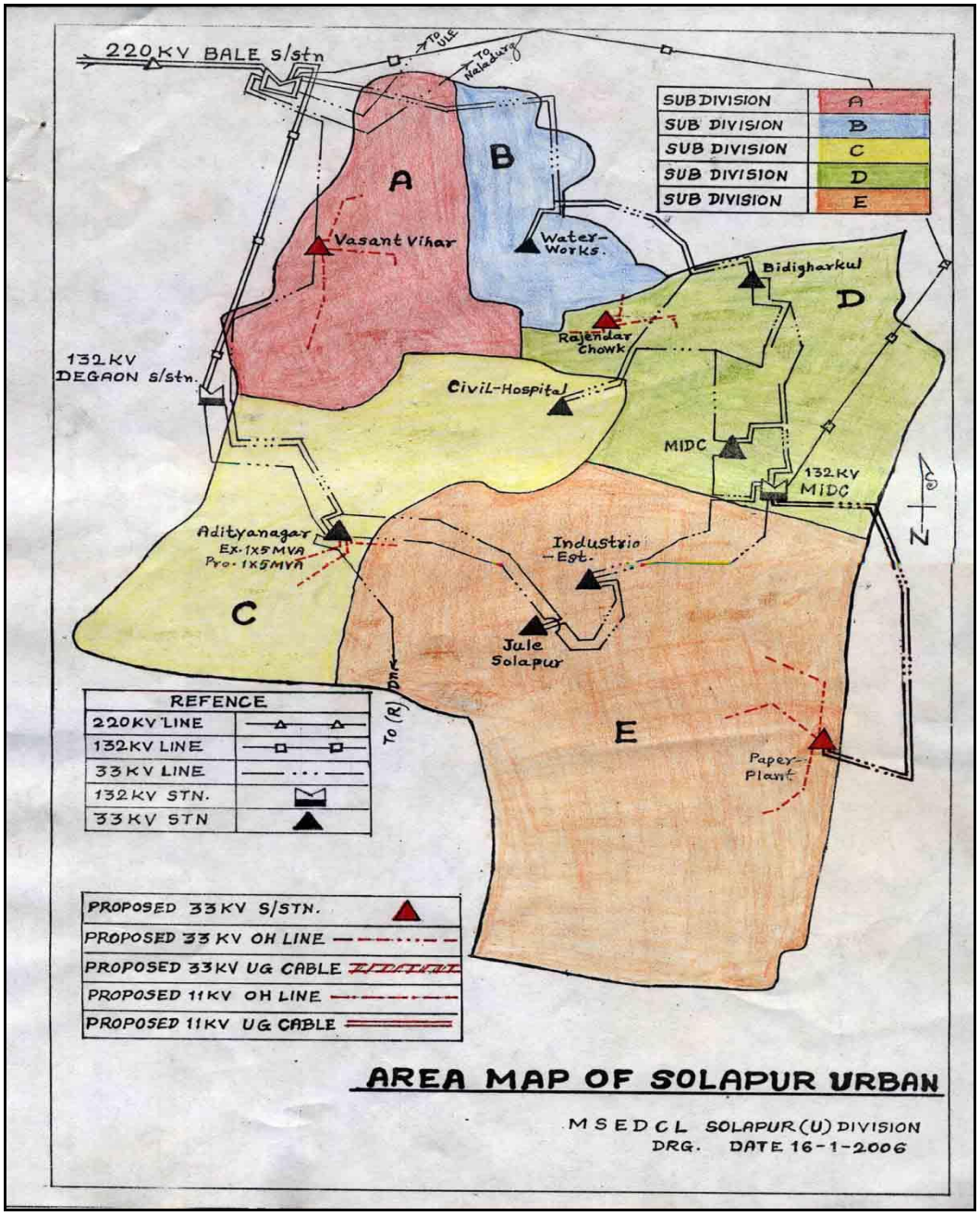
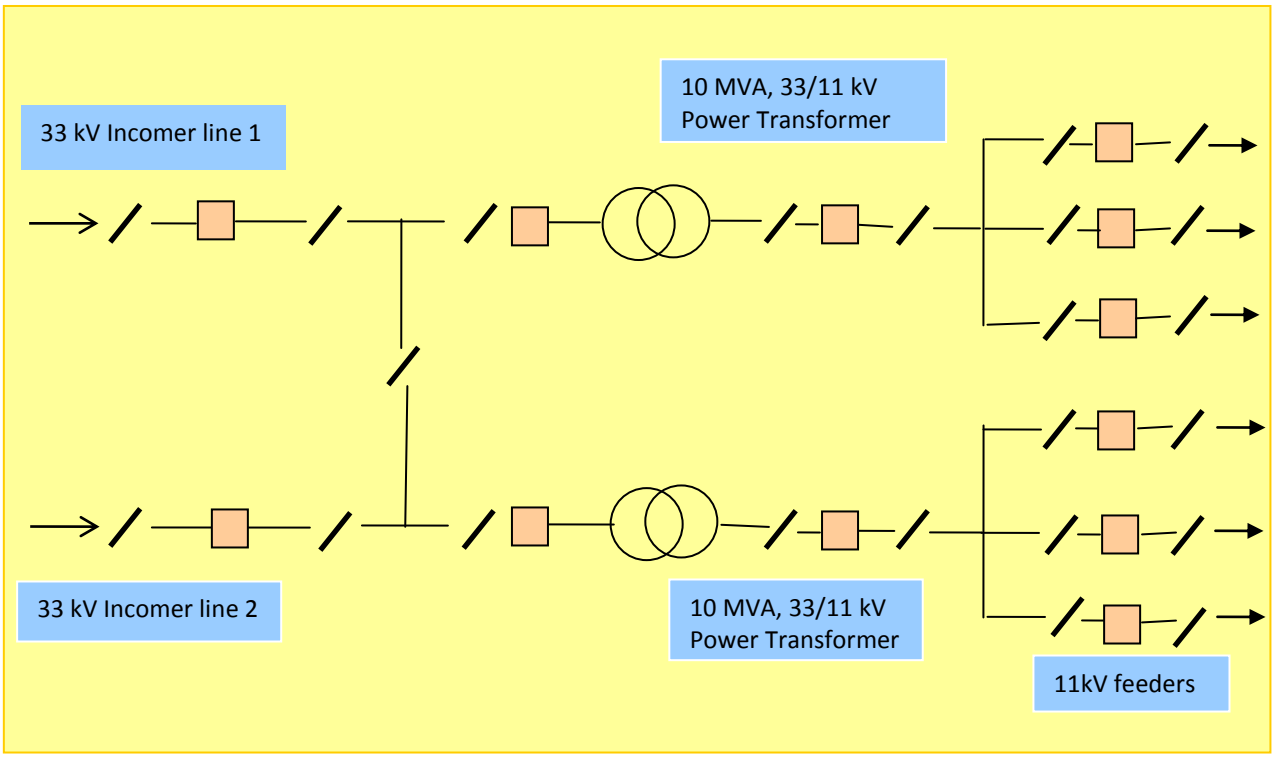


Figure 3: Sub-transmission Network: Urban Division

11kV is the distribution voltage as well as the utilization voltage for HT (11kV) consumers. 11kV is stepped down to 415 V by distribution transformers for distribution to LT consumers at 415 V (3 phase) and 240 V (single phase) .

A typical 33/11kV substation single line diagram of the urban division is shown in Figure 4 below:

Figure: 4: Typical Single Line Diagram: Urban 33/11kV Substation



The 33/11kV load centre substations of MSEDCL covering the five sub-divisions under the urban division of Solapur are listed below:

Table 6: 33/11kV Substations in Urban Division

Sl. No.	Substation	Transformers		Installed Capacity
		10 MVA	5 MVA	
1	MIDC	2 nos.	-	20 MVA
2	Industrial Estate	2 nos.	-	20 MVA
3	Bidi Gharkul	2 nos.	-	20 MVA
4	Jule Solapur	2 nos.	-	20 MVA
5	Water Works	2 nos.	-	20 MVA
6	Civil Hospital	2 nos.	-	20 MVA
7	Aditya Nagar		1 no.	5 MVA
8	Paper Plant		1 no.	5 MVA
	Total			130 MVA

The sub-transmission and distribution network of Solapur urban division is shown diagrammatically below at Figure 5

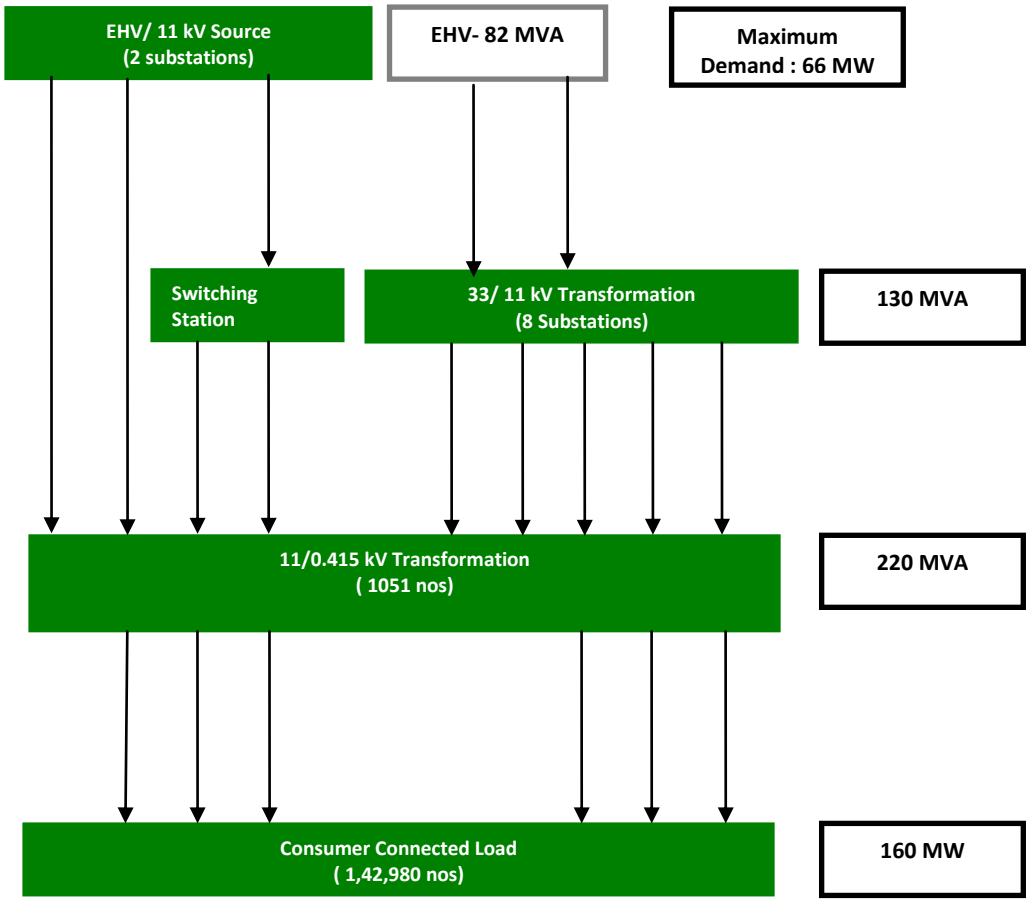


Figure 5: Capacities at Various Voltage Levels: Solapur Urban Division

6.1.3 33kV Sub-transmission Network: Conductor

The 33kV sub-transmission network of the Solapur urban division consists of 0.2 sq. inch (Al) cross section ACSR *Panther* conductor. Its current carrying capacity at 40^0C ambient temperature is 520 Amperes. The aggregate capacity of 33/11kV substations is 130 MVA.

6.1.4 11kV Primary Distribution Network: Conductor

The 11kV distribution network of Solapur urban division consists of underground cable network having a total length of 30 km and overhead line having a total length of 260 km. The conductor used is 0.1 sq. inch (Al) cross section ACSR conductor capable of carrying 325 Amperes at ambient conditions prevailing in Solapur.

Power is stepped down to LT utilisation voltage [415 V (3-phase)/ 240 V (1-phase)] by 11kV/ 415 V distribution transformers having an aggregate capacity of 220 MVA.

Reactive power compensation results in lower conductor loading, improved voltage profile and reduced I^2R losses. Fixed 11kV capacitor bank of 2.4 MVAr rating has been installed at each 33/11kV substation for providing reactive power compensation. However, these were found to be working in only two out of eight 33/11kV substations.

6.1.5 Secondary Distribution Network

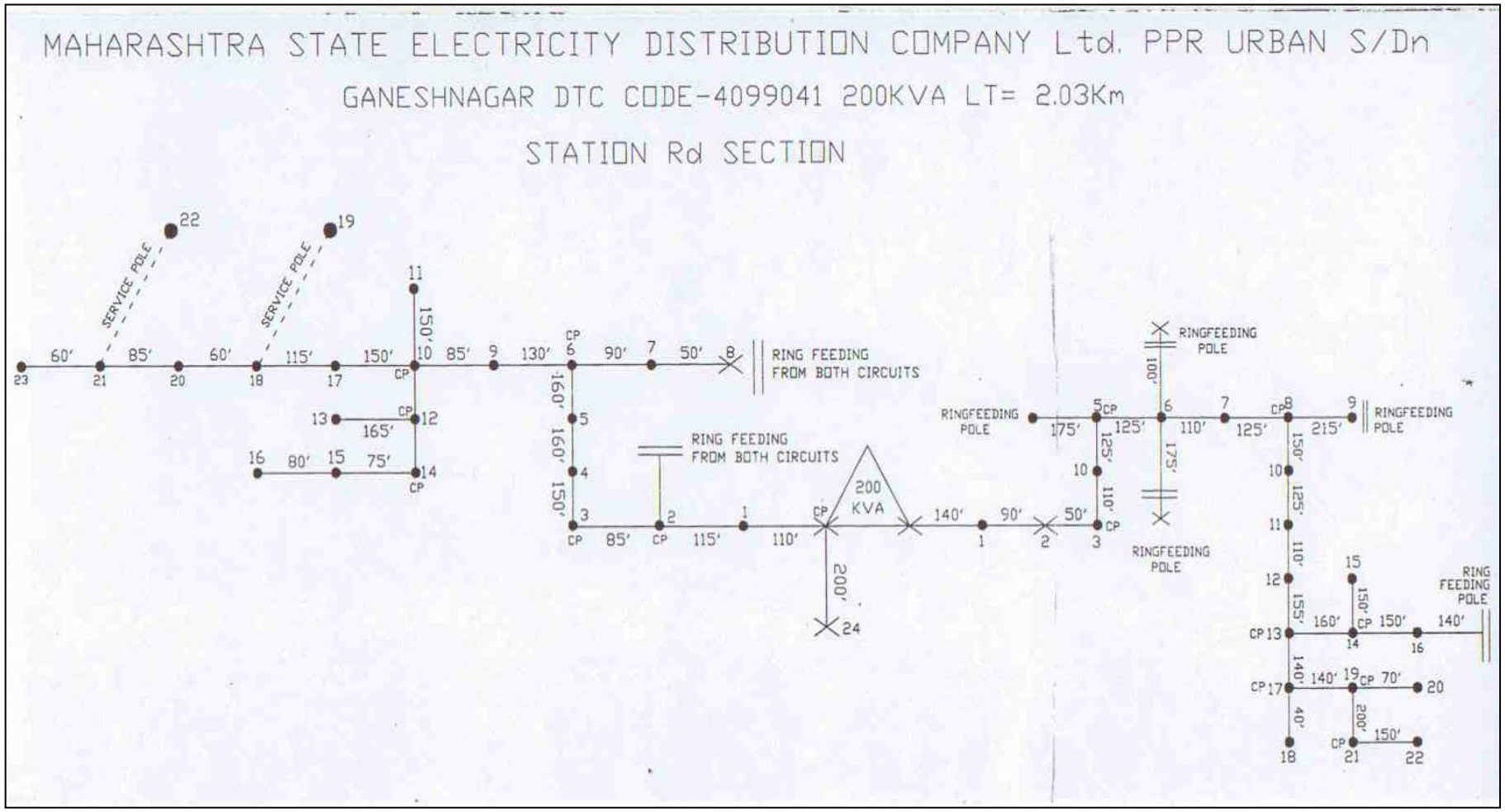
1.43 lakh urban consumers of Solapur urban division account for an annual energy consumption of 366 MUs per annum. Their requirement is met through the secondary distribution network of 415 V (3-phase) / 240 V (1-phase) derived from the distribution transformers. The secondary (LT) distribution network comprises mainly of 50 sq. mm. AAC (all aluminium conductor). The total length of LT network is approximately 963 km including underground LT cable network of 56 km.

A typical low tension radial distribution network supplied by a 200 kVA distribution transformer is shown in figure 6. Short circuit protection is provided by a drop off fuse on the 11kV side. Typically two and sometimes three LT feeders are taken out from a given transformer. A cable,typically of 185 sq. mm. cross section provides the connection between the transformer LV side and the overhead lines. Protection on the LV side of transformers is generally not provided.

Table 7: Summary of Distribution Transformers in Urban Division

Sr No	DTC Capacity (kVA)	No Of DTC	MVA capacity
1	63	28	1.76
2	100	254	25.37
3	200	625	124.92
4	250	16	4.03
5	300	34	10.32
6	315	65	20.32
7	500	19	9.68
8	750	3	2.42
9	630	9	5.42

Figure 6: 11/0.433 kV Distribution Transformer Single line diagram



6.2 Solapur Rural Divisions

6.2.1 Power Source

Power is sourced from Maharashtra State Electricity Transmission Company Ltd (MSETCL / Mahatransco). There are 7 nos. 220 kV substations, 9 nos. 132 kV substations and 5 nos. 110 kV substations (total 21 nos.) transmission substations supplying power to the four rural divisions of Solapur circle. In addition power is generated by co-generation plants that feed into the following substations of Mahatransco:

i. 132/33 kV Mohol Substation
ii. 220/132/33 kV Jeur Substation
iii. 220/132/33 kV Temburni Substation

6.2.2 Sub-transmission Network

At some EHV (220 kV & 132 kV) substations, voltage is stepped down to 33kV while at other EHV substations voltage is stepped down to 11kV in addition to 33kV level. 33kV/ 11kV substations owned and operated by MSEDCL step down the voltage to 11kV for further distribution downstream. The 33kV network of the four rural Solapur consists of 111 nos. 33kV lines.

The typical 33kV substation in a rural division of Solapur circle has a 5 MVA 33/11kV transformer supplying three nos. radial 11kV feeders. The single line diagram is typically as shown in the figure 7 below.

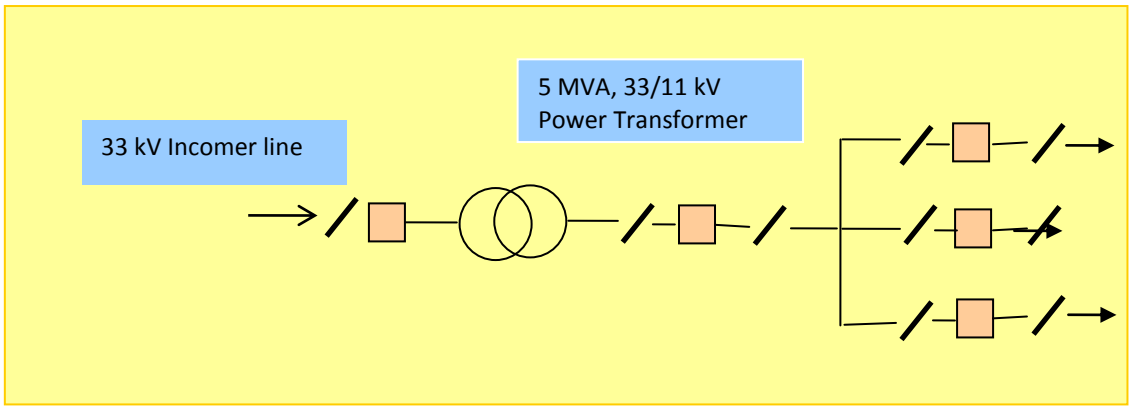


Figure 7: Typical Single Line Diagram: Rural 33/11kV Substation

6.2.3 11kV Primary Distribution Network

A network of 452 nos. overhead 11kV lines typically having 0.03 sq. inch aluminium cross section ACSR conductor distribute power across the four rural divisions of Solapur. The current rating of the conductor at the ambient conditions prevailing in Solapur is 150 Amperes (~ 2.8 MVA). The total length of 11kV feeders across rural Solapur is 4673 km.

Table 8: Summary of 11kV Feeders: Rural Solapur

Division	Line Length (km)	11 kV Feeders Nos.
Akluj	1214	74
Barshi	1122	114
Pandharpur	1133	136
Solapur (Rural)	1204	128
Total	**4673**	**452**

On an average a rural feeder in Solapur supplies 30 distribution transformers and the sum of DT capacities connected on a rural feeder comes to approximately 2.5 MVA. The distribution transformer capacity is predominantly 63 kVA (38%) and 100 kVA (54%) resulting in the average rating of 83 MVA.

Division – wise summary of the power distribution network of rural Solapur is tabulated below:

Table 9:

DTC Capacity	Akluj Divn.		Barshi Divn.		PPR Divn.		SPR (R) Divn.		Total	Total kVA	% of
kVA	(Nos)	Capacity	(Nos)	Capacity	(Nos)	Capacity	(Nos)	Capacity	(Nos)	Capacity	Total Capcity
25	12	300	21	525	22	550	17	425	72	**1800**	0.16%
50	25	1250	20	1000	33	1650	42	2100	120	**6000**	0.53%
63	992	62496	1749	110187	2304	145152	1875	118125	6920	**435960**	38.43%
100	994	99400	1649	164900	1799	179900	1685	168500	6127	**612700**	54.02%
200	31	6200	120	24000	85	17000	103	20600	339	**67800**	5.98%
250			2	500					2	**500**	0.04%
300			1	300					1	**300**	0.03%
315	1	315	11	3465	3	945	4	1260	19	**5985**	0.53%
500			1	500			1	500	2	**1000**	0.09%
630			1	630	1	630			2	**1260**	0.11%
1000			1	1000					1	**1000**	0.09%
Total	**2055**	**169961**	**3576**	**307007**	**4247**	**345827**	**3727**	**311510**	**13605**	**1134305**	**100.00%**
% of Total Nos	15.1%	15.0%	26.3%	27.1%	31.2%	30.5%	27.4%	27.5%			

Summary of Distribution Transformers: Rural Solapur

6.2.4 415 V Secondary Distribution Network

The number of consumers in rural Solapur was 4,48,077 at the end of the year 2007-08 and the connected load totalled 9,05,786 kW. While the domestic + commercial + industrial consumers totalled 2,38,104 and accounted for 17% (1,49,667 kW) of the connected load, the agricultural consumers numbering 2,09,973 accounted for 83% (7,56,119 kW).

The aggregate connected load of metered agricultural consumers numbering 62,683 constituting 30% of total agricultural consumers is 2, 41,828 kW which is 32% of the total connected load of metered and unmetered consumers taken together. The aggregate connected load of unmetered agricultural consumers numbering 1,47,290 constituting 70% of total agricultural consumers is 5,14,291 kW which is 68% of the total connected load of metered and unmetered consumers taken together.

7. Sampling (Selection of Representative Samples)

7.1 33kV & 11kV Feeder Network

The complete 33kV & 11kV networks have been modelled on ETAP software for determination of technical (I^2R) losses in Solapur circle as a whole, and hence there was no sampling involved in selection of feeders constituting 33kV and 11kV networks of Solapur. The details were collected from the field and single line diagrams built up accordingly.

7.2 Power & Distribution Transformers

The study covers estimation of technical losses in all the transformers forming part of the network – the 33/11kV power transformers (5 MVA and 10 MVA rating) and 11kV/ 415 V distribution transformers having ratings ranging from 25 kVA to 1 MVA. The transformer technical data was collected from the field and incorporated in the single line diagrams for modelling and analysis on ETAP.

7.3 LT (415 V) Distribution Network

Sample LT networks on which energy audit was performed to determine distribution losses were selected in the manner discussed below.

7.3.1 Urban Division

All distribution transformers in the urban division were classified depending on the type of consumers served by them, as follows:

i. Predominantly residential
ii. Predominantly commercial
iii. Predominantly industrial
iv. Mixed

The criteria of selection of representative samples was that these distribution transformers should supply mixed loads, have working meters at DTC level, and whose consumers are correctly mapped and have reliable meters at their end.

Table 10: Representative Transformers: Urban Division

DTC Code	Consumers (Nos)	Input Energy (Units)	Billed Energy (Units)	Energy Loss (Units)	Energy Loss %
4087130	290	14766	10686	4080	27.63
4579258	197	17775	13834	3941	22.17

7.3.2 Rural Divisions

Two representative samples from the four rural divisions were selected from amongst those that had the consumers reliably mapped and linked to the given transformers, and where consumer metering was available.

Table 11: Representative Transformers from Rural Divisions

Division	DTC name	DTC Code	Transformer Capacity (KVA)	Consumers (Nos)
Barshi	Mulge wada	4090122	100	205
Pandharpur	Ganesh Nagar	4099041	200	168

8. Methodology for Segregation of Technical and Commercial Losses

Segregation of technical and commercial losses requires estimation of *technical losses* and subtracting the same from the *T&D losses* (also called *distribution losses*) to obtain *commercial losses*. Distribution (T&D) loss is the difference between energy supplied to a network and the total energy billed. It includes both technical and commercial losses.

- Distribution (T&D) Loss = Input Energy (-) Energy Billed
- % Distribution (T&D) Loss = [Input Energy (-) Energy Billed] x 100 ÷ [Input Energy]
- Commercial Loss = Distribution Loss (-) Technical Loss
- In rural divisions, energy billed includes metered units as well as assessed energy billed to unmetered cons umers.

8.1 Estimation of Technical Losses by Network Simulation

8.1.1 Power Losses

Power losses in transmission and distribution networks comprise of I^2R losses in conductors (overhead lines and underground cables) and transformer iron and copper losses. I^2R losses are proportional to the resistance and the square of current in the conductor. Current flowing in a conductor at a given instant depends on the load – larger the load larger the current, which means power loss is proportional to the square of the percentage loading at a given instant. It is also proportional to resistance, which in turn is directly proportional to the conductor length and inversely proportional to conductor cross section. Larger the length greater the I^2R loss and smaller the cross section greater the I^2R loss. Thus power loss in a given feeder can be reduced by (a) reducing its loading/ (b) increasing the cross section of the conductor /(c) reducing the length.

By modelling a network in a system study software and running a load flow program, the power loss in each component of the network is determined as a result of the load flow study. From the power loss so determined, annual energy loss has to be determined as discussed in the following sections.

The loads assigned to the busses are the loads that occurred at the time of the peak demand of the system (not the individual feeder peaks).

8.1.2 Energy Losses

Power loss is an instantaneous quantity expressed in kW or MW. To determine energy lost as heat (I^2R loss) power loss varying from one moment to another has to be integrated over a given time period to obtain energy loss. The period of integration could be an hour, a day or a year. The unit is kWh. The energy loss cannot be obtained by multiplying power loss by the number of hours because the load keeps changing, and multiplying the power loss at the time of peak loading by the number of hours in the integration period would give an inflated loss figure. For example, if the average load remained 60% in a given feeder while the peak demand was touched only for a short period, the actual energy loss would be 36% (= $(60\%)^2$)of the power loss at peak demand multiplied by the number of hours. Hence it is necessary to introduce load factor (LF) and loss load factor (LLF) for correct determination of I^2R loss.

8.1.3 Load Factor

Load Factor is the ratio between the average demand and maximum demand of a given feeder, transformer or a network.

$$\text{Load Factor} = \frac{\text{Average Demand}}{\text{Maximum Demand}}$$

$$LF = \frac{P_{av}}{P_{max}} = \frac{\frac{1}{T}\int_0^T Pdt}{P_{max}}$$

Here P is the power varying over time (t) and P_{av} is the average demand over time T while P_{max} is the maximum demand during the time period.

Load factor is graphically illustrated in the figure 8 below:

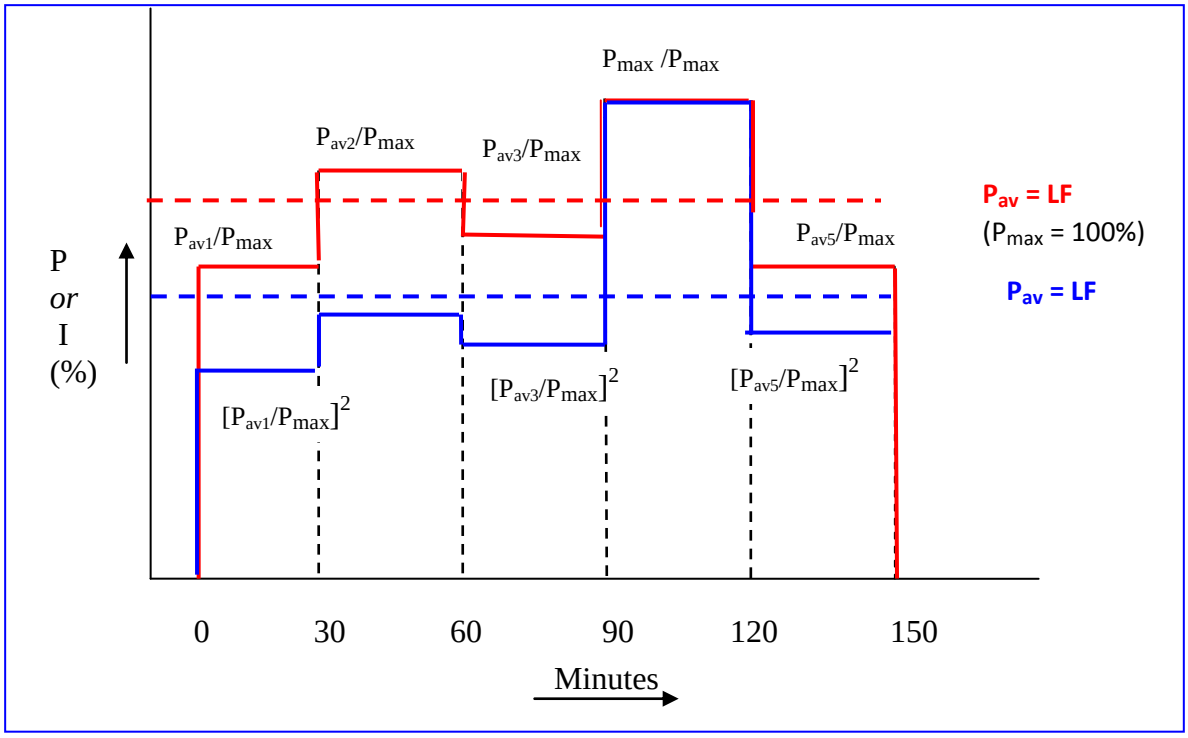


Figure 8: Load Curve (Red) and Loss Load Curve (Blue)

In the above curve of Power (P)/ Current (I) vs. time, drawn in red, the maximum demand is the highest of the average demands recorded during successive integration periods (usually 30 minutes or 15 minutes), which comes to P_{av4} in the present case.

The energy consumed or supplied during the period shown in the curve is the area below the curve ($\int Pdt$) while the average power is the area divided by the time T (150 minutes in the present case) The chain dotted horizontal line in red is the average power P_{av} over the period of the curve, and since power (P) is in 100% of maximum demand, the line also represents the load factor.

Load Factor: LF = Area below the load curve (red) drawn in ***% of P_{max}. Hours ÷ (Hours x 100)***

8.1.4 Loss Load Factor

Since the I^2R loss is proportional to the square of loading, and loading is variable, the energy loss cannot be determined by multiplying the power loss by time multiplied by the square of the load factor. For example, if the load in a 24 hour period was 100% for 12 hours and zero

for the other 12 hours, the average load would be 50% and the load factor 50%. The loss will be 100% for one block of 12 hours and zero for the other block of 12 hours. The energy loss will be 50% of what the energy loss would have been had the load remained 100% throughout. In another case, if the load were 75% for one block of 12 hours and 25% for the other block of 12 hours, the average load (and thence load factor) will still be 50%. However, since the energy loss is proportional to the square of loading, the total energy loss in this case will amount to ½ x $(75\%)^2$ + ½ x$(25\%)^2$ or 31.25% of what the loss would have been had the load remained 100% throughout. Thus it is important to determine loss load factor, which is a function of the loss curve, just as the load factor is a function of the load curve.

$$LF = \frac{Loss_{average}}{Loss_{maximum}} = \frac{L_{av}}{L_{max}} = \frac{\frac{1}{T}\int_0^T Ldt}{L_{max}}$$

8.1.5 Example : Determination of Load Factor and Loss Load Factor

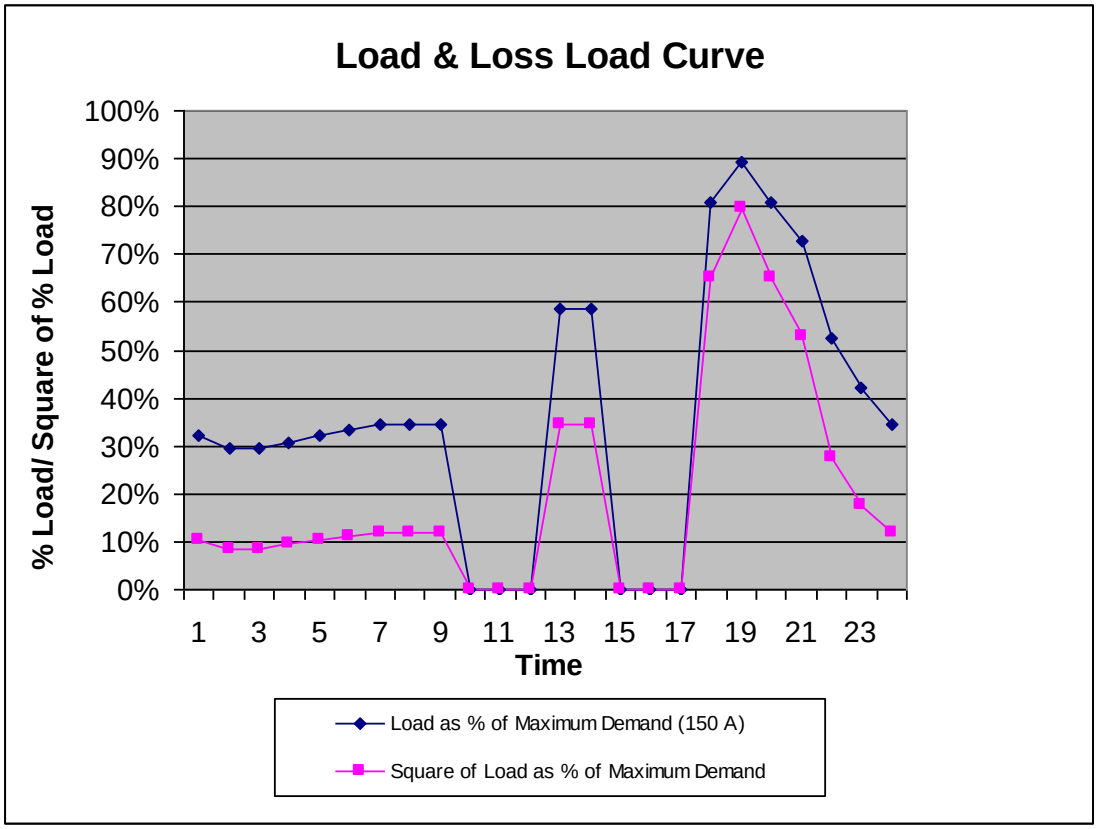
Table 12: Example: Load Curve and Loss Load Curve and Determination of LF & LLF

Hour	Load (Current: Amps)	Load as % of Maximum Demand (150 A)	Square of Load as % of Maximum Demand	Remarks
1	48	32%	10.2%	
2	44	29%	8.6%	
3	44	29%	8.6%	
4	46	31%	9.4%	
5	48	32%	10.2%	
6	50	33%	11.1%	
7	52	35%	12.0%	
8	52	35%	12.0%	
9	52	35%	12.0%	
10	0	0%	0.0%	
11	0	0%	0.0%	
12	0	0%	0.0%	
13	88	59%	34.4%	
14	88	59%	34.4%	
15	0	0%	0.0%	
16	0	0%	0.0%	
17	0	0%	0.0%	
18	121	81%	65.1%	
19	134	89%	79.8%	
20	121	81%	65.1%	
21	109	73%	52.8%	

22	79	53%	27.7%	
23	63	42%	17.6%	
24	52	35%	12.0%	
Average Current (Amps)	53.8			Ratio of Current.Time/ Time
Load Factor		36%		Ratio of % Loading.Time/ Time
Loss Load Factor			20.1%	Ratio of Square of Loading.Time/ Time

An example of drawing up load curve and loss load curve from hourly logged current (or power) of a feeder is shown below. It shows a log of 24 hours, wherein the maximum current recorded is 134 A. However maximum demand of the feeder on annual basis is known to be 150 A, whence the hourly loads have been converted to the base of maximum demand.

Figure 9: Load & Loss Load Curve



Loss load curve can be graphically determined as shown in the figure 9 by drawing the square of the load curve, determining the area below the curve and dividing the area by time

Loss Load Factor: LLF = Area below the square of the load curve (blue) drawn in

$[\%\ of\ P_{max}]^2$. *Hours ÷ (Hours x 100)*

The example shows how load factor and loss load factor are determined, and we have chosen hourly log for a day (24 hours). The annual load factor and loss load factor have been actually calculated taken into account data logged hourly for a whole year which means 8760 hours requiring the same number of rows in a spreadsheet. That is too lengthy to be included in the report, whence the example of daily logged data has been used to illustrate the application of the principle.

8.1.6 Typical Daily Load Curves: Solapur Urban Division

The hourly load curves of different types of 11kV feeders: (a) predominantly residential; (b) predominantly commercial and (c) predominantly industrial are shown below as examples of curves derived from hourly log sheets.

Figure 10: Load Curve: Residential

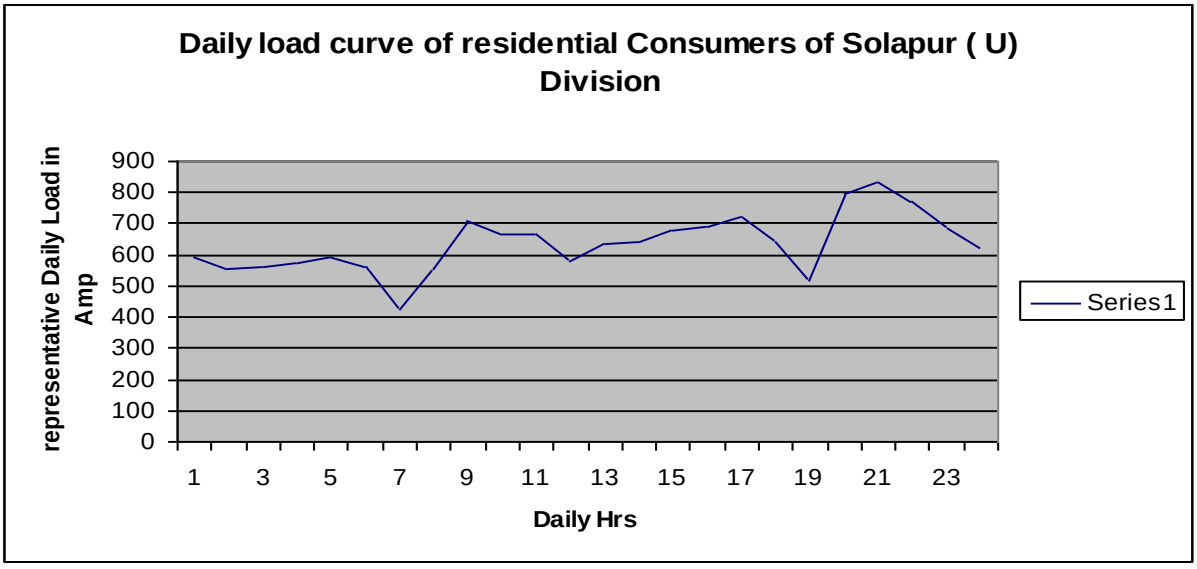


Figure 11: Load Curve: Commercial

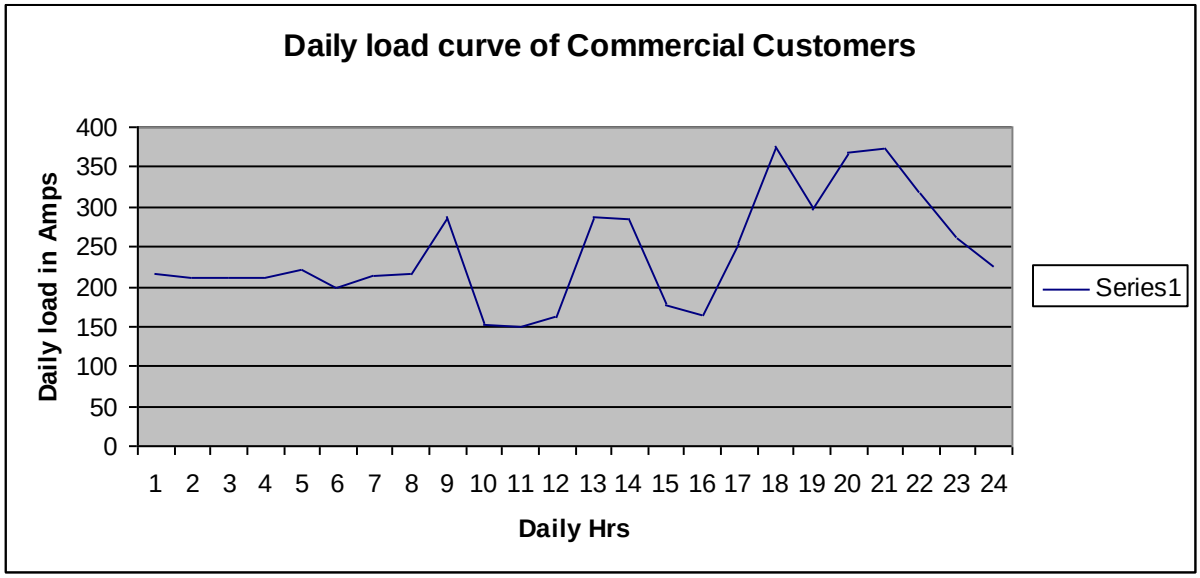
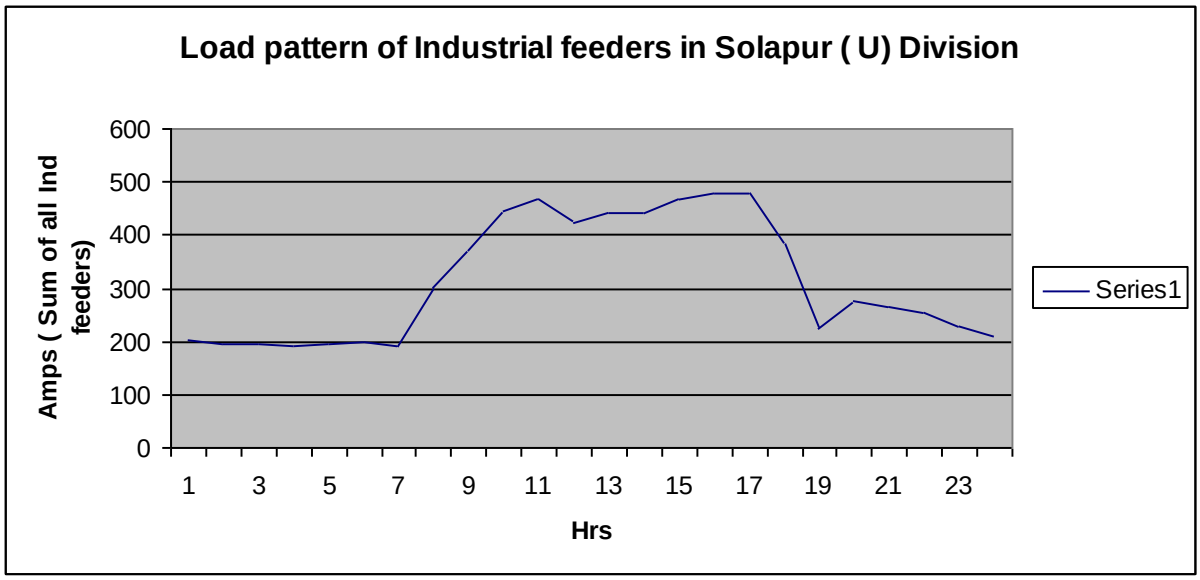


Figure 12: Load Curve : Industrial



8.2 Selection of Peak Demand for the Year 2007-08

The technical losses are determined by network parameters and system loading. Therefore the first step towards the estimation of technical losses is to decide the peak which represents the maximum demand handled by the sample network at any given point of time. The system demand varies with time of the day, seasons, festivals, rain level, crop pattern, river flow and other factors which contribute to the demand.

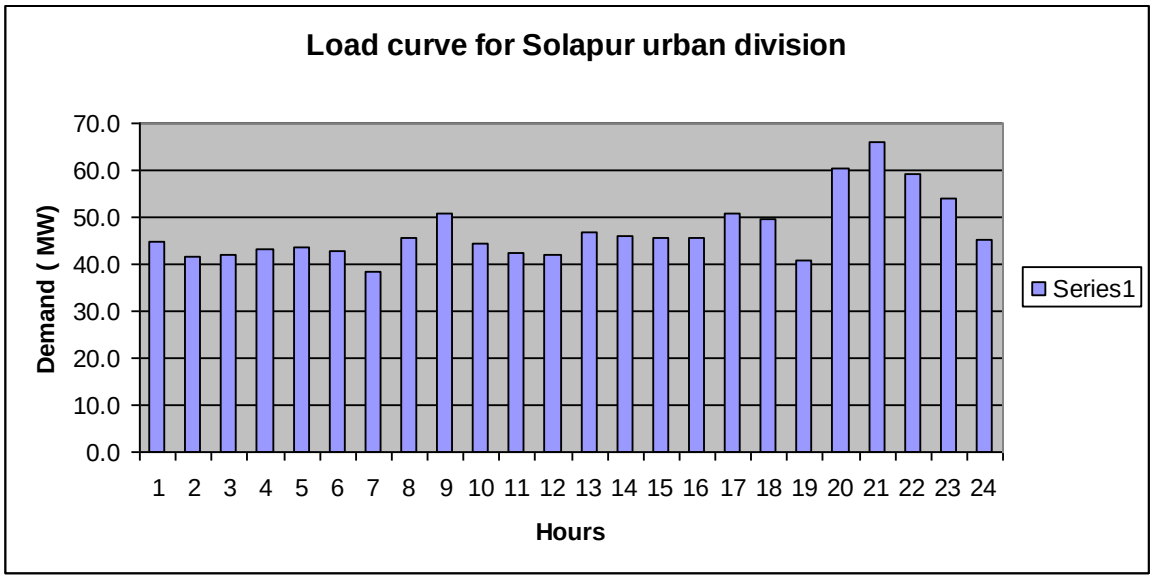
The system's highest peak occurs during the October – December i.e. just after rainy season when water is available for irrigation and October heat touches its peak level. However, the peaks recorded by individual feeders do not occur simultaneously. If the losses were determined on the basis of individual feeder peak loads, it would add up to a figure that would be above the loss experienced by the network as a whole at any time. Therefore for estimation of losses under peak conditions, the study was carried out corresponding to coincident peak conditions during FY 2007-08 for MSEDCL Network as a whole.

The maximum demand for MSEDCL network for the year 2007-08 occurred on 28th October 2007 at 2100 hours. Therefore loadings on this date have been taken as the coincident peak loads for system load flow study.

The corresponding maximum demand for Solapur urban division is 66 MW. The load curve for urban division is given in figure 6

The corresponding restricted demand for rural division is worked out as 385 MW. 186 feeders were reported to have been under load shedding at that instant. The sum of individual maximum demand of feeders under load shedding was 297 MW. The ratio of demand at 2100 hours to maximum demand of remaining feeders was 0.72. The tentative demand of feeders under load shedding is worked out as 214 MW. The unrestricted maximum demand of rural divisions is 599 MW.

Figure 10 : Load Curve of Solapur Urban Division on 28.10.2007



8.3 Modelling of HT Network for Technical Loss Determination

The HT networks of the urban and the four rural divisions from 33kV level upto distribution transformers was modelled on ETAP for conducting load flow study for determination of technical (I2R) losses in the HT network. The power (I2R) losses corresponding to coincident peak loading conditions were obtained directly as outputs from the studies. Power loss multiplied by the loss load factor and the annual operating hours (8760) yielded energy losses for the whole year.

8.4 Determination of Technical Loss in HT Network by Direct Method

To determine technical loss by direct method, energy input to the 11kV feeders from selected substations was compared with the sum of the energy outputs of all the distribution transformers supplied by it the period of study. The difference is the technical loss in the 11kV lines and distribution transformers.

8.5 Determination of Distribution Loss in LT Networks of Selected Transformers

LT networks supplied by two distribution transformers in the urban division that best represent the division in terms of size, consumer mix and losses were selected for energy loss calculation by direct method. Relevant data including consumer list, billing data etc. was obtained from the concerned sub-division. Door to door survey was carried out on all the consumers supplied by the two DTCs selected for the study. Data like sanctioned load and actual connected load found in consumers' premises, meter number, status of meter seal were collected using standard data formats designed to capture relevant data. While carrying out energy audit, the meters were checked for accuracy using Accucheck apparatus.

Likewise, two distribution transformers were selected from the four rural divisions as representative samples. The transformers selected were those (i) which that had working energy meters, (ii) whose consumers were reliably linked to them, and (iii) whose loss figures were typical of rural Solapur.

8.6 Determination of Technical Loss in LT Networks by Network Simulation

The representative LT networks were modelled on ETAP for conducting load flow study for determination of technical (I^2R) losses in the HT network. The power (I2R)

losses corresponding to coincident peak loading conditions were obtained directly as outputs from the studies. Power loss multiplied by the loss load factor and the annual operating hours (8760) yielded energy losses for the whole year

I2R losses in feeder pillars, service connections, meters and board wiring were calculated based on average loadings and loss load factors considered.

8.7 Assessment of Consumption by Unmetered Agricultural Consumers

8.7.1 Overview

MSEDCL network of rural Solapur is divided into four divisions namely Akluj Division, Barshi Division, Pandharpur Division and Solapur Rural Division. The population of Solapur district depends predominantly on agriculture for its livelihood. The rainfall is uncertain and scanty. The monsoon period is from June to end of September. The average annual rainfall for the district is 545.4 mms. The major rivers in the district are Bhima and Seena. During dry season all the rivers are nearly dry. The length of Bhima river in Solapur district is 289 kms. An area of 296107 hectares is under irrigation in the district from various sources.

While 62783 consumers are metered, the remaining 146490 consumers are unmetered and are charged on flat rate based on calculated Agricultural Consumption Index which varies from month to month. The ratio of the number of metered vs. unmetered agricultural consumers is 30%:70%

The division wise no of consumers and total connected load in HP as of 31.3.2008 is given in the Table 13.

Table 13: LT Agricultural Load as of March 2008 for Rural Divisions

Division/ Particulars	Unit	Akluj	Barshi	Pandharpur	Solapur (R)	Total	%
Unmetered consumers	Nos	22379	38923	46019	39169	146490	70.0%
Connected load	HP	103297	186453	213924	185724	689398	68.0%
Metered Consumer	Nos	8549	17634	17358	19242	62783	30.0%
Connected load	HP	42457	96460	90071	95178	324166	32.0%
Total Consumers	**Nos**	**30928**	**56557**	**63377**	**58411**	**209273**	**100%**
Connected load	**HP**	**145754**	**282913**	**303995**	**280902**	**1013564**	**100%**

Source: MSEDCL IT Department

8.7.2 Study of AS IS process of Billing of AG consumers in Solapur Rural Divisions

The "AS IS" process for the billing of AG consumers has been mapped based on discussions with Divisional Accountant (D/A), Assistant Accountant (A/A) & Technical officer (i.e. Assistant Engineer AE, Junior Engineer JE).

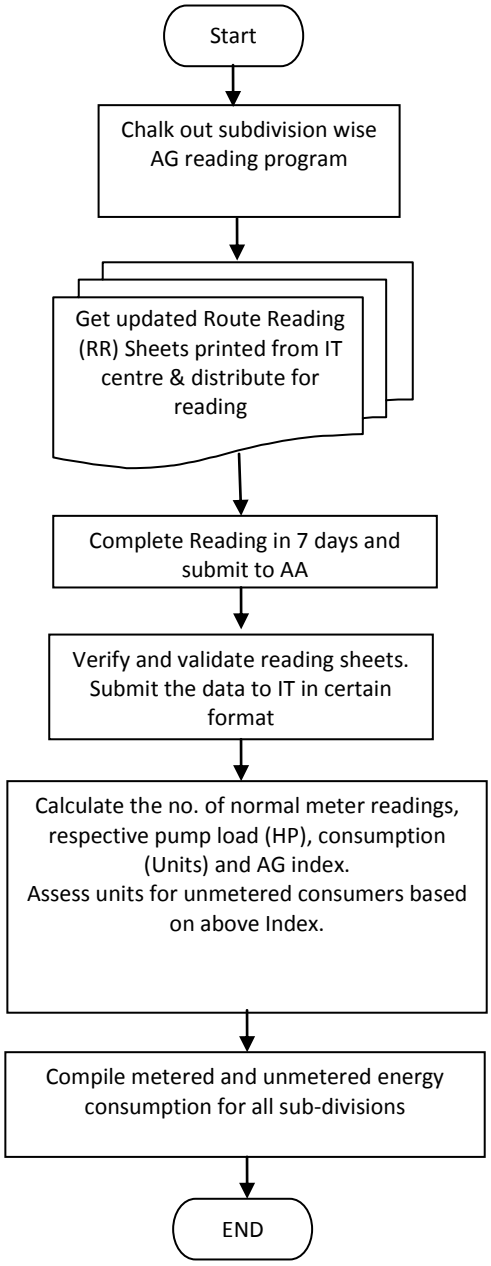
The important points of the study are as follows;

- Agricultural, residential and commercial consumers of rural areas are billed on quarterly basis. Other loads like industrial, public water works and street lights are billed on monthly basis
- Assistant Accountant (AA) acts upon the remarks given regarding connected load by meter readers and verifies the tariff applied. AA also verifies and validates the readings and abnormalities
- *Agricultural Consumption Index* (Ag Index) is the ratio of sum of energy consumption (kWh) recorded to the load in horse power (HP) of exclusively normal status meters of concern subdivision.
- Subdivision officer, based on the AG index obtained from normal readings of the metered consumers assesses energy consumed by unmetered consumers proportional to connected load.
- Tariff for AG unmetered consumers (LT) is Rs 150 /Month / sanction load (HP)
- MIS report is generated after each meter reading cycle by IT & submitted to sub-division/ section office for necessary action.

Quarterly AG index for all subdivisions of rural area is given in Annexure 3

The typical sample process flow chart of billing of agricultural consumer is shown in the following figure.

Figure 11: Flow chart of Billing Process of Ag Consumers in Rural Divisions

Flow Chart	Responsibility
	Divisional Accountant Assistant Accountant Meter Reader Assistant Accountant IT Centre In Charge Division Office

8.7.3 Analysis of Sub-Division Wise Agricultural Consumers & Connected Load

Table 14: Taluka wise Agricultural Consumers & Connected Load

Taluka	Metered				Unmetered			
	Consumers (Nos)	Percent of Total	Total Connected Load (HP)	Average Connected Load (HP)/ Consumer	Consumers (Nos)	Percent of Total	Total Connected Load (HP)	Average Connected Load (HP)/ Consumer
Akkalkot	3703	24.9%	18468	5.0	11167	75.1%	50811	4.6
North Solapur	2895	36.1%	14401	5.0	5122	63.9%	22819	4.5
South Solapur	5666	37.3%	28845	5.1	9508	62.7%	48116	5.1
Mohol	6878	32.7%	33464	4.9	14172	67.3%	63978	4.5
Mangal - wedha	3671	29.7%	18565	5.1	8695	70.3%	39298	4.5
Pandharpur	9389	30.2%	52972	5.6	21712	69.8%	109174	5.0
Madha	6617	30.3%	38298	5.8	15240	69.7%	73525	4.8
Karmala	2958	34.1%	17376	5.9	5706	65.9%	29844	5.2
Barshi	8059	31.0%	40786	5.1	17977	69.0%	83084	4.6
Sangola	4193	21.2%	17839	4.3	15610	78.8%	65437	4.2
Malshiras	8549	27.6%	42457	5.0	22379	72.4%	103297	4.6
Total	**62578**	**29.8%**	**323471**	**5.2**	**147288**	**70.2%**	**689383**	**4.7**
Median (of sub-division wise averages)				**5.1**				**4.6**

We observe from the above table that:

i. The sub-division wise average connected load shows little difference to the average (5.2 HP & 4.7 HP) as well as the median of the averages (5.1 HP & 4.6 HP) in respect of both metered and unmetered consumers

ii. The sub-division wise average connected loads of metered and unmetered consumers in a given sub-division are very nearly equal and close to the average and median of sub-division –wise average connected load

iii. Across the sub-divisions, the percentage of unmetered consumers is close to the overall average of 70.2% and that of metered consumers close to the overall average of 29.8%.

Conclusion: The above observations lead to the conclusion that the sub-division wise consumption of agricultural consumers is not likely to show variance across the geographical areas and therefore the sampling of agricultural consumers does not necessarily have to be spread across the four divisions equally.

8.7.4 Agro-climatic Characteristics of Solapur District:

[Ref: Department of Agriculture, Government of Maharashtra; http://www.mahaagri.gov.in/CropWeather/AgroClimaticZone.html#sz]

8.7.4.1 Rainfall:

The major part of Solapur district lies in the Western Maharashtra Scarcity Zone characterised by very low, uncertain and unevenly distributed rainfall. Occurrence of drought is noted every three years. The average annual rainfall is less than 750 mm in 45 days. There are two peaks in rainfall that occur in June/July and September respectively.

8.7.4.2 Soil Type:

General topography is having slope between 1-2%. Infiltration rate is 6-7 mm/hr.The soils are vertisol. Soils have Montmorilonite clay. Poor in nitrogen, low to medium in phosphate & well supplied in potash.

8.7.4.3 Crops and Cropping Pattern:

Based on bimodal distribution of rainfall hence two cropping systems are noticed. During kharif shallow & poor moisture retentive soils are cultivated. Medium deep, moisture holding capacity soils are diverted to rabi cropping. Kharif cropping 25-30%Jowar is the predominant crop grown in 70% of the gross area under cultivation. Wheat is a distant second at 5.11%, with gram at the third position at 3.92%. All these are winter (rabi) crops. Area going under paddy cultivation is increasing. Cultivation of sugarcane and summer crops is taken up on availability of irrigation. The area under sugarcane cultivation stood at 3.71%, far below jowar and below wheat and gram. Reliable estimates of area, production and productivity of the principal crops are available for the year 2004-05. The information is tabulated below.

SOLAPUR DISTRICT: ESTIMATES OF AREA, PRODUCTION & PRODUCTIVITY OF PRINCIPAL CROPS DURING 2004-05

Name of Crop	Area		Production x 10^3 tons	Productivity kg/Ha
	sq.km.	% of total		
Kh. Rice	4	0.04%	0.1	250
Kh. Jowar	4	0.04%	0.3	750
Rb. Jowar	6869	70.06%	302.6	441
Bajri	262	2.67%	15	573
Kh. Maize	131	1.34%	14.5	1107
Rb. Maize	130	1.33%	21.4	1646
Su. Maize	16	0.16%	2.5	1563
Other Kh. Cereals	33	0.34%	0.8	242
Tur	158	1.61%	5.5	348
Mung	37	0.38%	2.7	730
Udid	50	0.51%	4.4	880
Other Kh. Pulses	152	1.55%	3.4	224
Wheat	501	5.11%	56.2	1122
Oth. Rb. Cereals	34	0.35%	0.7	206
Gram	384	3.92%	18.8	490
Kh.Gr.nut	53	0.54%	3.4	642
Su.Gr.nut	46	0.47%	5.6	1217
Kh.Sesamum	4	0.04%	0.1	250
Nigerseed	2	0.02%	0.1	500
Kh. Sunflower	127	1.30%	6.7	528
Rb. Sunflower	252	2.57%	14	556
Su. Sunflower	4	0.04%	0.3	750
Soyabeen	21	0.21%	4.7	2238
Other Kh.Oilseeds	3	0.03%	0.1	333
Safflower	150	1.53%	7.8	520
Linseed	4	0.04%	0.1	250
Sugarcane	364	3.71%	2632.8	72330
Cotton	10	0.10%	1.9	1900

[Ref: Maharashtra Government: Department of Agriculture website: http://www.mahaagri.gov.in/distprofile/Solapur.html]

8.7.4.4 Groundwater:

Geo-physical investigations show that in a trap-covered terrain, vesicular traps when they occur below the water table, serve as principal repositories of groundwater under both

confined and unconfined conditions. The inter-trappean sedimentary horizons also serve as good aquifers. But no such beds have been reported in Solapur district. Infiltration of rainwater is the only means by which the annual re-charging of the groundwater body takes place. Hence the groundwater reserve in the district is entirely dependent on the amount and distribution of rainfall. Since the average annual rainfall of the district is very meagre, being around 50-60 cm, the annual re-charge of the groundwater body is also very scanty. Hence the general position of the groundwater in the district is not satisfactory. The individual trap flows in the southern part of Sholapur district have been tested for their yields in the partially penetrating open wells, where they are observed to yield a discharge of about 5 to 10 litres per second (*i.e.,* 4,000 to 9,000 gallons per hour) for a draw down of 1 to 3 metres. The chemical quality of groundwater tapped from the vesicular zones is generally good and quite suitable for irrigation and domestic purposes. There is, therefore, adequate scope for effectively harnessing the groundwater in open wells by tapping for unconfined vesicular traps by fully penetrating them. Some of the state government schemes such as constructions of dams and light irrigations in the Bhima basin and other areas have been helpful in easing the situation with regard to the domestic and irrigational requirement for groundwater in the hinterland.

[Ref: Solapur District Gazetteer, Government of Maharashtra; website: http://maharashtra.gov.in/english/gazetteer/Solapur/gen_geology.html

8.7.5 Determination of Agricultural Consumption Index & Energy Consumption by Unmetered Agricultural Consumers

i. Agricultural Consumption Index (Ag Index) for the month of September (the month during which the study of agricultural consumers was carried out) was first determined by recording actual consumption of the representative metered consumers during the month and dividing the aggregate consumption by the aggregate connected load in HP.

ii. The Ag Index for the remaining eleven months of the year was then determined by multiplying the Ag Index of September by the ratio of energy input to rural network during the month by the energy input during the month of September. The assumption implicit in this proportionality is that the energy consumed by agricultural consumers in a given month is proportional to the total energy input

to the rural network since the rural demand is predominantly owing to agricultural consumption.

iii. Month-wise energy consumption by unmetered agricultural consumers was determined by multiplying the Ag Index for the month by the aggregated connected load of the unmetered agricultural consumers

iv. By adding up the month-wise consumption, the annual energy consumption by unmetered agricultural consumers was obtained.

The formulas used were:

$$\text{Agricultural Consumption Index (kWh/HP/month)} = \frac{\text{Aggregate consumption during the month (kWh)}}{\text{Aggregate connected load (HP)}}$$

$$\text{Ag Index (in a given month)} = \text{Ag Index (September)} \times \frac{\text{Input energy during the month}}{\text{Input energy during the month}}$$

For analysis of data and calculation of various parameters, Section 10.1 of the report may be referred.

8.7.6 Sampling of Agricultural Consumers

For determination of agricultural consumption by statistical methods, a minimum number of representative samples must be selected, and then chosen randomly from amongst the consumers. As seen at Section 8.7.3 above, consumption pattern across rural Solapur does not exhibit notable differences between one part and another. The agro-climatic characteristics of Solapur district – rainfall, soil quality, crops and cropping pattern are not known to vary to any significant degree across the district as brought out at Section 8.7.4 above. Hence a random selection across Solapur urban divisions is expected to yield reliable results for the whole of rural Solapur. Sampling size should be large enough to yield results within defined margin of error and level of confidence.

8.7.6.1 Determination of Sampling Size

Three criteria usually will need to be specified to determine the appropriate sample size:

- Level of precision
- Level of confidence or risk
- Degree of variability in the attributes being measured

Level Of Precision

The *level of precision*, sometimes called *sampling error*, is the range in which the true value of a calculated parameter is estimated to be.

Confidence Level

When a population is repeatedly sampled, the average value of the attribute obtained by those samples is equal to the true population value. Furthermore, the values obtained by these samples are distributed normally about the true value, with some samples having a higher value and some obtaining a lower score than the true population value. In a normal distribution, approximately 95% of the sample values are within two standard deviations of the true population value (e.g., mean). In other words, this means that, if a 95% confidence level is selected, 95 out of 100 samples will have the true population value within the range of precision specified earlier

Degree Of Variability

The third criterion, the degree of variability in the attributes being measured refers to the distribution of attributes in the population. The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. The less variable (more homogeneous) a population, the smaller the sample size. Note that a proportion of 50% indicates a greater level of variability than either20% or 80%. This is because 20% and 80% indicate that a large majority do not or do, respectively, have the attribute of interest. Because a proportion of .5 indicates the maximum variability in a population, it is often used in determining a more conservative sample size, that is, the sample size may be larger than if the true variability of the population attribute were used.

The following formula gives the sample size:

$$n = \frac{N}{1+ N(e)^2}$$

n is the samples size, **N** is the population to be sampled, and **e** is the sampling error or degree of precision. This equation is valid for the maximum possible degree of variability (0.5) within a group.

The table 15 below shows the sampling size for different populations and precision levels (sampling errors) for confidence level of 95% and the highest degree of variability (P= 0.5)

Table15: Sample Size for ±3%, ±5%, ±7% and ±10% Precision Levels (Margins of Error) with Level of Confidence 95% and P= 0.5

Population Size	Sample Size for Precision Level (e) of:			
	±3%	±5%	±7%	±10%
1000	All	286	169	91
2000	714	333	185	95
5000	909	370	196	98
10000	1000	385	200	99
20000	1053	392	204	100
50000	1087	397	204	100
100000	1099	398	204	100

A sample size of **204** will thus yield results within a precision level (margin of error) of ±7% with a level of confidence of 95%.

8.7.6.2 Sampling Actually Done

206 metered agricultural consumers were selected across the four rural divisions. The break-up is as follows:

Barshi: 40

Pandharpur: 26

North Solapur: 78

Akkalkot: 62

Total: 206

Besides 206 metered consumers surveyed across rural Solapur, 212 unmetered consumers were surveyed as well. Results of the survey of unmetered consumers provided data supporting the observations made at Section 8.7.3

9. Segregation of Technical and Commercial Losses – Urban Division

9.1 Estimation of Technical Losses in HT Network: From 33kV upto DTC Level

The complete distribution network of Solapur urban division from 33kV level going down to the DTC level was modelled on ETAP system study software. Technical (I^2R) Losses were obtained as output of the load flow study. The study covered all the 33kV feeders, 33/11kV transformers, 11kV feeders and the distribution transformer centres (DTCs).

i. The network single line diagrams were prepared based on data obtained from the field offices of MSEDCL. The data was validated by visiting the substations.

ii. Load data was collected from the field offices and from log sheets maintained at the substations. The log sheets at the substations record hourly meter readings of current and voltage and readings of energy meters.

iii. The loads assigned to the nodes of the network were those logged at the time of coincident maximum demand of the state of Maharashtra in the year 2007-08, which occurred on 28th October 2007. Voltage, current and power factor were obtained from the log sheets maintained at the substations.

iv. Name plate ratings of all distribution transformers were obtained from the field offices of MSEDCL . These were randomly cross verified for data accuracy. Wherever data was not available, standard data for transformers of similar ratings available in the library of the system study software were used.

v. The load flow study yielded power loss corresponding to peak load conditions. Power loss was multiplied by the annual loss load factor (see Section 8.1.4) and annual operating hours (8760 hours) to give annual energy losses in a given network element.

9.1.1 Technical Loss in 33 kV Network

All 33 kV lines along with the substations were mapped and digitised on ETAP software based on the information collected from MSEDCL field offices and substations. Load flow was performed on the network based on the loads corresponding to coincident maximum demand of Maharashtra. The summary of calculated power loss in 33 kV network at 2100 Hour on 28.10.2007 is given in the Table 16:

Figure 12: 33 kV Network: Urban

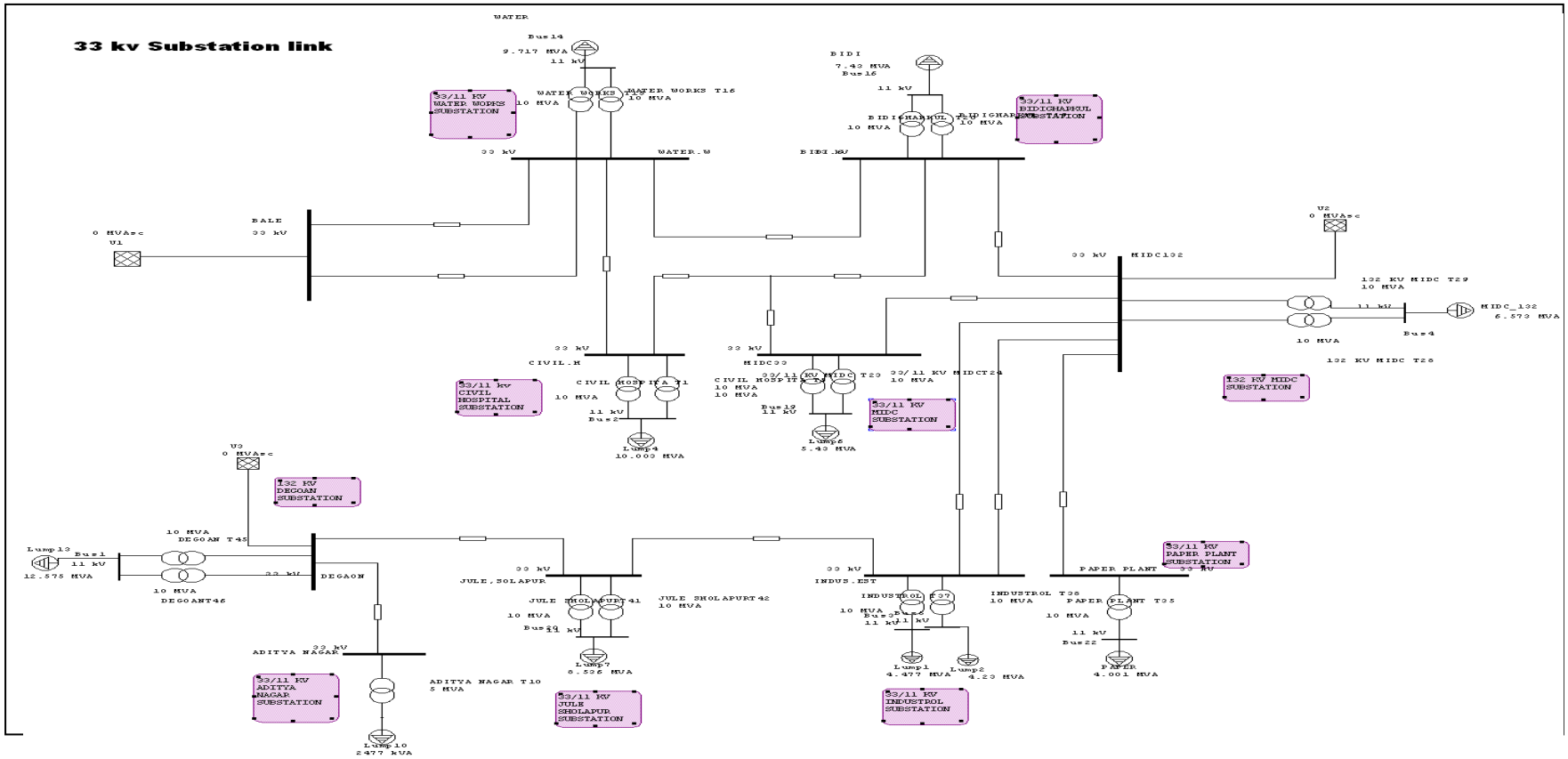


Table 16: Report - Technical Loss 33 kV Network

ID	Type	% Voltage Drop	kW Loss	kVAr Loss
Line2	33 kV Line	0.05	0.709	0
Line3	33 kV Line	0.27	19.228	0
Line4	33 kV Line	0.05	0.611	0
Line6	33 kV Line	0.27	13.741	0
Line7	33 kV Line	0.23	18.642	0
Line9	33 kV Line	0.23	18.642	0
Line11	33 kV Line	0.18	10.122	0
Line12	33 kV Line	0.18	16.541	0
Line14	33 kV Line	0.05	6.253	0
Line15	33 kV Line	0.14	6.586	0
Line17	33 kV Line	0.09	4.862	0
Line19	33 kV Line	0.09	4.862	0
Line21	33 kV Line	0	0.009	0
Line22	33 kV Line	0.09	2.497	0
Line24	33 kV Line	0.05	1.668	0
T1	33 / 11 kV Transformer	2.66	14.653	227
T5	33 / 11 kV Transformer	2.66	14.653	227
T10	33 / 11 kV Transformer	2.3	8.106	98.406
T15	33 / 11 kV Transformer	2.57	13.766	213
T16	33 / 11 kV Transformer	2.57	13.766	213
T19	33 / 11 kV Transformer	1.44	4.385	67.97
T20	33 / 11 kV Transformer	1.44	4.385	67.97
T23	33 / 11 kV Transformer	1.41	4.227	65.52
T24	33 / 11 kV Transformer	1.41	4.227	65.52
T35	33 / 11 kV Transformer	2.1	9.269	144
T37	33 / 11 kV Transformer	4.84	12.018	186
T38	33 / 11 kV Transformer	2.23	10.369	161
T41	33 / 11 kV Transformer	0.73	1.162	18.008
T42	33 / 11 kV Transformer	0.73	1.162	18.008
	33 kV Line Loss		**125.0 kW**	
	33 kV Transformation Loss		**116.1 kW**	
	Total 33 kV network Loss		**241.1 kW**	

Energy loss in 33 kV lines = 125.0 kW × 24 × 0.399 × 365 / 10^6 MU = 0.44 MU

(LLF = 0.399; based on avg. 11 kV LLF)

Energy loss in 33 kV / 11 kV Transformation = 116.1 kW × 24 × 0.399× 365 / 10^6 MU = 0.41 MU

Total Energy Loss in 33 kV network = 0.85 MU

Total Energy Input in the urban network at 33 kV = 366.53 MU

Total Energy Input in the urban network at 11 kV = 366.53 – Technical loss in 33 kV network = 366.53 – 0.85 = 365.69 MU

The HT consumers are fed and metered at 11 kV. Hence net energy Input in the urban network at 11 kV network is calculated after subtracting HT billed energy i.e. 80.8 MU.

Total Energy Input in the urban network at 11 kV = 365.69 MU – 80.8 MU= 284.89 MU

Net energy input to 11 kV network is 284.89 MU

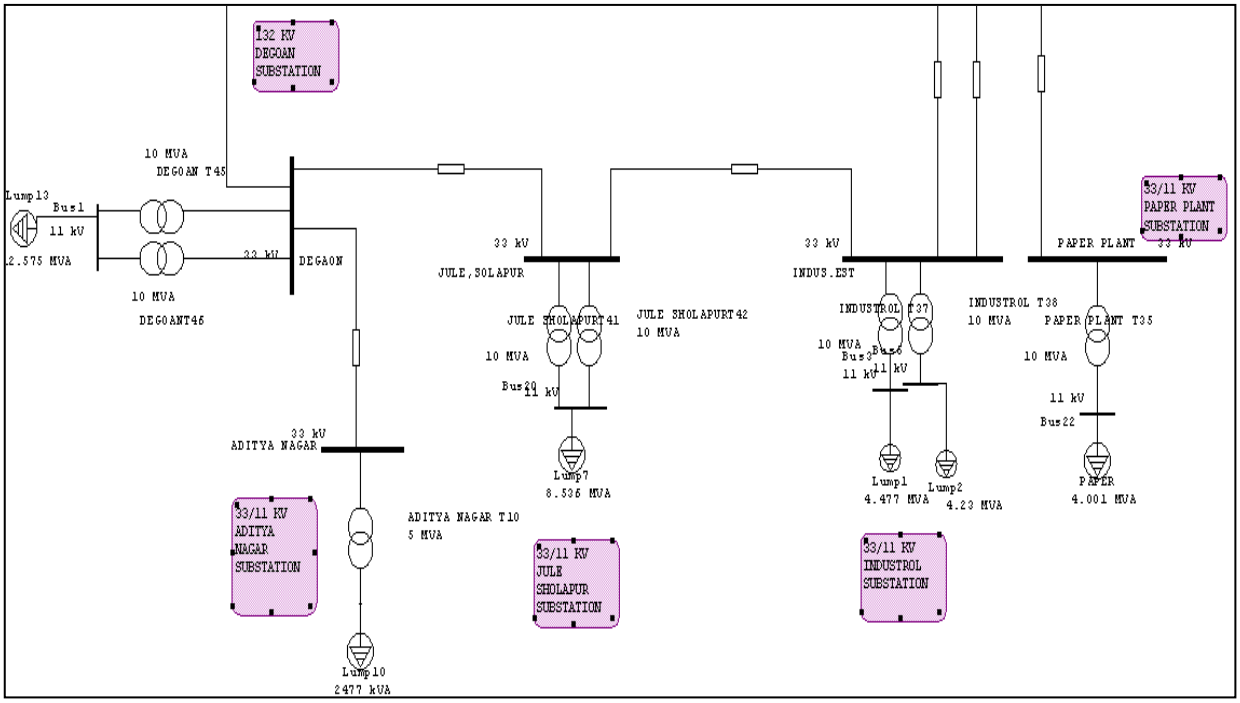


Figure 13: Load flow diagram: 33kV network

9.1.2 Technical Loss in 11 kV Network

All feeders were mapped and digitised on ETAP software as per the information collected and then simulated for the corresponding load of the representative day. The simulation report consists of the 11 /0.44 kV transformation loss and line loss in kW. The summary of estimated technical loss in 11 kV network at 2100 Hour on 28.10.2007 is given in the Table 12.

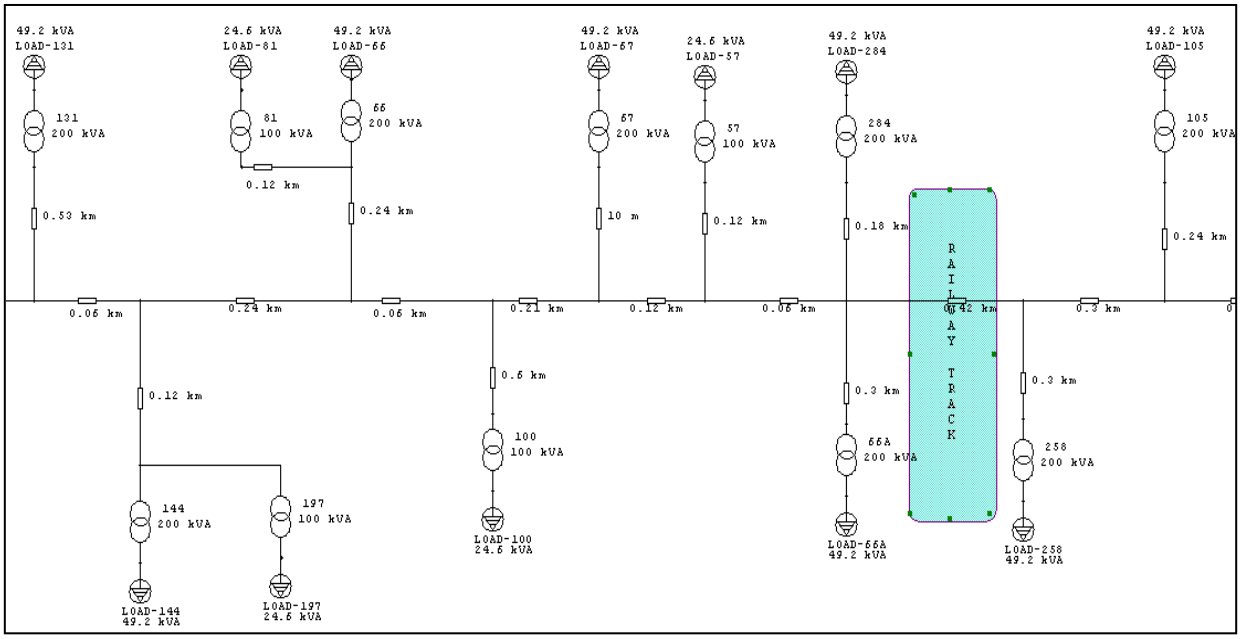


Figure 14: Load flow diagram: 11kV Ramwadi Feeder

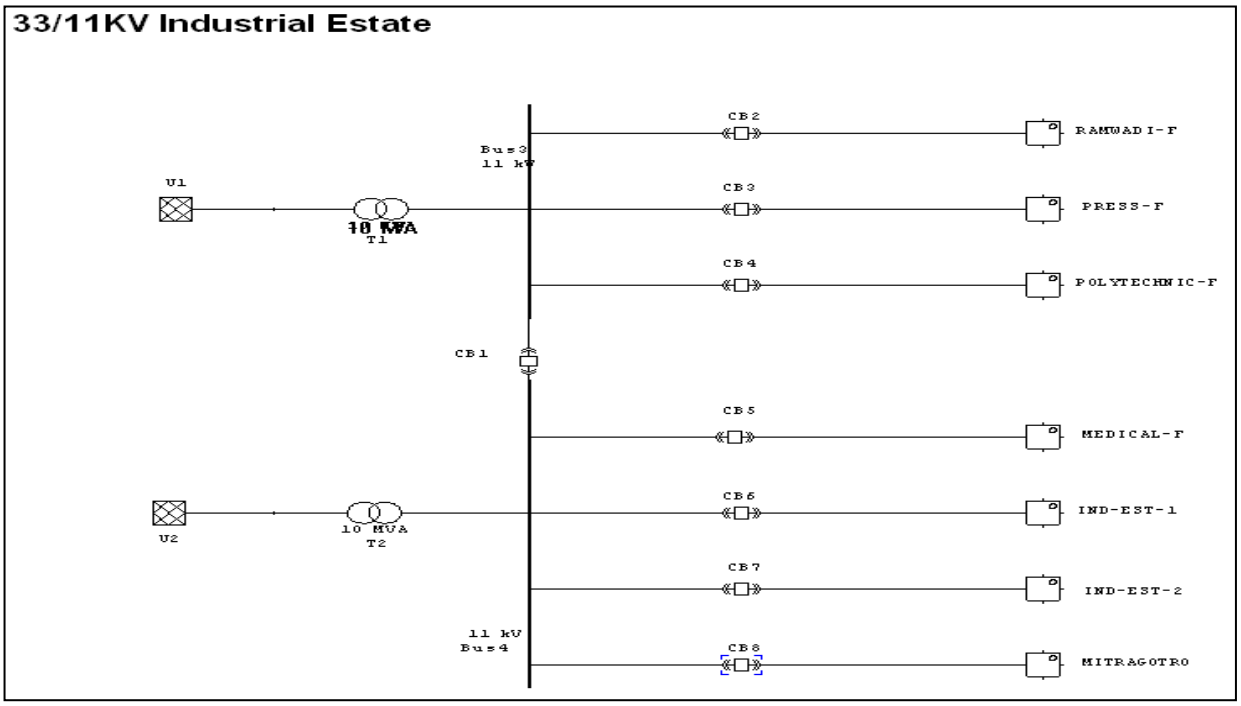


Figure 15: Load flow diagram: 33kV Industrial Estate Substation

Table 17: Summary of Technical Loss in 11 kV Network

Substation	Feeder No	Feeder	Load at 2100 Hrs (Amps)	PF	No of DTC's	Transf. Loss (kW)	Line Loss (kW)	Total Loss (kW)	Annual LLF	Annual T/F loss (MU)	Annual Line loss (MU)	Annual loss in (MU)
Swich. Stn	201	11 KV Local Navi Ves	14	0.85	2	0.54	0.56	1.1	0.352	0.002	0.002	0.003
	202	11 KV Shubhary	109	0.85	24	54.33	26.11	80.44	0.246	0.117	0.056	0.173
	203	11 KV Choupad	55	0.85	12	5.58	3.22	8.80	0.317	0.015	0.009	0.024
132/11 kV Degoan	202	11 KV SHP II	125	0.90	45	16.43	32.44	48.87	0.275	0.040	0.078	0.118
	205	11 KV Navi Ves	170	0.90	27	14.25	20.57	34.83	0.345	0.043	0.062	0.105
	206	11 KV SHP I	110	0.90	28	11.50	23.40	34.91	0.399	0.040	0.082	0.122
	208	11 KV Mill	80	0.90	4	10.91	0.04	10.95	0.718	0.069	0.000	0.069
33/11 kV Water Work	201	11KV WATER WORK	103	0.90	29	5.68	10.81	16.48	0.394	0.020	0.037	0.057
	202	11KV D.A.V. FEEDER	47	0.90	11	4.42	1.63	6.05	0.289	0.011	0.004	0.015
	203	11KV BHAWANI	52	0.90	12	4.82	1.87	6.69	0.342	0.014	0.006	0.020
	204	11KV SAMACHAR	112	0.90	35	7.18	65.32	72.50	0.278	0.017	0.159	0.176
	205	11 KV JODBHAVI	58	0.90	13	6.54	6.08	12.62	0.343	0.020	0.018	0.038
	206	11KV SAMART	134	0.90	39	13.19	34.04	47.24	0.350	0.040	0.104	0.145
33/11 kV Civil	201	11 KV RAMLAL	95	0.90	13	6.08	8.19	14.26	0.321	0.017	0.023	0.040
	202	11 KV OLYMPIC	85	0.90	11	9.51	6.57	16.09	0.382	0.032	0.022	0.054
	203	11 KV JAIL ROAD	75	0.99	14	5.79	6.85	12.64	0.314	0.016	0.019	0.035
	204	11 KV BAPUJI NAGAR	40	0.90	10	4.24	1.29	5.53	0.280	0.010	0.003	0.014
	205	11 KV JAGDAMBA	100	0.90	19	8.63	9.15	17.78	0.302	0.023	0.024	0.047

Substation	Feeder No	Feeder	Load at 2100 Hrs (Amps)	PF	No of DTC's	Transf. Loss (kW)	Line Loss (kW)	Total Loss (kW)	Annual LLF	Annual T/F loss (MU)	Annual Line loss (MU)	Annual loss in (MU)
	206	11 KV DAK BANGLA	125	0.90	29	12.44	27.71	40.15	0.524	0.057	0.127	0.184
Aditya Nagar	201	11 KV LIMAYEWADI	70	0.90	30	79.75	108.50	188.245	0.304	0.213	0.289	0.502
	202	11 KV MODI	5	0.90	34	27.63	68.04	95.66	0.311	0.075	0.186	0.261
	203	11 KV MAHALAXMI	60	0.99	18	7.50	10.72	18.22	0.383	0.025	0.036	0.061
33/ 11 kV MIDC	201	11 KV M I D C NO 3	19	0.85	16	0.5	0.27	0.77	0.335	0.001	0.001	0.002
	202	11 KV PATAN BAG	50	0.85	25	2.84	1.55	4.39	0.411	0.010	0.006	0.016
	203	11 KV M I D C NO 4	22	0.85	16	0.56	0.32	0.88	0.329	0.002	0.001	0.003
	204	11 KV M I D C NO 5	44	0.85	33	1.33	4.83	6.15	0.369	0.004	0.016	0.020
	205	11 KV ASHOK CHOWK	63	0.85	24	3.20	3.69	6.89	0.361	0.010	0.012	0.022
	206	11 KV VINKAR	82	0.85	10	11.35	2.66	14.01	0.538	0.053	0.013	0.066
33/11 kV BG	201	BIDIGHRKUL	100	0.85	29	13.75	4.84	18.59	0.387	0.047	0.016	0.063
	203	GANDHINAGAR	50	0.85	27	1.62	2.64	4.26	0.273	0.004	0.006	0.010
	204	AGRO	50	0.85	24	2.24	2.09	4.33	0.558	0.011	0.010	0.021
	205	MULEGAON	160	0.85	24	61.78	31.45	93.225	0.565	0.306	0.156	0.462
	207	11 KV GADGI NAGAR	30	0.85	13	4.44	1.05	5.49	0.361	0.014	0.003	0.017
132/11 kV MIDC	202	MIDC NO 1	40	0.85	9	5.16	1.73	6.885	0.393	0.018	0.006	0.024
	203	GANDHINAGAR	20	0.85	8	1.05	0.22	1.27	0.690	0.006	0.001	0.008
	204	POLYTECHNIC	100	0.85	12	14.75	5.42	20.17	0.458	0.059	0.022	0.081

Substation	Feeder No	Feeder	Load at 2100 Hrs (Amps)	PF	No of DTC's	Transf. Loss (kW)	Line Loss (kW)	Total Loss (kW)	Annual LLF	Annual T/F loss (MU)	Annual Line loss (MU)	Annual loss in (MU)
	207	MIDC NO 2	60	0.85	17	6.95	2.93	9.878	0.473	0.029	0.012	0.041
	209	SIDDESHAWAR	120	0.85	17	10.07	5.74	15.81	0.683	0.060	0.034	0.095
33/11 kV IE	201	RAMWADI	72	0.90	36	4.90	3.06	7.95	0.339	0.015	0.009	0.024
	202	Press	22	0.90	9	1.14	0.07	1.22	0.578	0.006	0.000	0.006
	203	Polytechnic	125	0.90	18	81.273	81.67	162.942	0.431	0.307	0.308	0.615
	204	MEDICAL	85	0.90	18	10.65	5.43	16.08	0.373	0.035	0.018	0.052
	206	IND-ESTATE-2	16	0.90	16	7.086	3.63	10.718	0.623	0.039	0.020	0.058
	207	IND-ESTAET-1	65	0.90	29	0.02	0.29	0.316	0.385	0.000	0.001	0.001
	209	MITRGOTRI	72	0.90	26	56.26	72.34	128.60	0.372	0.183	0.236	0.419
33/11 kV Jule SPR	201	Mantrichandak	110	0.90	48	8.427	18.17	26.595	0.329	0.024	0.052	0.077
	202	VIMANTAL	80	0.90	10	18.79	10.35	29.14	0.285	0.047	0.026	0.073
	203	SHINDU VIHAR	90	0.90	34	11.30	5.76	17.05	0.348	0.034	0.018	0.052
	204	SHIVSHAI	60	0.90	10	4.47	0.02	4.48	0.419	0.016	0.000	0.016
	205	KUMTHA	35	0.90	15	3.29	4.53	7.82	0.542	0.016	0.022	0.037
	206	SANTOSH NAGAR	70	0.90	12	9.96	6.74	16.69	0.264	0.023	0.016	0.039
33/11 kV Paper Pl.	201	SHANTI NAGAR	2	1.00	1	0.13	0.00	0.13	0.509	0.001	0.000	0.001
	202	SHANKAR NAGAR	39	1.00	2	3.386	1.45	4.835	0.321	0.010	0.004	0.014
	203	SIDDHESHWAR	165	1.00	4	18.97	25.18	44.144	0.485	0.081	0.107	0.187
TOTAL					**1051**	**698.56**	**783.17**	**1481.7**		**2.39**	**2.50**	**4.89**

The energy loss in 11 kV lines and 11 kV / 0.415 kV Transformation is calculated taking into account the respective LLFs derived from annual log sheets. The simulation report and respective drawing of all feeders is attached in annexures I and III separately.

Loss in HT Capacitor Banks:

2 nos of capacitors banks are installed. Hence their contribution to the technical loss is only marginal. Rated watt loss per kVAr is given on the name plates of the capacitors which have been used here to calculate technical loss on their account as follows:

Standard loss per kVAr = 0.2 watts

No of capacitor banks in service = 2 nos

HT capacitor in service = 4.8 MVAr

Loss in MU = MVAr capacity × 10^3 × (Rated loss) ×24 ×365 / 10^9 MU;

= 4.8 × 10^3 × (0.2) ×24 ×365 / 10^9 MU;

= 0.0084 MU

Total loss in Capacitors = 0.0084 MU

Hence net energy Input at LT network in the urban division is calculated after subtracting technical loss in 11kV feeders and the distribution transformers obtained by network simulation and the technical loss in HT capacitors calculated as above.

Net Energy Input in the urban network at LT network = 284.89 MU – 4.89 MU - 0.0084 MU = 279.99 MU

Net energy available for LT distribution network is 279.99 MU

9.1.3 Technical Loss in Low Tension (LT) Network: By Load Flow Study

LT networks downstream of two DTCs selected as representative samples were modelled on ETAP system study software and the technical (I^2R) losses determined by load flow study.

The methodology used for performing load flow study on the LT networks was as based on:

i. Walk down survey of representative low tension network up to the pole level.
ii. Information like connected load, actual load, length of service wire was gathered for all consumers.

iii. The single phase loads were assumed to be of constant voltage type.

iv. From the survey, it was observed that the average length of the service wire was 20 metres.

v. The single line diagram of low tension network was drawn up with network technical parameters collected from site survey.

vi. The peak power loss was calculated by load flow study.

vii. The load flow study yielded power loss corresponding to peak load conditions. Power loss was multiplied by the annual loss load factor (see Section 8.1.4) and annual operating hours (8760 hours) to give annual energy losses in a given network element.

The figure 16 shows the single line diagram of LT network downstream of DTC 4579258, which was one of the two DTCs on which I^2R losses were determined by network simulation (load flow study)

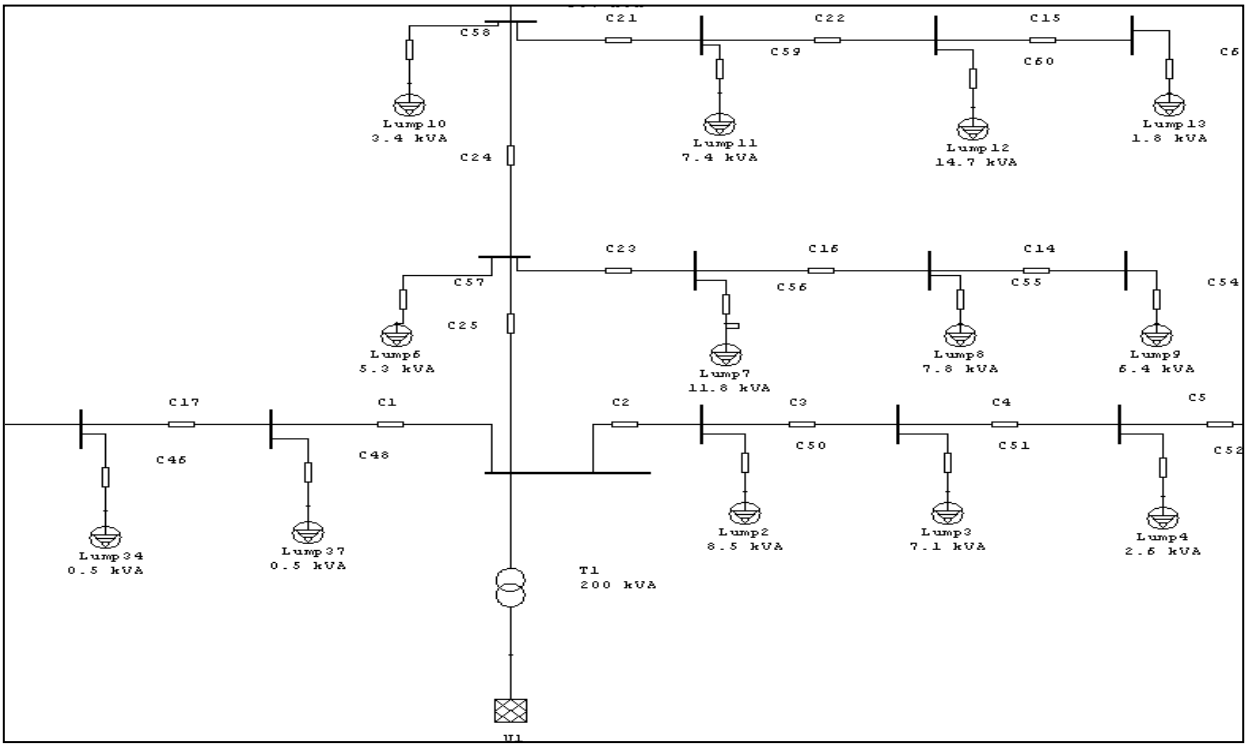


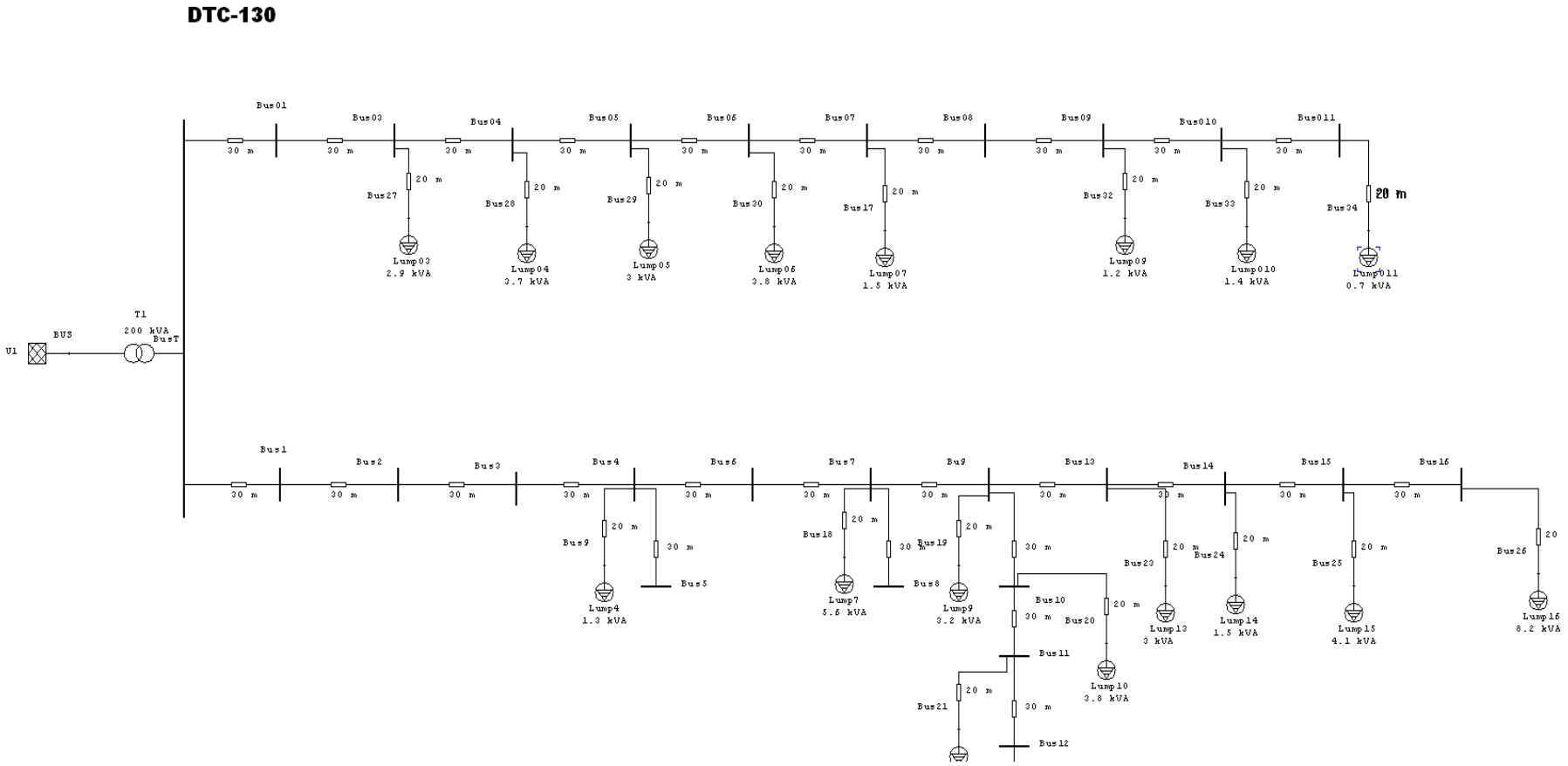
Figure 16: Load flow diagram: LT network downstream of DTC 4579258

A part of the load flow diagram of the LT network is given in Figure 17.

Energy supplied by two selected transformers for one week duration was obtained as the difference between the final and initial readings of the respective energy meters. Energy

metered at each consumer meter was obtained as the difference between Initial and final readings for the same period. These details are given in Annexure 4 for the first transformer and the consumers supplied by it and in Annexure 6 for the second transformer and the consumer supplied by it. The results obtained by load flow study are given in Annexure 5 and 6 respectively.

Figure 17: Simulation of LT Network – Urban Division



9.1.4 Technical Loss in Low Tension (LT) Network: By Estimation

The energy loss in Distribution box fuse, meters and service wire is estimated as follows:

- **Service Connection**

In urban areas, the supply is typically taken to the consumers' premises through cable in case of buildings or service wire of 2.5 sq mm in case of individual consumer. For calculation of losses in service connection, it has been assumed that the number of consumers supplied by cable equals the number of consumers supplied by service wires

Loss in service wire

Total consumers in Solapur urban division: 142000.

Estimated number of consumers supplied by service wire: 71000

Average meters per each service wire: 1.5

No of service wires = 71000/1.5 =47333 Nos.

Total length of service wire @ 20m = 947 kM

Average connected load per service wire in Solapur Urban division = 2.25 kW

Average current per service wire = 10 Amps

Technical losses = $(\text{current})^2 \times (\text{resistance}) \times (\text{length}) \times (\text{LLF}) \times 24 \times 365 / 10^9$ MU;

Loss in MU = $(I)^2 \times (R) \times (L) \times (\text{LLF}) \times 24 \times 365 / 10^9$ MU;

= $(10)^2 \times (12.1) \times (947) \times (0.399) \times 24 \times 365 / 10^9$ MU; (LLF of 0.399 assumed equal to the average LLF of 11 kV feeders)

= 4.0 MU

Loss in consumer cable

A group of consumers, consisting of between six to twelve consumers is provided service connection by cable. Average 10 consumers per cable and 4/c, 16 sq. mm. aluminium cable is considered for calculation.

Average connected load per service wire in Solapur Urban division = 15 kW

Average current per service wire = 20 Amps

Average length of the cable = 7100 × 20 meter = 142 kM

Loss in MU = $3 \times (20)^2 \times (1.91) \times (142) \times (0.399) \times 24 \times 365 / 10^9$ MU

= 1.14 MU

Total loss in service connections is estimated at 5.14 MUs (= 4+ 1.14 MUs)

- **Energy loss in feeder pillars**

Distribution transformer LV side cable is typically taken to a feeder pillar having one incomer circuit and two out going circuits. Thus each feeder pillar has nine fuses – three for each circuit. The standard watt loss figures are available manufacturer's catalogue. The sample calculation is carried out for 200 kVA transformer. Nine 250 A fuses are considered per feeder pillar. Each fuse has standard watt loss component of 23 watts. Accordingly total energy loss in overall urban network is worked out as given below:

No of distribution transformers = 1051

No of Distribution Boxes assumed per DTC = 1

No of Distribution fuses per Distribution Box = 9

Typical Watt loss in fuse as per IS = 23 watts

Average Load loss factor = 0.399

Energy loss in Distribution box=

= Standard watt loss component × Average LLF × no of Fuse elements per Box × No of DTC × 24 ×365 / 10^9 MUs

= 23 watt × 0.399 × 9 × 1051 × 24 × 365 / 10^9 MU

= 0.76 MUs

Energy loss in feeder pillars in the entire urban network of Solapur is estimated at 0.76 MUs

- **Energy loss in metering**

Total no of meters in Solapur Urban division = 142000

From the survey, it is observed that 95% meters are electronic and 5% meters are electromagnetic. Based on the above, the energy loss in the electronic meters is calculated as below:

Energy loss in an electronic meter = (energy loss in current circuit+ energy loss in voltage circuit + energy loss in meter wiring)

Energy loss in current circuits of the meters = (85200 × 0.44 + 56000 × 0.2) × 0.399 × 24 × 365 / 10^9 MU = 0.17 MU

Energy loss in voltage circuits of the meters = (85200 × 0.184 + 56000 × 1) × 0.399 × 24 × 365 / 10^9 MU = 0.25 MU

Total energy loss in meters is estimated at 0.42 MUs (= 0.17 MU + 0.25 MU)

- **Losses in Board wiring**

Meters are installed inside meter cabins in urban areas. Average 4 metre long wire is assumed for each single phase meter. Average load of each consumer is 5 A. Total consumers are 142000. The size of wire is 2.5 Sq mm. The resistance of wire is 12.1 Ohm/ km.

The losses in wire is = Current ^{2} × Resistance/km × Length in km × LLF × 24 × 365 /10^9 MU

= (5)^2 ×12.1 × 568 × 0.399 ×× 24 × 365 /10^9 MU

=0.6 MU

The energy losses in board wiring are estimated at 0.6 MUs

9.1.5 Technical Loss in Low Tension (LT) Network: Summary

The summary of estimated technical loss in LT network is given in the Table 18.

Table 18: Report - Technical Loss in LT Networks

Description	Xfmr. 4087130	Xfmr. 4579258	Total for the two Xfmrs.	In percent of Dist. Loss	In MUs (% of Dist. Loss in LT Network of Urban Division x Dist. Loss (60.82 MUs)
Distribution Loss Calculation by Energy Audit on Representative Distribution Transformers (Ref: Annexures 4 & 6)					
Energy Available for LT distribution (kWh)	3288	2920	6208	-	
Energy Received (Metered) at Consumers' Premises (kWh)	2410	2228	4638		
Distribution Loss in LT network (kWh)	878	692	1570	-	
Components of Technical Loss in LT Networks by Network Simulation (Ref Annexures 5 & 7: Results of Load Flow Study & Technical Loss Calculations)					
LT OH Lines	172.9	57.66	230.56	14.69%	8.9 MUs
Incomer Cables	0.13	6.43	6.56	0.42%	0.3 MUs
Outgoing Cables	0.6	1.073	1.673	0.11%	0.1 MUs
Components of Technical Loss by Calculation (Ref Section 9.5.3.3)					
Distribution Box Fuses					0.8 MUs
Outgoing Cables					0.1 MUs
Service wire					5.1 MUs
Board wiring					0.6 MUs
Meters					0.4 MUs
Total Technical Loss in LT Network: Solapur Urban Division					**16.2 MUs**

9.1.6 Total Technical Loss

Technical Loss (Total) = Technical Loss in 33 kV Network + Technical Loss in 11 kV Network +

Technical Loss in LT Network = 0.85 MU + 4.90 MU + 0.0084 + 16.22 MU

= **21.97 MU**

Technical loss in entire network for FY 2007-08 is 21.97 MU

$$\% \text{ Total distribution loss} = \frac{\text{Input Energy} - \text{Energy Billed}}{\text{Input Energy}} \times 100$$

$$= \frac{366.53 - 300.39}{366.53} \times 100 = \textbf{18.04 \%}$$

9.1.7 Break-Up of Technical Loss

Table 19: Break-up of Technical Loss

	Head - Technical losses	Energy Loss (MU)	Percent of Technical Loss	Percent of Distribution Loss	Percent of Input Energy
A	**Sub transmission Network**				
	33 kV line	0.44	2.00%	0.67%	0.12%
	33/11 kV transformation	0.41	1.87%	0.62%	0.11%
	Subtotal	0.85	3.87%	1.29%	0.23%
B	**Primary Distribution Network**				
	11 kV line	2.50	11.38%	3.78%	0.68%
	11/0.44 kV transformation	2.39	10.88%	3.61%	0.65%
	HT capacitor	0.01	0.04%	0.01%	0.00%
	Subtotal	4.90	22.30%	7.41%	1.34%
C	**Secondary Distribution Network**				
	Incomer cables	0.30	1.37%	0.45%	0.08%
	Distribution box fuse	0.80	3.64%	1.21%	0.22%
	Outgoing cables	0.10	0.46%	0.15%	0.03%
	Low tension line (Over head conductor)	8.90	40.51%	13.46%	2.43%
	Service cables	5.10	23.22%	7.71%	1.39%
	Board wiring	0.60	2.73%	0.91%	0.16%
	Metering	0.42	1.91%	0.64%	0.11%
	Subtotal	16.22	73.83%	24.52%	4.43%
	Total Technical losses	21.97	100.00%	33.21%	5.99%

9.1.8 Estimation of Technical Loss by Direct Reading

Estimation of technical loss by direct reading is performed by comparing the meter readings from the 33 kV feeder onwards going down to 33/11kV transformers, 11kV feeders and distribution transformers. This is only possible when meters are available and working all the way from the 33kV feeders up to the distribution transformers. The status of metering at the 33kV level was as given in Table 15.

Table 20: Status of Metering at 33kV Level

33/11 kV Substation	Remark
Bidi Gharkul	33 kV metering system out of order.
Jule-Solapur	33 kV metering system not in places.
Paper Plant	Substation commissioned in FY2008-09. It feeds only HT load.
Civil Hospital	33 kV metering system out of order.
Aditya Nagar	33 kV metering system not in places.
Industrial Estate	33 kV metering was in order
Water-Work	33 kV metering system out of order due to failure of potential transformer
MIDC	33 kV metering was in order. 4 out of 6 were Industrial feeders.

Keeping in view the status of metering, direct reading method for determination of technical losses was ruled out in all except the Industrial Estate and MIDC substations. Furthermore, four out of six feeders taken out from the MIDC substation supplied predominantly industrial loads, whence these could hardly be called representative feeders. This left only the Industrial Estate substation where technical loss determination by direct reading method would yield meaningful results. Hence the Industrial Estate Substation and its downstream network was selected for determination of technical losses by direct method.

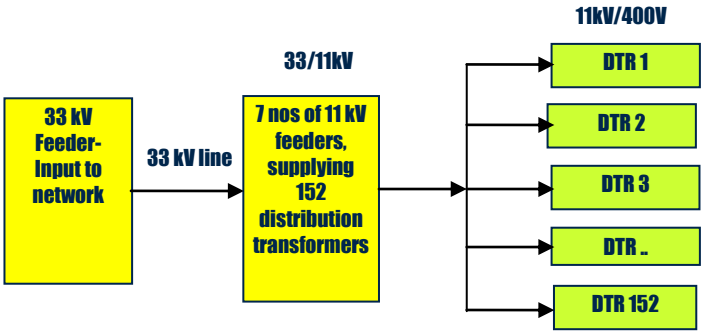


Figure 18: Schematic Diagram: Network Supplied by MIDC Substation

9.1.9 Comparison of Computation of Technical Losses by Direct & Indirect Methods

Table 16 compares the losses calculated by using direct method and indirect method at various voltage levels.

Table 21: Technical Loss by Direct Reading & Comparison of Computation of Losses by Direct & Indirect Methods

Voltage level	Units Measured at	Initial Reading	Final Reading	MF	Units	% Loss by Direct Method	%Loss by Indirect Method	Reference: Annexure
33 kV	EHV substation	244090	244720	1200	756000			
11kV	33/11 kV transformer 1	23834.7	24368.9	1000	534190			
	33/11 kV transformer 2	21304.1	21523.6	1000	219500			
	Total Units sent in 11 kV network				753690	0.31%	0.23%	Annexure 16 for Indirect Method
0.433 kV	Dist. Trans. secondary's(From Annexure 13)				740112	1.80%	1.33%	Annexure 13 for Direct Method & Annexure 17 for Indirect Method

9.2 Commercial Loss

Commercial loss takes place largely in the low tension network. The high tension consumers are small in number and are metered using sealed current transformers and voltage transformers and sealed metering cubicle. These meters are read by senior personnel and a watch is kept over the pattern of consumption whereby abnormally low consumption caused by tampering with connections is easy to detect. Hence the commercial losses in the HT network are assumed to be low enough to be neglected in comparison to the losses in LT network.

Commercial loss is obtained as the difference between distribution loss and calculated technical loss.

For estimating commercial loss by sampling, the energy supplied by a selected representative distribution transformer in a certain period is compared with the sum of energy billed to the consumers in the same period. The difference is distribution loss. Subtracting the technical loss estimated by network simulation from the distribution loss yields commercial loss. In this study, such a study has been carried on two selected urban distribution transformers.

Commercial loss is due to the following contributory factors at the consumer end:

- Slow meters
- Defective meters
- Meter tampering
- Theft by direct tapping, meter bypassing etc.

Inadequacies and inefficient commercial practices listed below also contribute to commercial losses:

- Unbilled consumers (new and reconnected)
- Erroneous meter reading and erroneous data punching
- Application of incorrect CT ratios to meter readings

Factors contributing to commercial losses in the urban division were identified by studying the commercial practices being followed in metering and billing.

9.2.1 Estimation of Unmetered Consumption

There is no unmetered consumption in the urban division.

9.2.2 Distribution Loss

The sub-division wise quarterly input and billed units (in million units) are tabulated as under:

Table 22: Input and Billed Units for Urban Division

Quarter ▼ / Name of Sub Div	Jun-07		Sep-07		Dec-07		Mar-08		Total Units Received For Year	Total Billed Units in Year	% loss for year
	Units Recd.	Total Units Billed	Units Recd.	Total Units Billed	Units Recd.	Total Units Billed	Units Recd.	Total Units Billed			
A' urban Solapur	16.22	13.50	15.54	13.56	14.08	12.76	13.95	11.56	59.78	51.38	14.05
B' urban Solapur	11.13	8.28	11.16	8.21	9.67	8.42	9.58	6.98	41.53	31.89	23.21
C' urban Solapur	14.27	11.74	13.34	11.43	11.88	10.70	12.66	10.37	52.16	44.24	15.18
D' urban Solapur	28.45	25.24	29.62	25.78	26.11	24.53	26.69	23.96	110.86	99.51	10.24
E' urban Solapur	27.00	18.72	26.10	19.78	24.37	18.55	24.73	16.31	102.20	73.36	28.22
URBAN SOLAPUR	**97.06**	**77.48**	**95.76**	**78.77**	**86.10**	**74.97**	**87.61**	**69.18**	**366.53**	**300.39**	**18.05**

Distribution loss in Solapur urban division for financial year 2007-08 totals 18.04 MU, which is 18.6% of the input energy received

9.2.3 Calculation of Commercial Loss

Commercial loss for Solapur urban division = Distribution loss – Technical loss

= 66.14 – 21.97

= 44.17 MU

Commercial loss for Solapur urban division is 44.17 MU

% Commercial loss = 44.17 x 100 ÷ 366.53 = 12.05%

Commercial loss for Solapur urban division 12.05%

Table 23: Segregation of Distribution Losses

Description	Energy (MU)	% of Input Energy
Energy input to Solapur urban division	366.53	100%
Energy assessed for unmetered Consumers	0	0
Total energy Billed	300.39	81.95%
Distribution loss	**66.14**	**18.05%**
Technical loss	**21.97**	**6%**
Commercial loss	**44.17**	**12.05%**

9.2.4 Computation Of Commercial Loss Components

9.2.4.1 Assessment of Commercial Loss Due To Theft Of Energy

Table 24: Assessment of Commercial Loss Due To Theft of Energy

CONSUMER NO	Type of Meter	NAME	Meter Const.	Wire Length	Initial Rdng.	Final Rdng.	Diff. = (FR-IR) (6days) with new meter	Seal Pos.	% Error	Std. meter Units (6 days)	Mly. Units recorded with new meter	Mly / Avg. with old meter	Diff. in Units
330240516179	EM	ARJUN TUKARAM UMATE	750	16	3093	3104	11	ok	7.75	12	55	43	12
330240520621	E	YESHWANT AMBADAS JADHAV	3200	18	17	32	15	ok	26.37	19	75	51	24
330240913933	E	VISHAKHA GOPALRAO GHATE	3200	22	580	599	19	ok	28.20	24	95	31	64
							45			**55**	**225**	**125**	**100**

Three consumer meters were replaced on DTC 4579258 on account on theft in July 2008. Initial and final meter readings were taken for these consumers for a period of six days with both newly installed MSEDCL meters and Accucheck meters.

From the above table it is seen that for the six day period at the beginning and end of which meter readings were taken:

- Average (historical) consumption = 125 x 6 ÷ 30 = 25 units
- Consumption recorded by new meters = 45 units
- Correct consumption recorded by Accucheck meters = 55 units

Hence actual loss due to theft = 55-25 = 30 units

% Loss = [30 ÷2410] x 100 % = **1.25%**

[2410 units is the energy delivered by the concerned distribution transformer during the period of study]

This translates to 1.25% of energy at LT level for the year = 1.25% of 219.17 MUs = 2.74 MUs per year

9.2.4.2 Assessment of Commercial Loss Due To Slow Meters

Table 25: Assessment of Commercial Loss Due To Slow Meters

	DTC 4087130			DTC 4579258			Total for two DTCs		
	Units recorded	Diff. owing to slow meters	Correct consumption	Units recorded	Diff. owing to slow meters	Correct consumption	Units recorded	Diff. owing to slow meters	Correct consumption
Taking all consumers into account	1895	145	2040	2287	198	2485	4182	343	4525
Taking slow meters only into account	1227	144	1371	1604	211	1815	2831	355	3186

It is seen from the above there is a loss of 355 units due to slow meters against total energy delivered of 4525 units. This gives:

% Loss due to slow meters = 355 ÷ 4525 x 100 % = 7.85%

Thus loss due to slow meters translates into an annual energy loss of 7.85% of energy billed to LT consumers (219.17 MUs) which comes to **17.20 MUs**

9.2.4.3 Assessment of Commercial Loss Due To Faulty Meters

Table 26: Assessment of Commercial Loss Due to Faulty Meters

DTC_COD	CONSUMER_ NO	Meter No	Meter type	Sanctioned Load (kW)	Actual Load (kW)	Mtr Const	Oct-07 Billed Units	Jul-08 Billed Units
4087130	330241082521			0.3	0.4	750	6	57
4087130	330241401570	322647	E	0.2	0.4	3200	11	58
4087130	330241507173	322652	E	0.4	0.5	3200	83	83
4087130	330241583791	324148	E	0.2	0.4	750	27	18
4087130	330241596303	324655	E	0.3	0.3		60	90
4579258	330240505185	68929	E	0.5	0.5	3200	30	15
							217	**321**

During our survey we studied the billing of consumers with faulty meters supplied by the two representative DTC's in month of October 2007 and compared the consumption with July 2008. It was observed that commercial loss decreased by 104 (= 321-217) units (out of 4638 units on two DTC's) the actual consumption of these consumers with faulty meters being more than the assessed consumption. [104 = 2.25% of 4638]

Faulty meters thus contribute to commercial loss to the extent of 2.25% of billed units at LT level (219.17 MUs), amounting to **4.93 MUs**.

9.2.5 Summary of Commercial Loss Components

Table 27: Break-up of Commercial Loss: Urban Division

	Head - Commercial losses	Energy Loss (MU)	% of Commercial Loss	% of Distribution Loss	% of Input Energy
1	Theft of energy by tampering meter	2.74	6.20%	4.14%	0.75%
2	Inaccurate Meters	17.2	38.91%	26.01%	4.69%
3	Low average of faulty meters	4.93	11.15%	7.45%	1.35%
4	Theft of energy - illegal / direct use	19.33	43.73%	29.23%	5.27%
	Total Commercial losses	44.2	100.00%	66.83%	12.06%

10. Loss Segregation : Rural Divisions (4)

10.1 Assessment of Energy Consumption by Unmetered Agricultural Consumers

10.1.1 Survey of Agricultural Consumers With Normal Status Meters:

A survey was carried out on energy consumption by 206 agricultural randomly chosen consumers having energy meters installed at their end. Initial and final readings were taken for periods ranging from three weeks to one month. Consumption was normalised for a month (30 days) by assuming pro-rata consumption. The total of energy consumption (kWh) during the month by all consumers divided by the aggregate sanctioned load (HP) yielded *Agricultural Index* for Metered Consumers in *kWh/HP/month*.

Table 28: Summary of Agricultural Consumer Survey: Normal Status Meters

Sr No	Consumer No.	Initial Reading (kWh)	Final Reading (kWh)	Difference (kWh)	Study Period (Days)	Calc. Monthly Consmn. (kWh)	Sanc. Load (HP)	Daily supply hrs (Hrs)
Meters with Progressive Readings								
1	337270774398	538	668	130	26	150	3	7
2	337270770015	11434	11839	405	26	467	3	7
3	330010071151	2851	3004	153	29	158	5	10
4	330010102723	2759	2848	89	29	92	5	10
5	330010103118	10266	10407	141	29	146	5	10
6	330010102031	2271	2717	446	29	461	5	10
7		646	976	330	29	341	5	10
8	330010102634	8049	8464	415	29	429	3	10
9	330010514649	2617	2703	86	29	89	3	10
10	330010502195	27947	28156	209	29	216	3	10
11	PWW	3138	3620	482	29	499	5	10
12	330010102391	0	0	0	29	0	5	10
13	330010102839	6199	6502	303	29	313	3	10
14	330010102553	6541	6739	198	27	220	5	10
15	N G THORAT	3185	3371	186	28	199	5	10
16	P D BANKAR	65535	65981	446	28	478	5	10
17	P D BANKAR	4290	4901	611	28	655	5	10
18	S S GUNGE	4637	4981	344	28	369	5	10
19	KASTURE	3142	3571	429	28	460	5	10
20	330010102961	7053	7111	58	28	62	3	10
21	330010072221	1006	1041	35	28	38	5	10
22	A M MULLA	5646	5981	335	28	359	5	10
23	E A KARANDE	741	930	189	28	203	5	10
24	330010070171	525	558	33	28	35	5	10
25	330010070171	525	558	33	28	35	6	10
26	330010070554	1151	1408	257	27	286	10	7
27	330010071224	4705	4861	156	27	173	5	7

Sr No	Consumer No.	Initial Reading (kWh)	Final Reading (kWh)	Difference (kWh)	Study Period (Days)	Calc. Monthly Consmn. (kWh)	Sanc. Load (HP)	Daily supply hrs (Hrs)
28	D R JOSHI	644	913	269	27	299	5	7
29	330010076447	2144	2164	20	29	21	7.5	10
30	330010072085	3795	3848	53	29	55	7.5	10
31	330010076315	382	681	299	29	309	3	10
32	E A KARALE	52487	52941	454	28	486	7.5	10
33	E A KARALE	2296	2407	111	28	119	7.5	10
34	330010076790	6328	6357	29	28	31	5	10
35	330010071682	5858	6024	166	30	166	10	10
36	330010073332	2238	2521	283	30	283	5	10
37	330010072174	1379	1486	107	30	107	5	10
38	330010072875	1711	1905	194	30	194	7.5	10
39	330010102642	4214	4381	167	30	167	7.5	10
40	330010071950	1737	2000	263	30	263	5	10
41	330010076382	3436	3492	56	30	56	10	10
42	330010070252	1032	1069	37	30	37	5	10
43	P SONNA	1537	1657	120	30	120	5	10
44	330010070643	1146	1147	1	30	1	8	10
45	M G NIMAERGI	2486	2763	277	30	277	8	10
46	KADADI L	3820	4666	846	30	846	8	10
47	330010102804	18604	18701	97	29	100	5	10
48	330010502411	10110	10381	271	29	280	3	10
49	S GAIKWAD	13416	13731	315	29	326	5	10
50	R D BADEGHAR	8546	8860	314	29	325	3	10
51	330010073227	3010	3061	51	30	51	10	10
52	330010076404	1620	1633	13	30	13	5	10
53	S E KARATE	1662	1990	328	30	328	8	10
54	332110853427	15452	15458	6	22	8	3	7
55	332110833175	761	770	9	11	25	3	7
56	332110890021	4816	5059	243	22	331	3	7
57	332110853443	14733	14741	8	22	11	3	7
58	332110853435	5997	6009	12	22	16	3	7
59	331850894678	10733	11151	418	23	545	3	7
60	331850827491	2704	2757	53	23	69	5	7
61	331850878397	686	901	215	23	280	3	7
62	331850012535	19010	20952	1942	23	2533	5	7
63	331850804466	20082	20108	26	23	34	3	7
64	A B PATIL	111	115	4	23	5	3	7
65	330440814867	4126	4314	188	24	235	5	7
66	330440081436	10	25	15	5	90	3	7
67	S V PATIL	58	195	137	24	171	3	7
68	R R BALGAM	1032	1233	201	24	251	5	7
69	332200902711	24830	24893	63	25	76	3	7
70	332200902702	2260	2315	55	25	66	3	7
71	332200078350	23353	23365	12	25	14	3	7

Sr No	Consumer No.	Initial Reading (kWh)	Final Reading (kWh)	Difference (kWh)	Study Period (Days)	Calc. Monthly Consmn. (kWh)	Sanc. Load (HP)	Daily supply hrs (Hrs)
72	332200078619	29778	29785	7	25	8	3	7
73	N.P.HAGRE	810	1064	254	25	305	3	7
74	K M DINDURE	8	123	115	25	138	3	7
75	331540075073	10998	11058	60	26	69	3	7
76	331540904754	1056	1212	156	26	180	5	7
77	331540075081	8587	8590	3	26	3	5	7
78	331540814135	5075	5084	9	26	10	3	7
79	331540770278	7630	7979	349	26	403	5	7
80	337010702458	12957	13455	498	22	679	3	21
81	337010702440	2302	2321	19	22	26	3	21
82	337010702431	6135	6146	11	22	15	3	21
83	337010198903	3740	4113	373	22	509	5	21
84	337010702326	2823	2869	46	28	49	8	24
85	B D SHINDE	30594	31649	1055	28	1130	5	24
86	337010702300	6986	6996	10	22	14	5	24
87	337010702318	17168	17220	52	22	71	5	24
88	333010700361	6648	6721	73	27	81	5	21
89	333011009770	5003	5192	189	27	210	3	21
90	333010088665	8759	8784	25	27	28	3	21
91	333010703351	24394	24619	225	27	250	3	21
92	333010700182	7524	7658	134	27	149	5	21
93	333010703556	10999	11000	1	27	1	5	21
94	333010703203	1761	1858	97	27	108	3	21
95	333010703602	62223	62268	45	27	50	5	21
96	333010505061	1439	1472	33	27	37	3	21
97	333010703521	1227	1501	274	27	304	5	21
98	333010519739	8167	8569	402	27	447	2	21
99	333010521911	26025	26250	225	21	321	5	21
100	333010521881	19701	19827	126	21	180	5	21
101	K B CHANDAK	39029	40242	1213	21	1733	5	21
102	333010702240	49627	49792	165	21	236	5	21
103	333010702240	49627	49792	165	21	236	5	21
Total for 103 consumers whose meters showed difference between initial and final readings showing energy consumption during the study period						**25178 kWh/ month**	**489 HP**	**51.49 kWh/ HP/ month**
Stationary Meters								
104	337270770945	850	850	0	29	0	5	10
105	337270784644	11	11	0	29	0	3	10
106	337270790032	2288	2288	0	29	0	3	10
107	330010077401	2965	2965	0	29	0	5	10
108	330010072379	767	767	0	29	0	5	10
109	330010102421	8097	8097	0	27	0	5	10

Sr No	Consumer No.	Initial Reading (kWh)	Final Reading (kWh)	Difference (kWh)	Study Period (Days)	Calc. Monthly Consmn. (kWh)	Sanc. Load (HP)	Daily supply hrs (Hrs)
110	330010102448	47	47	0	28	0	5	10
111	G M Shaikh	2867	2867	0	28	0	3	10
112	330010072891	6745	6745	0	28	0	5	10
113	330010072999	516	516	0	28	0	5	10
114	330010102367	1308	1308	0	28	0	10	10
115	330010077451	1420	1420	0	28	0	5	10
116	330010076536	Burnt			28	0	7.5	10
117	330010487609	1168	1168	0	28	0	10	10
118	330010070180	1162	1162	0	28	0	5	10
119	330010073430	2445	2445	0	28	0	7.5	10
120	330010072034	2951	2951	0	28	0	7.5	10
121	330010102171`	4240	4240	0	27	0	10	10
122	P Sumpata	1331	1331	0	27	0	7.5	10
123	330010103185`	9166	9166	0	27	0	10	10
124	330010102910	7876	7876	0	29	0	10	7
125	330010070147	1033	1033	0	29	0	5	7
126	332110086302	1970	1970	0	29	0	3	7
127	332110827019	1326	1326	0	28	0	3	7
128	332110853320	7904	7904	0	29	0	3	7
129	332110086299	5932	5932	0	29	0	5	7
130	332110890021	2471	2471	0	29	0	3	7
131	332110853401	1233	1233	0	29	0	5	7
132	332110853338	356	356	0	29	0	5	7
133	332110853371	5082	5082	0	29	0	5	7
134	33240832896	1165	1165	0	29	0	3	7
135	331850804555	5	5	0	29	0	3	7
136	3304400842925	17992	17992	0	29	0	5	7
137	332200809877	0	0	0	29	0	3	7
138	332200078325	1340	1340	0	27	0	3	7
139	332200078546	4356	4356	0	28	0	3	7
140	332200805065	3055	3055	0	28	0	3	7
141	332200078554	11017	11017	0	28	0	3	7
142	R R BHUSWANI	3	3	0	28	0	3	10
143	331540821221	917	917	0	28	0	3	10
144	331540075146	77057	77057	0	28	0	5	10
145	B R GHODAKE	3619	3619	0	28	0	3	10
146	H B KULARI	34	34	0	28	0	3	7
147	337010702474	9607	9607	0	28	0	5	7
148	337010203753	1542	1542	0	29	0	3	7
149	337010702369	6695	6695	0	29	0	5	7
150	337010702229	524118	524118	0	29	0	10	7
151	337010702261	27803	27803	0	29	0	7.5	10
Total for 151 consumers including 103 whose meters showed difference between initial and final readings showing energy						**25178 kWh/**	**732.5 HP**	**34.37 kWh/**

Sr No	Consumer No.	Initial Reading (kWh)	Final Reading (kWh)	Difference (kWh)	Study Period (Days)	Calc. Monthly Consmn. (kWh)	Sanc. Load (HP)	Daily supply hrs (Hrs)
consumption during the study period and 48 consumers whose meters showed zero consumption during the study period.						month		HP/ month

10.1.2 Agricultural Consumers With Other Than Normal Status Meters

Meters of 55 agricultural consumers could not be read due to different reasons. The summary of these consumers is given below:

Table 29: Survey of Agricultural Consumers Having Meters Other Than of Normal Status

Sr No	Cons No/Name	Initial Reading (kWh)	Final Reading (kWh)	Energy Consumption (kWh)	Sanctioned Load (HP)	Meter status
1	V B Patil			0	5	Meter Locked
2	330010072328	5098	6		5	Meter Changed
3	330010072077	2442	10		5	Meter Changed
4	330010076536				7.5	Meter Burnt
5	D K Bhaskar					Meter Locked
6	R R PARSETHI				7.5	Faulty
7	D K Bhaskar				7.5	Meter Stopped
8	330010071461				7.5	Meter Locked
9	R S Parsetti				5	Meter Locked
10	V V karle				7.5	Disconnected
11	332110887801				3	New Connection
12	331850820321				3	Meter Locked
13	331850804563				3	Meter Locked
14	330440829848				3	Meter Burnt
15	330440081487				3	Meter Burnt
16	330440081533				5	Meter Locked
17	3304400895280				3	Meter Locked
18	330440081487				3	Meter Locked
19	332200078627	6955			3	Meter Locked
20	330044080812				5	Disconnected
21	330044080847				5	Meter Burnt
22	330044080791				5	Meter Burnt
23	332200805065		3055		3	Meter Locked
24	332200078368				3	Disconnected
25	332200078554		11017		3	Meter Locked
26	M T BHUSANGI				3	Meter Locked
27	N Y AMOILCHUNGE				3	New Connection
28	R R BHUSWANI	3			3	Meter Locked

Sr No	Cons No/Name	Initial Reading (kWh)	Final Reading (kWh)	Energy Consumption (kWh)	Sanctioned Load (HP)	Meter status
29	331540075413				5	Meter Locked
30	H B KULARI		34		3	Meter Locked
31	337010702415				5	Not accessible
32	337010702393				5	Disconnected
33	337010702504					Not accessible
34	33701012383				5	Not accessible
35	337010702229	524118			10	Meter Faulty
36	337010702334				5	Disconnected
37	337010702211				5	Disconnected
38	337010201688				5	Disconnected
39	333010703564		3102		5	Meter Locked
40	333010070758	lock	lock		3	Meter Locked
41	333010702274	11962	70			Meter Changed
42	333010703815	1486			5	Meter Locked
43	333010703521	12		0	5	Meter Locked
44	333010071541			0	5	Not accessible
45	333010095009	5167		0	3	Not accessible
46	333010703386	24769		0	3	Disconnected
47	333010702835	37001		0	3	Disconnected
48	333010703742	5762		0	3	Disconnected
49	333010700255	2854		0	5	Meter Locked
50	333010700212	4589		0	5	Meter Locked
51	333010703599			0	5	Not accessible
52	333010521971			0	5	Not accessible
53	333010702258			0	5	Not accessible
54	333010702924	lock	7216		5	Meter Locked
55	333010521962	1274		0	5	Meter Locked

Energy consumption figures of these agricultural consumers could not be obtained as evident from the above table for reasons noted against each consumer.

10.1.3 Assessment of Agricultural Consumption for FY 2007-08

Agricultural consumption index defined as:

Agricultural Consumption Index = [Agricultural consumption in the district during a given month in kWh] ÷ [Aggregate HP of the consumers].

It is a measure of consumption by an average consumer during that month per HP of sanctioned agricultural load.

Table 30: Assessment of Unmetered Agricultural Consumption for FY 2007-08

Assessment of Unmetered Agricultural consumption for FY 2007-08												
	Energy Input for FY 2007-08											
Sub-Div/Div	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Rural 1 Solapur	17.8	19.0	17.0	17.5	18.8	15.9	19.4	19.9	20.8	19.6	17.8	18.5
Rural 2 Solapur	20.8	25.1	18.5	24.4	22.2	13.2	22.6	26.8	25.5	26.0	22.9	21.8
Mohol	22.9	25.7	17.0	21.0	24.5	12.0	20.7	30.0	31.5	29.4	26.3	23.6
Akkalkot	11.1	12.8	10.2	11.6	11.8	8.3	11.4	15.9	16.0	14.8	12.7	11.3
Solapur Rural	**72.6**	**82.6**	**62.7**	**74.5**	**77.3**	**49.4**	**74.1**	**92.7**	**93.8**	**89.8**	**79.8**	**75.2**
Pandharpur (U)	2.3	2.8	2.7	3.2	3.2	2.6	2.8	2.4	2.4	2.2	2.3	2.6
Pandharpur Rural 1	15.2	20.7	8.5	13.4	15.0	10.2	12.8	15.1	16.4	15.8	12.8	14.7
Pandharpur Rural 2	18.4	21.5	9.1	14.1	18.2	7.2	18.6	22.3	21.0	19.6	18.2	17.8
Mangalwedha	10.0	11.6	6.5	9.4	10.1	5.0	9.3	13.4	16.5	17.7	15.1	15.1
Sangola	0.0	0.0	0.0	15.4	15.0	10.3	15.9	20.3	21.0	19.4	15.9	16.5
Pandharpur	**45.9**	**56.7**	**26.9**	**55.6**	**61.4**	**35.4**	**59.5**	**73.3**	**77.2**	**74.7**	**64.3**	**66.7**
Akluj	14.2	17.5	11.6	13.7	11.9	7.1	13.0	13.2	13.6	14.9	13.4	10.3
Natepute	11.6	13.0	7.1	10.0	11.2	7.4	11.1	9.0	10.7	12.6	11.4	10.5
Velapur	17.6	17.6	10.4	15.3	17.5	10.4	18.1	18.0	19.3	18.5	18.3	15.2
Sangola	14.5	15.6	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Akluj	**57.9**	**63.7**	**39.6**	**39.1**	**40.6**	**24.9**	**42.2**	**40.2**	**43.5**	**46.0**	**43.0**	**36.0**
Barshi (U)	4.1	4.4	4.0	4.1	4.1	4.2	4.1	3.7	4.0	3.9	3.9	4.3
Barshi Rural	12.6	14.9	7.3	11.2	11.3	7.3	12.1	15.1	17.9	16.8	13.3	11.4
Jeur	13.3	14.8	10.0	12.2	13.8	7.8	15.2	15.2	14.5	13.0	12.7	11.8
Karmala	11.3	10.2	6.1	7.2	9.5	5.2	10.9	10.6	11.2	10.1	9.0	8.3
Kuruduwadi	27.8	31.2	17.3	24.5	24.8	12.6	24.3	29.6	32.3	28.0	27.2	28.7
Barshi	**69.2**	**75.5**	**44.6**	**59.2**	**63.4**	**37.1**	**66.5**	**74.3**	**79.9**	**71.8**	**66.2**	**64.6**
Total Input Energy	**245.6**	**278.4**	**173.9**	**228.3**	**242.8**	**146.8**	**242.3**	**280.5**	**294.5**	**282.3**	**253.3**	**242.5**
HT Consumption	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6	29.6
Energy Available at LT network	**216.1**	**248.8**	**144.3**	**198.8**	**213.2**	**117.2**	**212.7**	**250.9**	**264.9**	**252.7**	**223.7**	**212.9**
Calculated Parameters												
Parameter	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**
Input Energy Index (= Input Energy during month ÷ Input Energy in Sept. 2008)	1.8	2.1	1.2	1.7	1.8	1.0	1.8	2.1	2.3	2.2	1.9	1.8
Ag Consumption Index (= Input Energy Index Ag Consumption Index of Sept. 2008 (= 34.37 kWh/HP/month))	**63.3**	**72.9**	**42.3**	**58.3**	**62.5**	**34.4**	**62.4**	**73.6**	**77.7**	**74.1**	**65.6**	**62.4**

Assessment of Unmetered Agricultural consumption for FY 2007-08												
	Energy Input for FY 2007-08											
Sub-Div/Div	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Assessment of Monthly Unmetered Ag Consumption (MU)[=68938 HP x Ag. Consumption Index 10^{-6}]	43.7	50.3	29.2	40.2	43.1	23.7	43.0	50.7	53.5	51.1	45.2	43.0
Assessed Annual Unmetered Ag consumption (MUs)	516.7											

Distribution loss estimated by licensee for rural divisions = 2911.96 - (1033.19 + 1030.7) = 848.07 MU [29.12%]

Distribution loss estimated by FVL for rural divisions = 2911.96 - (1033.19 + 516.7) = 1362.07 MU [

The total energy billed against unmetered agricultural consumers adds up to 1030.7 MUs. (based on MSEDCL calculations). Our own estimate is 516.7 MUs (Table 25). Hence distribution loss calculated by MSEDCL comes to 848.07 MUs. Were the distribution loss calculated by basing consumption of unmetered agricultural on our calculations, the distribution losses would increase to 1362.07 MUs and the distribution loss in percent terms rise to **46.7%**

10.2 Estimation of Technical Loss

119 nos. 33/11kV substations of Solapur rural divisions and their downstream networks going down to the DTC level was modelled on ETAP system study software. Technical (I^2R) Losses were obtained as output of the load flow study.

i. The network single line diagrams were prepared based on data obtained from the field offices of MSEDCL.

ii. Load data was collected from the field offices and from log sheets maintained at the substations. The log sheets at the substations record hourly meter readings of current and voltage and readings of energy meters.

iii. The loads assigned to the nodes of the network were those logged at the time of coincident maximum demand of the state of Maharashtra in the year 2007-08, which occurred on 28th October 2007. Voltage, current and power factor were obtained from the log sheets maintained at the substations.

iv. Name plate ratings of all distribution transformers were obtained from the field offices of MSEDCL . These were randomly cross verified for data accuracy. Wherever data was not available, standard data for transformers of similar ratings available in the library of the system study software were used.

v. The load flow study yielded power loss corresponding to peak load conditions. Power loss was multiplied by the annual loss load factor (see Section 8.1.4) and annual operating hours (8760 hours) to give annual energy losses in a given network element.

10.2.1 Technical Loss: 33kV Network

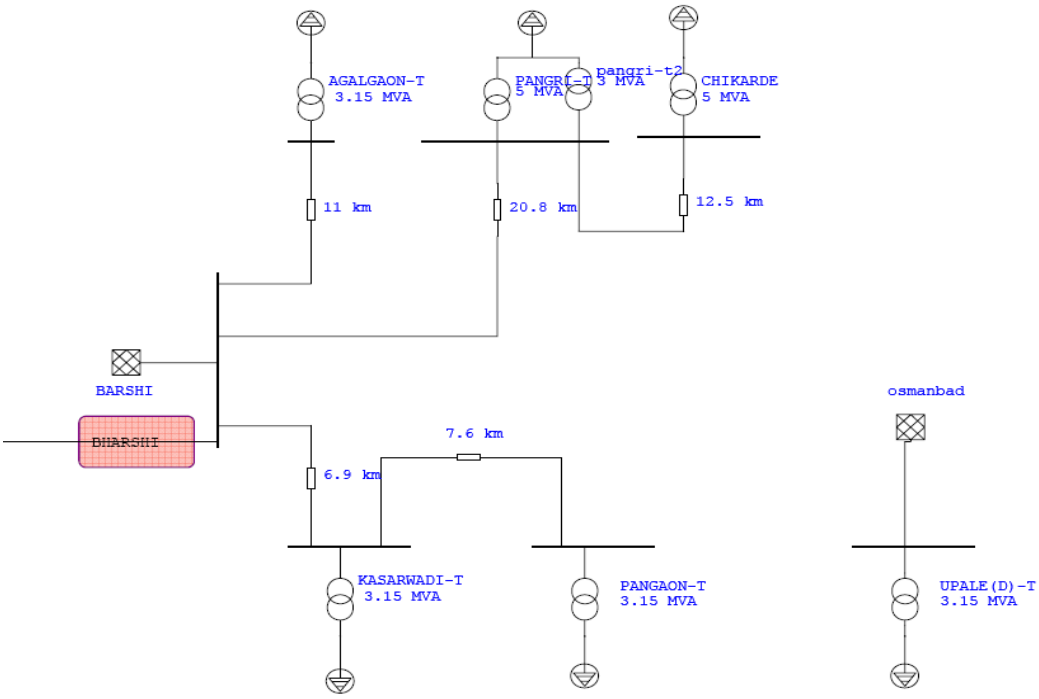


Figure 19 : Simulation of 33kV Network: Rural Divisions

The technical loss in the 33/11kV transformers and in the 33kV overhead lines were obtained as outputs of load flow study performed on the network. The power (kW)

loss figures corresponding to peak coincident demand conditions are tabulated at Table 31for the 33/11kV transformers and at Table 32 for 33kV lines.

Table 31: Technical Loss in 33/11 kV Transformers

Location	Capacity (KVA)	% Voltage Drop	kW Losses	kVAr Losses
Achakdani T1	5000 kVA	3.39	18.91	230.00
Adhegaon T1	5000 kVA	1.91	5.81	70.51
Adhegaon T2	5000 kVA	1.91	5.70	69.19
Adhegaon T3	3150 kVA	1.91	4.11	46.84
AGALGAON-T	3150 kVA	3.66	14.32	163.00
AKOLEKATI-T	5000 kVA	2.44	9.28	113.00
Alegaon T1	5000 kVA	2.24	8.11	98.43
Andhalgaon	5000 kVA	6.42	63.79	774.00
ANGAR-T	5000 kVA	3.44	18.53	211.00
ANTROLI-T	5000 kVA	4.72	31.57	383.00
BEGAMPUR-T	5000 kVA	5.58	41.64	505.00
Bembale T1	5000 kVA	2.29	7.76	94.22
Bembhale T2	3150 kVA	2.29	5.73	69.56
Bhalwani T1	5000 kVA	4.21	26.05	316.00
Bhalwani T2	3150 kVA	4.21	18.74	214.00
BHANDAR KAVATE-T	5000 kVA	2.59	9.84	119.00
BORALE-T	3150 kVA	2.17	5.50	62.78
BORALE-T2	3150 kVA	2.17	5.50	62.78
B Shegaon T1	5000 kVA	5.75	44.49	540.00
B Shegaon T2	5000 kVA	5.75	44.47	540.00
Chale T1	5000 kVA	3.72	20.68	251.00
Chikalthan T1	5000 kVA	6.16	54.46	661.00
Chikalthan T2	3150 kVA	6.16	37.21	425.00
CHIKARDE	5000 kVA	5.84	47.67	579.00
CHINCHOLIKATI-T	5000 kVA	2.12	7.10	86.19
CHINCHOLIKATI-T2	5000 kVA	2.12	7.57	91.89
Dahigaon T1	5000 kVA	2.81	11.40	138.00
Deagon T1	5000 kVA	4.9	35.63	432.00
DUDHANI-T	5000 kVA	3.05	14.33	174.00
Fondshiras T1	5000 kVA	6.33	55.20	670.00
Gherdi T1	3150 kVA	4.16	19.37	221.00
Gursale T1	5000 kVA	4.29	28.41	345.00
Gurusale T2	3150 kVA	4.29	18.32	209.00
HANNUR-T	5000 kVA	2.17	7.05	85.55
HOTAGI-T	5000 kVA	3.81	20.90	254.00
Hunnur T1	5000 kVA	2.31	8.08	98.11
Islampur T1	3150 kVA	4.52	20.51	234.00
JAWALGAON-T	5000 kVA	4.51	29.62	360.00
Jawal T1	5000 kVA	3.43	20.26	246.00
Jeur T1	5000 kVA	6.75	24.25	575.00
Jeur T2	5000 kVA	6.75	24.25	575.00

Location	Capacity (KVA)	% Voltage Drop	kW Losses	kVAr Losses
Jinti T1	5000 kVA	5.54	43.18	524.00
KAMATI-T	5000 kVA	3.3	16.34	198.00
KAMATI-T2	5000 kVA	3.3	16.34	198.00
Kandar T1	3150 kVA	2.4	6.27	71.56
Kandar T2	3150 kVA	2.4	6.87	78.40
Kandar T3	3150 kVA	2.4	6.35	72.42
KARAJAGI-T1	5000 kVA	1.96	5.58	67.73
KARAJAGI-T2	3150 kVA	1.96	4.30	49.06
Karkamb T1	5000 kVA	4.01	22.67	275.00
Karkamb T2	3150 kVA	4.01	16.25	185.00
Karkamb T3	5000 kVA	4.01	22.67	275.00
Karmala T1	5000 kVA	2.1	7.29	88.51
KArmala T2	5000 kVA	2.1	7.29	88.51
KASARWADI-T	3150 kVA	4.98	25.94	296.00
Kavhe T1	3150 kVA	9.28	51.40	586.00
Kem T1	5000 kVA	5.36	38.13	463.00
Khalve T1	5000 kVA	8.02	90.27	1030.00
KORSEGAON-T	5000 kVA	5.28	39.07	474.00
KURUL-T	5000 kVA	5.39	42.07	511.00
LAMBOTI-T	5000 kVA	4.31	28.54	326.00
Madha T1	5000 kVA	4.7	31.45	382.00
Madha T2	3150 kVA	4.7	21.87	249.00
Mahud T1	5000 kVA	2.09	6.68	81.06
Mahud T2	5000 kVA	2.09	6.55	79.54
MAINDARGI-T1	5000 kVA	3.36	16.05	195.00
MAINDARGI-T2	3150 kVA	3.36	12.37	141.00
Malshiras T1	5000 kVA	4.31	29.95	364.00
Malshiras T2	5000 kVA	4.31	29.00	352.00
MANDRUP-T1	5000 kVA	1.14	2.22	26.99
MANDRUP-T2	2000 kVA	1.14	1.24	8.83
MANEGAON-T	5000 kVA	3.74	22.21	253.00
Mangalwedha T1	5000 kVA	3.38	17.87	217.00
Mangalwedha T2	5000 kVA	3.38	16.88	205.00
Mangi T1	3150 kVA	2.76	7.80	88.94
Mangi T2	3000 kVA	2.76	9.09	97.02
manjergaon T1	5000 kVA	3.43	17.74	215.00
Manjorgaon T2	5000 kVA	3.43	17.12	208.00
Mendhapur T1	5000 kVA	3.51	18.06	219.00
NAGANSUR-T	5000 kVA	4.34	27.21	330.00
NARKHED-T	5000 kVA	4.8	34.40	392.00
NAtepute T1	5000 kVA	3.94	22.93	278.00
Natepute T2	5000 kVA	3.94	22.65	275.00
Neware T1	5000 kVA	2.23	7.73	93.81
Neware T2	5000 kVA	2.23	7.72	93.68
Pandharpur T1	5000 kVA	3.44	17.19	209.00
PANGAON-T	3150 kVA	4.1	17.84	204.00

Location	Capacity (KVA)	% Voltage Drop	kW Losses	kVAr Losses
PANGRI-T	5000 kVA	2.54	9.65	117.00
pangri-t2	3000 kVA	2.54	7.72	82.35
Papri T1	5000 kVA	4.88	36.52	443.00
Papri T2	3150 kVA	4.88	24.32	278.00
Pimpalner T1	3150 kVA	11.17	117.00	1425.00
Potegaon T1	5000 kVA	5.22	38.06	462.00
pt. Kauroli T1	5000 kVA	4.47	28.45	345.00
Pt. Kauroli T2	3150 kVA	4.47	20.58	235.00
Pt. Kauroli T3	3150 kVA	4.47	22.33	255.00
Sade T1	5000 kVA	4.44	27.98	340.00
Salse T1	3150 kVA	6.68	48.77	556.00
Sangam T1	5000 kVA	6.71	64.93	788.00
Shethpal T1	3150 kVA	5.54	29.45	358.00
SHIRWAL-T1	3000 kVA	3.31	12.82	137.00
SHIRWAL-T2	3150 kVA	3.31	11.93	136.00
Shripur T1	5000 kVA	2.33	8.40	102.00
Shripur T2	3150 kVA	2.33	5.71	65.14
Sonke T1	3150 kVA	4.11	19.03	217.00
T26	5000 kVA	5.54	43.80	532.00
TADWAL-T1	5000 kVA	4.09	25.24	306.00
TADWAL-T2	5000 kVA	4.09	25.46	309.00
TAKALI-T	5000 kVA	2.26	7.56	91.83
TAKALI-T2	5000 kVA	2.26	7.88	95.63
Tarapur T1	5000 kVA	2.98	13.43	163.00
Tembhruni T1	5000 kVA	2.79	11.61	141.00
Tembhruni T2	5000 kVA	2.79	11.77	143.00
Tembhruni T3	5000 kVA	2.79	11.77	143.00
THANDULWADI-T	5000 kVA	1.41	3.88	47.11
Tungat T1	5000 kVA	1.08	1.84	22.27
Tungat T2	5000 kVA	1.08	1.87	21.37
ULE-T	3150 kVA	1.86	4.13	47.07
Umbare T1	5000 kVA	5.51	44.15	536.00
UPALE(D)-T	3150 kVA	4.94	24.25	277.00
VAIRAG-T1	3000 kVA	2.46	5.02	60.96
VAIRAG-T2	5000 kVA	2.46	9.94	106.00
VALASUNG-T	5000 kVA	6.04	51.22	622.00
Veet T1	3150 kVA	1.86	3.84	43.83
Velapur T1	5000 kVA	6.81	60.32	732.00
Velapur T2	3150 kVA	6.81	42.07	480.00
Velapur T3	5000 kVA	6.81	62.18	755.00
WADAKBAL-T	5000 kVA	1.73	4.78	57.97
WADALA-T1	3150 kVA	3.44	14.39	164.00
WADALA-T2	3000 kVA	3.44	12.18	130.00
Wangi T1	5000 kVA	4.85	33.43	406.00
Wangi T2	3150 kVA	4.85	24.98	285.00
Warwade T1	5000 kVA	2.32	8.65	105.00

Location	Capacity (KVA)	% Voltage Drop	kW Losses	kVAr Losses
Warwade T2	3150 kVA	2.32	5.99	68.30
Ymangewadi T1	5000 kVA	1.87	6.19	75.18
Total: 33/11kV Transformers			**2958.15 kW**	

Table 32: Technical Loss in 33 kV Overhead Line Network in Rural Network.

Line	Length (m)	% Voltage Drop	kW Losses	kVAr Losses
Line1	11000	0.21	7.20	0.00
Line2-1	21800	6.18	347.00	347.00
Line3	20800	1.62	217.00	0.00
Line5	12500	0.54	41.42	0.00
Line5-1	11200	3.22	185.00	185.00
Line6	6900	0.33	27.40	0.00
Line6-1	12800	4.13	263.00	263.00
Line7	7600	0.16	6.20	0.00
Line7-1	8000	1.35	45.40	45.40
Line9	15000	0.4	18.59	0.00
Line9-1	10500	4.25	338.00	338.00
Line10	1000	0.07	7.43	0.00
Line11	10500	0.31	15.88	0.00
Line11-1	11000	2.36	100.00	100.00
Line12	6500	0.45	53.55	0.00
Line12-1	13200	19.04	5318.00	5318.00
Line13	10500	0.38	23.40	0.00
Line13-1	3500	1.31	95.39	95.39
Line14	16000	0.66	48.07	0.00
Line15-1	10500	2.06	79.50	79.50
Line16	19000	1.23	138.00	0.00
Line17	1000	0.03	1.07	0.00
Line17-1	10500	2.15	88.21	88.21
Line18	300	0.01	0.83	0.00
Line19	22000	1.93	291.00	0.00
Line19-1	18300	5.02	274.00	274.00
Line21	12500	0.44	27.24	0.00
Line21-1	18500	10.93	1278.00	1278.00
Line22	16500	2.04	421.00	0.00
Line22-1	100	0.04	3.68	3.68
Line23	18400	1.89	329.00	0.00
Line23-1	6400	2.26	158.00	158.00
Line24	6000	0.39	42.89	0.00
Line25	12000	0.42	25.28	0.00
Line25-1	100	0.02	0.69	0.69
Line26	8500	0.35	25.70	0.00
Line26-1	14400	14.51	2828.00	2828.00

Line	Length (m)	% Voltage Drop	kW Losses	kVAr Losses
Line27	16500	0.18	3.36	0.00
Line27-1	2600	0.39	11.77	11.77
Line28	16000	0.32	10.83	0.00
Line29	200	0	0.06	0.00
Line29-1	7000	1.41	56.22	56.22
Line30	3000	0.27	41.28	0.00
Line30-1	6400	1.99	120.00	120.00
Line31	3500	0.05	1.23	0.00
Line31-1	10000	0.52	5.39	5.39
Line32	2000	0.15	19.43	0.00
Line33	6000	0.22	13.06	0.00
Line33-1	12000	8.34	1124.00	1124.00
Line34	9770	0.38	26.35	0.00
Line35	27000	0.39	9.45	0.00
Line35-1	2300	0.31	8.34	8.34
Line36	32000	2.95	459.00	0.00
Line36-1	100	0.02	0.74	0.74
Line37	10000	0.65	74.24	0.00
Line37-1	13500	2.05	60.47	60.47
Line38	14800	0.49	28.14	0.00
Line38-1	7500	2.6	176.00	176.00
Line39	16000	0.51	29.33	0.00
Line39-1	100	0.02	0.59	0.59
Line40	12800	0.16	3.70	0.00
Line41	19000	0.33	9.36	0.00
Line41-1	25600	13.32	1352.00	1352.00
Line42	15000	0.54	33.68	0.00
Line43	14400	0.99	115.00	0.00
Line44	11700	0.29	12.22	0.00
Line60	8800	5.89	776.00	776.00
Line61	5500	1.34	64.07	64.07
Line62	6000	2.55	215.00	215.00
Line64	6000	0.66	14.26	14.26
Line70	3300	0.36	7.84	7.84
Line72	100	0.04	2.75	2.75
Line74	14000	1.64	38.08	38.08
Line79	10000	0.88	15.49	15.49
Line80	8000	2.99	220.00	220.00
Line81	7600	0.73	14.10	14.10
Line82	11200	3.11	169.00	169.00
Line86	22400	8.39	622.00	622.00
Line87	10000	2.14	91.06	91.06
Line88	100	0.02	0.51	0.51
Line90	8000	0.75	14.00	14.00
Line91	13100	3.81	220.00	220.00
Line97	8000	8.01	1570.00	1570.00

Line	Length (m)	% Voltage Drop	kW Losses	kVAr Losses
Line98	100	0.02	0.79	0.79
Line99	7000	5.61	879.00	879.00
Line100	12000	8.54	1190.00	1190.00
Line101	100	0.01	0.16	0.16
Line103	100	0.03	2.26	2.26
Line105	14000	5.21	380.00	380.00
Line107	1500	0.18	4.39	4.39
Line111	6000	1.63	88.22	88.22
Line113	6400	0.96	28.85	28.85
Line115	3000	0.83	45.84	45.84
Line118	19200	2.89	86.54	86.54
Line119	100	0.02	0.45	0.45
Line121	1000	0.41	33.54	33.54
Line123	7500	1.04	28.78	28.78
Line125	7500	1.66	72.18	72.18
Line127	10200	4.31	360.00	360.00
Line129	100	0.02	0.50	0.50
Line131	11000	2.03	75.27	75.27
Line133	3800	1.3	89.42	89.42
Line135	2500	2.45	477.00	477.00
Line137	100	0.03	2.28	2.28
Line141	10000	1.57	49.49	49.49
Line143	8000	1.71	73.38	73.38
Line145	10200	2.76	147.00	147.00
Line147	10500	3.19	192.00	192.00
Line149	18400	8.69	801.00	801.00
Line151	10000	1.65	54.30	54.30
Line153	100	0.03	1.83	1.83
Total: 33 kV Lines			**26193.86 kW**	

Table 33: Energy Loss in 33kV Network

	Power (kW) Loss at Coincident Peak Demand Condition	Annual Energy Loss (MU)taking into account Annual Loss Load Factor of 0.37 [= kW Loss x 365 x 24 x LLF/ 10^6]
33/11kV Transformers	2958.15 kW	9.59 MUs
33kV Lines	26193.86 kW	84.89 MUs
Total Technical Loss : 33kV Network	**29152.01 kW**	**94.48 MUs**

Table 34: Energy Input to 11kV Network

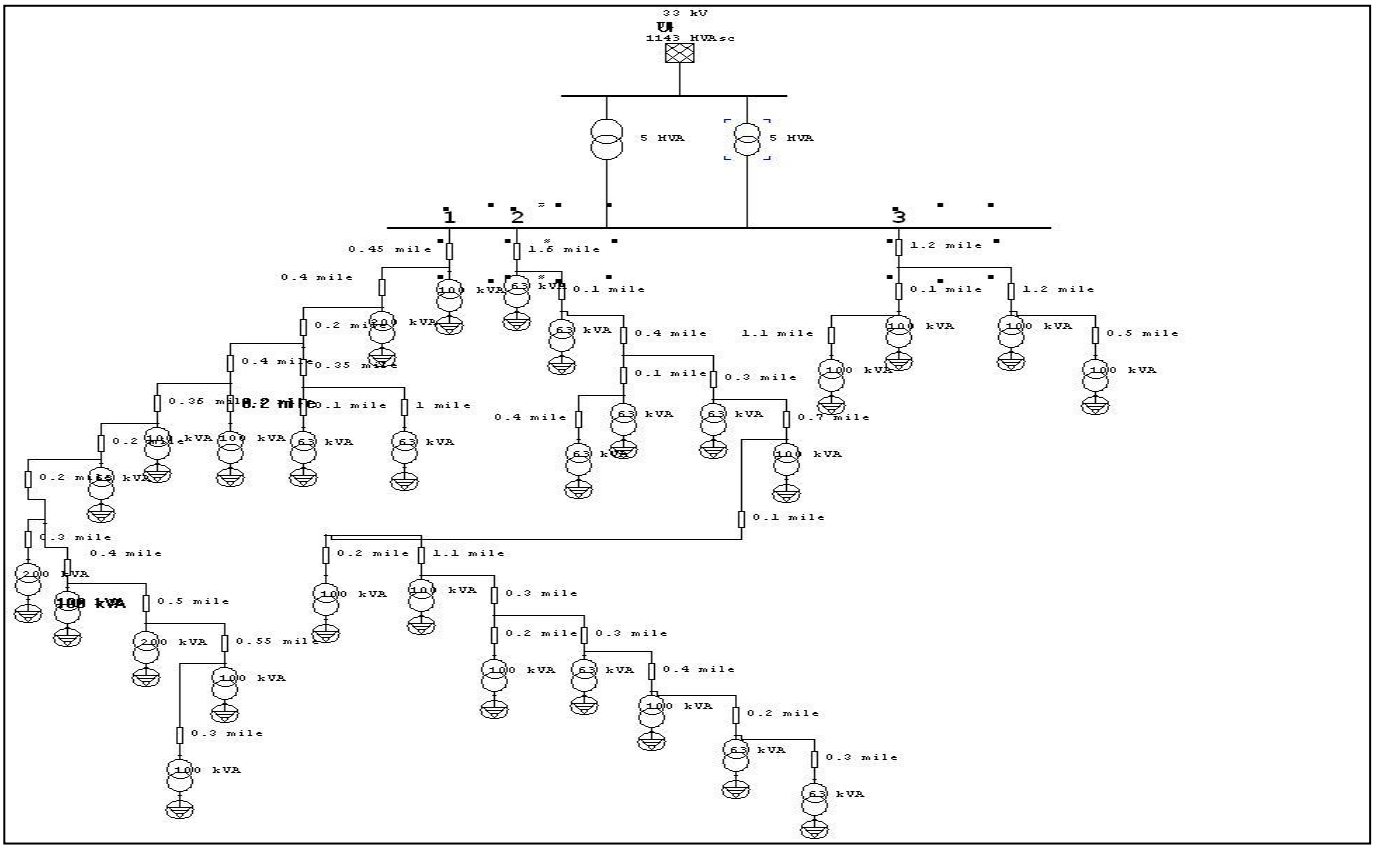
Figure	Quantity
Total Energy Input to Rural Divisions of Solapur at 33kV	2911.86 MUs

Technical Loss at 33kV Network	94.48 MUs
Total Energy Input to Rural Divisions of Solapur at 11kV	2817.48 MUs
Energy Supplied to 11kV Consumers	354.93 MUs
Total Energy Input to Rural 11kV Network	**2462.55 MUs**

10.2.2 Technical Loss: 11kV Network

452 nos. 11kV feeders and the distribution transformers supplied were modelled on ETAP software. The output power loss figures based on loading during the coincident peak conditions were obtained from the load flow study, and annual energy loss figures calculated by multiplying the power loss (kW) by the calculated loss load factor of a given feeder and annual operating hours (= 24 x 365).

Figure 20: Simulation of 11kV Network: Rural Divisions



The power loss figures (output of load flow study) and the calculated annual energy loss figures for each feeder and the distribution transformers respectively supplied by them are tabulated at Table 35

Table 35: **Summary of Technical Loss in 11 kV Network**

Substation Code	Sub-Station Name	Power loss: 11/0.415 kV DTCs (kW)	Power Loss: 11 kV Lines (kW)	Load Loss Factor (LLF)	Energy Loss : DTCs (MU)	Energy Loss: 11 kV Line (MU)
274006	Upale (D)	60.92	2.235	0.389	0.21	0.01
274007	Vairag	38	13.62	0.306	0.10	0.04
274005	Pangari	213	12.84	0.325	0.61	0.04
274004	Pangaon	441.14	12.5	0.385	1.49	0.04
274001	Agalgaon	120	7.1	0.372	0.39	0.02
274002	Chikharde	135.94	6.87	0.338	0.40	0.02
274066	Jeur	273	95	0.299	0.72	0.25
274057	Wangi	254	3.75	0.202	0.45	0.01
274036	Chikhalthan	51.9	3.14	0.362	0.16	0.01
274011	Kandar	163.83	4.289	0.420	0.60	0.02
274017	Salse	73.42	13.62	0.372	0.24	0.04
274091	Sade	56.5	3.1	0.281	0.14	0.01
274013	Kem	48.38	17.49	0.372	0.16	0.06
	Jategaon	80	9.3	0.372	0.26	0.03
274087	Jinti	93.47	11.304	0.340	0.28	0.03
274016	Parewadi	204.71	14.18	0.37	0.66	0.05
274015	Manjargaon	210	1.42	0.372	0.68	0.00
274026	Tembhurni	273	6.4	0.405	0.97	0.02
274021	Bembale	79	2.4	0.410	0.28	0.01
274020	Adhegaon	80	5.1	0.585	0.41	0.03
274025	Pimpalner	165.6	20.7	0.439	0.64	0.08
274109	Uplai (KH)	118.6	12.5	0.280	0.29	0.03
274027	Warwade	79.8	9	0.803	0.56	0.06
274024	Mahisgaon	89	4.03	0.372	0.29	0.01
277004	Kurduwadi	878	110	0.344	2.64	0.33
274022	Madha	62	3.372	0.348	0.19	0.01
274023	Manegaon	119	13	0.401	0.42	0.05
274053	Khardi	39.23	197.45	0.225	0.08	0.39
274049	Bhandishegaon	108	459	0.501	0.47	2.02
274048	Bhalawani	54.77	53.263	0.491	0.24	0.23
		96	84.43	0.320	0.27	0.24
274056	Sonake	58.6	107	0.334	0.17	0.31
274121	Eklaspur (Anawali)	168.14	201.38	0.321	0.47	0.57
274116	Pandharpur - Urban	34.81	270.48	0.322	0.10	0.76
274058	Umbare	48	190	0.515	0.22	0.86
274057	Tungat	6.66	29	0.373	0.02	0.09
274051	Gursale	108.29	190.5	0.329	0.31	0.55

Substation Code	Sub-Station Name	Power loss: 11/0.415 kV DTCs (kW)	Power Loss: 11 kV Lines (kW)	Load Loss Factor (LLF)	Energy Loss : DTCs (MU)	Energy Loss: 11 kV Line (MU)
274055	Pat.Kuroli	69	144	0.374	0.23	0.47
274052	Karkamb	184	293	0.263	0.42	0.68
274104	Tarapur	65	55	0.355	0.20	0.17
274119	Degaon	62.8	102	0.545	0.30	0.49
274054	Mendhapur	49	57	0.312	0.13	0.16
274033	Mangalwedha	137	300	0.376	0.45	0.99
274030	Borale	15.7	100	0.384	0.05	0.34
274034	Nimboni	55.918	67.466	0.309	0.15	0.18
274032	Hunnur	18.175	33.3	0.302	0.05	0.09
274028	Andhalgaon	38.52	190	0.296	0.10	0.49
274031	Huljanti	35	41.5	0.225	0.07	0.08
274118	Salgar Bk	165.7	191	0.307	0.45	0.51
274121	Marapur	9	7.71	0.321	0.03	0.02
274064	Mahud	48	106	0.348	0.15	0.32
274061	Gherdi	15.28	11.1	0.380	0.05	0.04
274063	Kole	3.78	5.5	0.356	0.01	0.02
274065	Shirbhavi	27	23.6	0.302	0.07	0.06
274060	Jawala	10.25	16.7	0.282	0.03	0.04
274068	Alegaon	17.6	13.25	0.243	0.04	0.03
2746009	Sangola	282	1104	0.369	0.91	3.57
274059	Achakdani	30	130	0.377	0.10	0.43
274067	Y' Manegewadi	25.4	51	0.418	0.09	0.19
274066	Udhanwadi	36.849	57.55	0.322	0.10	0.16
274069	Manjari	39	29	0.274	0.09	0.07
274089	Wadala	64	182	0.291	0.16	0.46
277002	Degaon	51.8	0.127	0.390	0.18	0.00
274075	Chincholikati	109	199	0.706	0.67	1.23
274083	Akolekati	21	23.53	0.326	0.06	0.07
274093	Hotgi			0.307	0.00	0.00
274092	Bhandarkawthe	26.76	46.15	0.371	0.09	0.15
274100	Wadakbal	2.694	6.824	0.317	0.01	0.02
274091	Antroli	64.03	137.999	0.281	0.16	0.34
274094	Mandrup	11.618	11.259	0.331	0.03	0.03
274097	Tandulwadi	7.611	24.589	0.404	0.03	0.09
274086	Takali	69.43	144.356	0.255	0.16	0.32
274099	Valsang	31.65	50.335	0.300	0.08	0.13
274098	Ule	20.812	8.765	0.447	0.08	0.03
274069	Maindargi	81.4	5.87	0.274	0.20	0.01
274086	Karajagi	93.5	25.22	0.255	0.21	0.06

Substation Code	Sub-Station Name	Power loss: 11/0.415 kV DTCs (kW)	Power Loss: 11 kV Lines (kW)	Load Loss Factor (LLF)	Energy Loss : DTCs (MU)	Energy Loss: 11 kV Line (MU)
274072	Tadwal	257	42.5	0.472	1.06	0.18
274071	Shirwal	162.5	4.5	0.423	0.60	0.02
274070	Nagansur	64	3.675	0.432	0.24	0.01
274103	Korsegaon	276	16	0.510	1.23	0.07
274081	Penur	336	27.6	0.323	0.95	0.08
274082	Shetphal	152	4.4	0.404	0.54	0.02
274072	Begampur	90	24.4	0.370	0.29	0.08
274080	Papari	175	11.78	0.361	0.55	0.04
274073	Anagar	45.69	8.64	0.400	0.16	0.03
274076	Kamati	107	11.23	0.298	0.28	0.03
274077	Lamboti	123.7	5.5	0.378	0.41	0.02
274079	Narkhed	79	8.7	0.326	0.23	0.02
274078	Mohol	975.52	58.4	0.503	4.30	0.26
274037	Lawang	129	571.628	0.229	0.26	1.15
278008	Malinagar	367	3785.58	0.529	1.70	17.54
274117	Y.Nagar	20.711	48.18	0.506	0.09	0.21
274035	Akluj	241.5	263	0.499	1.06	1.15
274120	Sangam	236	159	0.410	0.85	0.57
274047	Vizori	8.347	3.4	0.456	0.03	0.01
274088	Shripur	17.9		0.364	0.06	0.00
274040	Neware	275	53	0.239	0.58	0.11
274042	Piliv	143	20.4	0.348	0.44	0.06
274041	Nimgaon	213	60	0.367	0.68	0.19
274043	Salmukh	2		0.432	0.01	0.00
274046	Velapur	41	114	0.364	0.13	0.36
274102	Khalwe	75.12		0.409	0.27	0.00
274047	Umbre(Velapur)	3.13	3.79	0.263	0.01	0.01
274036	Dahigaon	600	93	0.362	1.90	0.30
274042	Fondshiras	155	6.7	0.361	0.49	0.02
274038	Malshiras	407	22	0.558	1.99	0.11
274039	Natepute	141	7.65	0.411	0.51	0.03
274105	Islampur	209.8	9.5	0.364	0.67	0.03
TOTAL: DTCs		**Power Loss 13409 kW; Annual Energy Loss: 42.57 MUs**				
TOTAL: 11 kV Lines		**Power Loss 11645 kW; Annual Energy Loss: 45.55 MUs**				
TOTAL: 11 kV Lines + DTCs		**Power Loss 25054 kW; Annual Energy Loss: 88.11 MUs**				

The energy loss in 11 kV lines and energy loss in 11 kV / 0.415 kV Transformation have been calculated taking into account respective LLFs derived from annual log sheets. The simulation report and respective drawings of all feeders is attached in annexure II and IV (A) and IV (B) separately.

Loss in Capacitor Bank:

Just 4 nos. of capacitors banks are installed, whereby these capacitors contribute to the technical loss marginally. Rated watt loss per kVAr is given on the name plate of the capacitor itself which have been used to calculate loss as given below;

HT capacitor

Standard loss per kVAr = 0.2 watts

No of capacitor banks in service = 4 nos

HT capacitor in service = 9.6 MVAr

Loss in MU = MVAr capacity × 10^3 × (Rated loss) ×24 ×365 / 10^9 MU;

= 9.6 × 10^3 × (0.2) ×24 ×365 / 10^9 MU;

= 0.0168 MU

The watt loss for a capacitor is designed value and varies with different makes, average value of watt loss per kVAr is considered for estimation.

Total loss in Capacitors = 0.0168 MU

Hence net energy Input at LT network in the rural divisions is calculated after subtracting technical loss obtained by network simulation and estimated technical loss in HT capacitors;

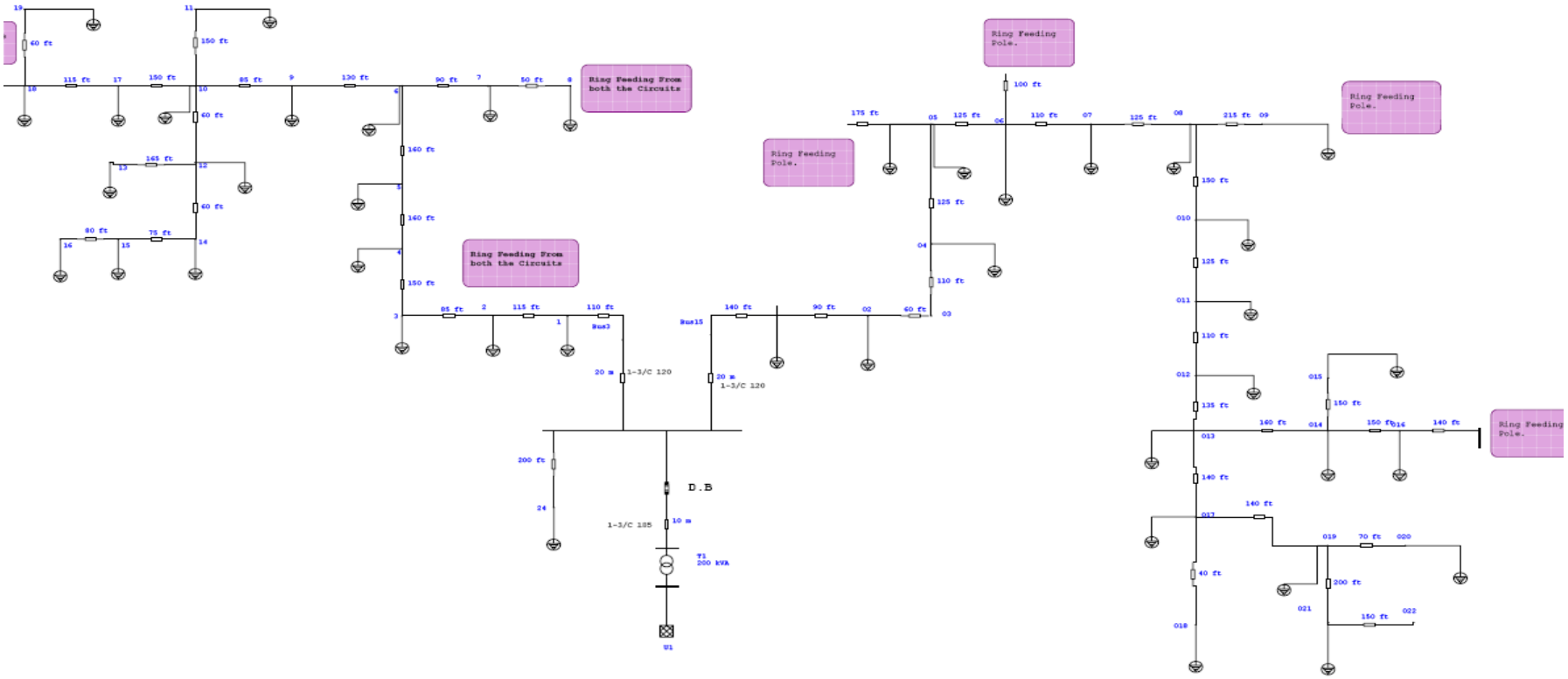
Net Energy Input at LT network of the rural network = 2462.55 MU – 88.11 MU - 0.01 = 2374.42 MU

Net energy available at LT distribution network is 2374.42 MU

10.2.3 Technical Loss in Low Tension (LT) Network: By Load Flow Study

LT networks of two distribution transformers were modelled on ETAP software based on the information collected. The networks were simulated for the actual load collected on sites. A part of the simulated drawing is given in figure 21

Figure 21 : Simulation of LT network – DTC code 4099041 (Rural Division)



Energy supplied by two selected transformers for a week was obtained as the difference between the final and initial readings of the respective energy meters. Energy metered at each consumer meter was obtained as the difference between Initial and final readings for the same period. These details are given in Annexure 8 for the first transformer and the consumers supplied by it and in Annexure 10 for the second transformer and the consumer supplied by it. The results obtained by load flow study are given in Annexure 9 and 11 respectively.

10.2.4 Technical Loss in Low Tension (LT) Network: By Estimation

The energy loss in Distribution box fuse, meters and service wire is estimated as follows:

- **Service Wire**

In rural divisions, agricultural load accounts for 82% of the connected load, with most pump sets rated at 3HP or 5 HP. This load is typically fed from the nearest pole by 3 x 2.5 sq. mm. cable having resistance of 12.1 ohm/km. The average length of service connection is 23 m, and the average current is 5A. The average loss load factor for the rural divisions is 0.37. The total length of service connections for all agricultural consumers comes to 5600 km

Loss in MU = 3 × (5) 2 × (12.1) × (5600) × (0.37) ×24 ×365 / 109 MU

= 16.47 MUs

Total loss in 2.5 sq mm service wire = 16.47 MUs

- **Distribution Box Fuse**

Distribution transformers outgoing cable is terminated in a distribution box. Normally these distribution boxes have one incomer circuit and two out going circuits. Thus each distribution box has nine fuses. The outgoing circuits typically have rewirable LT fuses. The standard watt loss figures are available from manufacturer's catalogues. Each fuse has standard watt loss component of 7.5 watts. Accordingly Total energy loss in overall rural network is worked out as given below:

No of distribution transformers = 13605

No of Distribution Boxes assumed per DTC = 1

No of Distribution fuses per Distribution Box = 9

Typical Watt loss in fuse as per IS = 7.5 watts

Average Load loss factor = 0.37

Energy loss in Distribution box=

= Standard watt loss component × Average LLF × no of Fuse elements per Box × No of DTC × 24 ×365 / 10^9 MU's

= 7.5 watt × 0.37 × 9 × 13605 × 24 × 365 / 10^9 MU

= 2.97 MU

Energy loss in Distribution box in entire network is 2.97 MU's.

In above calculations watt loss of 7.5 watts per fuse is considered as per manufacturer's catalogue.

- **Energy loss in metering**

There are two types of the meters in the system i.e. static meter and electromagnetic meter. These could be single phase meters and three phase meters depending upon whether a consumer has a single phase or a three phase connection. The service wire is directly connected to meter incomer terminals whence panel wiring is generally absent in rural network. Typical loss figures for both potential and current coils are tabulated below from manufacturer's catalogue.

Table 36: Losses in Potential and Current Coils/ Circuits

Standard Loss	Electronic meter (watts)	Electromechanical meter (watts)
Current coil/ circuit	0.44	0.2
Potential coil/ circuit	0.184	1

Total no of meters in Solapur rural division = 327915

From our survey it was observed that 95% meters were electronic and 5% meters were electromagnetic. Based on that, the energy loss in e electronic meters is calculated as below:

Energy loss in meters = (energy loss in current coils/ circuits + Energy loss in potential coils/ circuits + energy loss in meter wiring)

Energy loss in current coils/ circuits of the meters = (311519 × 0.44 + 16395 × 0.2) × 0.37 × 24 × 365 / 10^9 MU = 0.63 MU

Energy loss in potential coils/ circuits of the meters = (311519 × 0.184 + 16395 × 1) × 0.37 × 24 × 365 / 10^9 MU = 0.239 MU

The energy loss in wiring of the meter = Nil

Total energy loss in meters = 0.63 MU + 0.239 MU = 0.869 MU

10.2.5 Technical Loss in Low Tension (LT) Network: Summary

The summary of estimated technical loss in LT network is given in following table

Table 37: Technical Loss in LT Networks

Description	Xfmr. 4087130	Xfmr. 4579258	Total for the two Xfmrs.	In percent of Dist. Loss	In MUs (% of Dist. Loss in LT Network of Rural Divisions x Dist. Loss (1179 MUs)
Distribution Loss Calculation by Energy Audit on Representative Distribution Transformers (Ref: Annexures 8 & 10)					
Energy Available for LT distribution (kWh)	5193	3514	8707	-	
Energy Received (Metered) at Consumers' Premises (kWh)	4101	2683	6784		
Distribution Loss in LT network (kWh)	1092	831	1923	-	
Components of Technical Loss in LT Networks by Network Simulation (Ref Annexures 9 & 11: Results of Load Flow Study & Technical Loss Calculations)					
LT OH Line	335	234	568	29.56%	348.66 MUs
Incomer Cable	2	8	10	0.52%	6.19 MUs
Outgoing Cable	4	2	6	0.32%	3.79 MUs
Components of Technical Loss by Calculation (Ref Section 10.2.4)					
Distribution Box Fuses					2.97 MUs
Service wire					16.47 MUs
Meters					0.87 MUs
Total Technical Loss in LT Network: Solapur Rural Divisions					**378.95 MUs**

10.2.6 Total Technical Loss

Total Technical Loss = Technical Loss in 33 kV Network + Technical Loss in 11kV Network

+ Technical Loss in LT Network

= 94.48 + 88.11 + 378.95 MUs

= 561.54 MUs

Estimated technical Loss in the rural divisions of Solapur totals 561.54 MUs for the year 2007-08

10.2.7 Break-up of Technical Loss

Table 38: Break-up of Technical Loss

	Head - Technical losses	Energy Loss (MU)	Percent of Technical Loss	Percent of Distribution Loss	Percent of Input Energy
A	**Sub transmission Network**				
	33 kV line	84.89	15.12%	6.23%	2.92%
	33/11 kV transformation	9.59	1.71%	0.70%	0.33%
	Subtotal	94.48	16.83%	6.94%	3.24%
B	**Primary Distribution Network**				
	11 kV line	45.55	8.11%	3.34%	1.56%
	11/0.44 kV transformation	42.57	7.58%	3.13%	1.46%
	HT capacitor	0.02	0.00%	0.00%	0.00%
	Subtotal	88.14	15.70%	6.47%	3.03%
C	**Secondary Distribution Network**				
	Incomer cable	6.19	1.10%	0.45%	0.21%
	Distribution box fuse	2.97	0.53%	0.22%	0.10%
	Outgoing cable	3.79	0.67%	0.28%	0.13%
	Low tension line (Over head conductor)	348.66	62.09%	25.60%	11.97%
	Service wire	16.47	2.93%	1.21%	0.57%
	Panel wiring	0	0.00%	0.00%	0.00%
	Metering	0.87	0.15%	0.06%	0.03%
	Subtotal	378.95	67.48%	27.82%	13.01%
	Total Technical losses	**561.57**	**100.01%**	**41.23%**	**19.29%**

10.2.8 Estimation of Technical Loss by Direct Reading

Estimation of technical loss by direct reading is performed on representative 11kV feeders by comparing the meter readings from the 33 kV feeder onwards going down to 33/11kV transformers, 11kV feeders and distribution transformers.

In case of the four rural divisions, two feeders from 33/11kV Pandharpur Substation (Code: 274116) – *Ganesh Nagar* and *Darshan Mandal*, and two feeders from 33/11kV Barshi Substation (Code: 278003) – 11kV Mill and 11kV Industrial were taken up for estimation of technical loss by direct method.

The results are shown in Table 33

Table 39: Technical Loss by Direct Reading & Comparison of Computation of Losses by Direct & Indirect Methods

Energy Metered at 11kV Feeder							Energy Metered at DTCs kWh (Ref: Annexure - 13)	Loss by Direct Method (Ref: Annexure- 13)		Loss by Indirect Method % (Table 33)
Initial Rdng.	Date	Final Rdng.	Date	MF	Diff. (FR-IR)	Energy Sent kWh		kWh	%	
719.98	02.10.08	879.53	08.10.08	1000	159.55	159550	154051.6	5498.4	3.45 %	6.47%
2172.7	02.10.08	2339.8	08.10.08	1000	167.1	167100	161353.35	5746.65	3.44 %	
8745.31	09.10.08	8765.49	11.10.08	1000	20.18	20180	19828	352	1.74 %	
48499.7	09.10.08	48573.5	11.10.08	1000	73.8	73800	71013	2787	3.78 %	

The difference in loss determined by direct method and indirect method are explained by the fact that loss determination by direct method was done at low load conditions prevailing in September, while the indirect method gives losses for the whole year.

10.3 Commercial Loss

Commercial loss takes place largely in the low tension network. The high tension consumers are small in number and are metered using sealed current transformers and voltage transformers and sealed metering cubicle. These meters are read by senior personnel and a watch is kept over the pattern of consumption whereby abnormally low consumption caused by tampering with connections is easy to detect. Hence the commercial losses in the HT network are assumed to be low enough to be neglected in comparison to the losses in LT network.

Commercial loss is obtained as the difference between distribution loss and calculated technical loss.

For estimating commercial loss by sampling, the energy supplied by a selected representative distribution transformer in a certain period is compared with the sum of energy billed to the consumers in the same period. The difference is distribution loss. Subtracting the technical loss estimated by network simulation from the distribution loss yields commercial loss. In this study, such a study has been carried on two selected urban distribution transformers.

Commercial loss is due to the following contributory factors at the consumer end:

- Slow meters

- Defective meters
- Meter tampering
- Theft by direct tapping, meter bypassing etc.

Inadequacies and inefficient commercial practices listed below also contribute to commercial losses:

- Unbilled consumers (new and reconnected)
- Erroneous meter reading and erroneous data punching
- Application of incorrect CT ratios to meter readings

Factors contributing to commercial losses in the urban division were identified by studying the commercial practices being followed in metering and billing.

10.3.1 Distribution Loss

Table 40: Input and Billed Units in Rural Divisions

Sub-Div./Division	Input	Metered sale	Unmetered	Total sale	LOSS
	MUs	MUs	MUs	MUs	%
AKLUJ I SUB-DN.	155.10	46.24	34.67	80.91	47.84
AKLUJ II SUB-DN.	198.19	54.64	68.81	123.45	37.71
NATEPUTE	125.54	26.61	36.38	62.99	49.83
AKLUJ	**478.83**	**127.49**	**139.86**	**267.35**	**44.17**
BARSHI (R) S/DN.	151.21	43.54	77.94	121.48	19.66
BARSHI (U) S/DN.	48.95	40.59	0.00	40.59	17.08
JEUR SUB-DIVISION	154.38	40.14	54.52	94.66	38.68
KARMALA S/DN.	109.70	38.71	50.25	88.96	18.91
KURDUWADI S/DN.	306.09	78.70	93.45	172.15	43.76
BARSHI	**770.33**	**241.68**	**276.16**	**517.84**	**32.78**
MANGALVEDHA	139.70	36.78	60.27	97.05	30.53
PANDHARPUR (U)	32.06	28.09	0.02	28.11	12.32
PANDHARPUR R-I	169.77	46.36	83.60	129.96	23.45
PANDHARPUR R-II	206.04	45.94	92.53	138.47	32.79
SANGOLA	190.22	61.59	62.29	123.88	34.88
PANDHARPUR	**737.79**	**218.76**	**298.71**	**517.47**	**29.86**
AKKALKOT S/DN.	148.03	49.56	93.65	143.21	3.26
MOHOL S/DN.	284.89	75.80	113.24	189.04	33.64
SOLAPUR R-I S/DN.	222.06	184.29	32.11	216.40	2.55
SOLAPUR R-II S/DN.	270.04	135.61	76.99	212.60	21.27
SOLAPUR RURAL	**925.01**	**445.26**	**315.98**	**761.24**	**17.71**
Rest Of Four Div	**2911.96**	**1033.19**	**1030.70**	**2063.89**	**29.12%**

Sub-division wise input and billed units are tabulated at Table 34, the difference being the distribution loss. In this calculation, input energy, billed energy against metered and unmetered agricultural consumers, and hence total energy billed figures have been obtained from MSEDCL.

Total Billed Units = 1033.19 MU

Distribution Loss = Input Energy – Energy Billed

= 2911.96 – (1033.19 + 516.7)

= 1362.07 MUs

(In case of rural divisions, energy billed includes metered units as well as unmetered assessed units.)

$$\% \text{ Distribution Loss} = \frac{\text{Distribution Loss}}{\text{Input Energy}} \times 100$$

$$= \frac{1362.07}{2911.96} \times 100$$

$$= 46.78\%$$

10.3.2 Calculation of Commercial Loss

Commercial loss = Distribution loss – Technical loss
= 1362.07 – 561.54
= 800.53 MU

Estimated commercial loss for Solapur rural division is 800 .53 MU

Table 41: Segregation of Distribution loss – Rural Divisions

Description	Energy (MU)	% of Input Energy
Energy input to Solapur rural divisions	2911.96	100.0%
Energy metered and billed	1033.19	35.5%
Energy assessed for unmetered consumers	516.7	17.7%
Total energy billed	1549.89	53.2%
Distribution loss	**1362.07**	**46.8%**
Technical loss	**561.54**	**19.3%**
Commercial loss	**800.53**	**27.5%**

10.3.3 Computation of Commercial Loss Components

10.3.3.1 Assessment of Commercial Loss Due to Faulty meters

Table 42: Assessment of Commercial Loss Due to Faulty Meters

DTC Code	Consumer No.	Sanctioned Load: kW	Actual Load: kW	Consumption July-07: kWh	Billed July - 08: kWh (on average consumption)	Difference: kWh
4099041	337010168095	0.7	1	37	11	26

4099041	337010101608	0.2	1	73	62	11
4090122	333010087103	0.5	0.5	43	39	4
4099041	337010042709	0.4	0.4	94	79	15
				247	191	56

During our survey we studied the billing of consumers with faulty meters supplied by four representative DTCs in month of July 2008 and compared the consumption with July 2007. It was observed that commercial loss decreased by 56 units (out of 1923 units supplied by the four DTC's) the actual consumption of these consumers with faulty meters being more than the assessed consumption. [56 = 2.91 % of 1923]

Faulty meters thus contribute to commercial loss to the extent of 2.91% of billed units at LT level (1362.07 MUs), amounting to **39.64 MUs** per year.

10.3.3.2 Assessment of Commercial Loss Due To Slow meters

All meters on the two distribution transformers were checked with Accucheck apparatus. Energy measured by meters which are inaccurate i.e. performing slow by more than 1% was considered for assessment of commercial loss.

Table 43: Assessment of Commercial Loss Due to Slow Meters

DTC 4090122			DTC 4099041			Total for two DTCs		
Units recorded	Diff. owing to slow meters	Correct consumption	Units recorded	Diff. owing to slow meters	Correct consumption	Units recorded	Diff. owing to slow meters	Correct consumption
956	76.18	1032.18	1944	110.10	2054.44	2900	186.28	3055.80

It is seen from the above there is a loss of 155.8 units due to slow meters against total energy delivered of 3055.80 units. This gives:

% Loss due to slow meters = 155.8 ÷ 3055.8 x 100 % = 5.1%

Thus loss due to slow meters translates into an annual energy loss of 5.1% of energy billed to LT consumers (1362.07 MUs) which comes to **69.46 MUs**

10.3.3.3 Assessment of Commercial Loss Due to Direct Theft

Due to the huge Low tension network across Solapur District, odd supply hours and lack of vigilance energy theft by direct hooking from LT line or bypassing the meter is very high as

compared to other components in rural area. Considering the 82% agricultural connected load, the energy audit was carried out on distribution transformer centre exclusively supplying agricultural load. Energy audit of a 200 kVA distribution transformer feeding only metered agricultural pumps was carried out for 30 days. The summary of the results are given in Table 38

Table 44: Energy Audit of Agricultural Distribution Transformer

Energy Audit Report, Solapur Rural Division					
Sub division:			**Sub Dn. Code: 4087 PC :**		
DTC code : 4094253			**KVA : 200 I.R.: 92333 Dt: 06.09.08**		
DTC Name: MF: 02			**Category :AGRI F.R.: 94874 Dt:06.10.08**		
Sr No	**Consumer No.**	**Days**	**Initial Reading (IR)**	**Final Reading (FR)**	**Diff. =(FR-IR)**
			(kWh)	**(kWh)**	**(kWh)**
1	330010071151	30	2851	3040	189
2	330010102723	30	2759	2848	89
3	330010103118	30	10266	10487	221
4	330010102031	30	2271	2717	446
5		30	746	776	30
6	330010102634	30	8049	8494	445
7	330010514649	30	2617	2703	86
8	330010502195	30	27947	28156	209
9	PWW	30	3138	3680	542
10	330010102391	30	0	0	0
11	330010102839	30	6199	6502	303
	Units (kWh)				**2560**

Table 45: Loss by Theft

Particulars	**Units(kWh)**
Energy delivered by DTC	5082
Metered Energy	2560
Energy Lost by Theft	2522
%Loss	**49.63%**

There was no other load besides the agricultural consumers mentioned above. All meters were in working condition. Energy audit carried out on this DTC clearly showed that the loss of 2522 units (49.63 %) is on account of direct theft by hooking or bypassing the meter.

Thus the remaining energy loss in the four rural divisions is treated as energy loss due to direct theft.

Energy loss due to theft = Total commercial loss - Energy loss due to slow meters - Energy loss due to faulty meters.

= 800.53 MU – 39.64 MU – 69.46 MU

= **691.43 MU**

10.3.4 Summary of Commercial Loss Components

Table 46: Break-up of Commercial Loss: Rural Divisions

	Head - Commercial Loss	Energy Loss (MU)	Percent of Commercial Loss	Percent of Distribution Loss	% of Total Input Energy
1	Low Billing average - Faulty meters	39.64	4.95%	2.91%	1.36%
2	Inaccurate Meters	69.46	8.68%	5.10%	2.39%
3	Theft of energy – illegal / direct use	691.43	86.37%	50.76%	23.75%
	Total Commercial Loss	800.53	100.00%	58.77%	27.49%

11. Factors Contributing to Losses

11.1 Technical Loss

The key factors which contribute to technical loss are discussed below:

i. Effect of Feeder Loading

Technical (I^2R) loss is directly proportional to the square of loading. Feeders in Solapur urban division were found to be well within the respective conductor thermal loading limits. Hence overloading is ruled out as a factor contributing significantly to technical losses to warrant bifurcation of feeders or balancing of loads between underloaded and overloaded feeders.

In the rural divisions about 20% of feeders were close to the respective thermal loading limits. Measures such as bifurcation of feeders and load balancing will help to reduce technical losses and result in undesirable outage due to overloading.

ii. Effect of Conductor Length

Technical (I^2R) loss is directly proportional to the conductor length. It was observed that the HT feeders were appropriately bifurcated in urban area. However in case of rural area many feeders were too long causing high losses as well as poor voltage profile.

The I^2R loss in the LT lines is estimated at 349 MUs which constitutes 62% of the technical loss in LT network and 19% of the energy supplied into rural network of Solapur. By reducing the feeder length to half, the losses will also be halved with current remaining constant. That would mean a saving of 175 MUs per year or 9.5% of all energy supplied into the network.

iii. Effect of Power Factor

Improved power factor means less reactive current (I) being supplied by the network, which translates to reduced total current, and hence reduced I^2R losses in conductors.

It must however be noted that, installing power factor in LT network is difficult and except in indoor LT substations where automatically switched power factor correction capacitors can be installed, there is little choice but to install capacitors on 11kV busses. This reduces the current drawn from 33 kV level but does not affect the power factor of 11kV feeders and the downstream LT network. In other words the only practical way to limit loss due to power factor is to encourage use of high power factor apparatus at the consumer end.

iv. Phase unbalance Current

Due to the imperative of supplying single phase loads from a three phase + neutral system, unbalance of a lesser or greater degree is always present in the LT network. Unequal currents in the three phases results in the resultant current finding its way back through the neutral conductor. It is difficult to quantify the unbalanced current because the degree of unbalance is not usually known from the data available with the utility. Further, the degree of unbalance keeps changing, which makes it even more difficult. All that one can say or do in this regard is to ensure that while giving connections to consumers, the need to keep the system balanced is always kept in view.

11.2 Commercial Loss

In rural areas the factor contributing the most to commercial loss Is illegal tapping of overhead conductors. Conversion to HVDS system offers the best solution to curb direct theft of electricity besides effective vigilance and putting in place a reliable energy accounting system.

In urban areas theft by direct tapping of overhead conductors is estimate to contribute to 44% of all commercial loss, which comes to 29% of all distribution loss. Use of HVDS or use of LT AB conductors (aerial bunched conductors) lead to reduction of losses due to direct tapping of bare overhead LT conductors. Inaccurate meters are estimated to contribute 39% of all commercial loss, equivalent to 26% of distribution loss. Replacement of old electromechanical meters by accurate electronic meters is the answer to this problem.

12. Bench Marking

12.1 Technical Loss

Technical losses in transmission, sub-transmission and distribution networks in India range between the values given in the following table:

Table 47 : Benchmarking- Technical Loss in Indian Power Sector

Distribution System Elements	Technical Loss(%)
Transformation to intermediate voltage level &step down to sub transmission voltage level	1.5 to 3 %
Sub transmission system and step down to distribution voltage level	2.25 to 4.5 %
Distribution lines and service connections	4 to 7 %
Total	**7.75 to 14.5 %**

Source: EPS 17 by CEA

This shows that the technical loss in Solapur urban division estimated at 6% lies at the lower level of range achieved in utilities across the country. On the other hand the estimated technical loss in rural divisions at 19% is above the range indicated above. This suggests that there is scope for reduction of technical losses. Reduction in feeder lengths will help achieve reduction in technical loss. This has been discussed at Section 11.

Referring to Table 19, it will be observed that the contribution of service cables, distribution box fuses, board and meter wiring to the technical loss is small enough to be ignored. Furthermore, there is little scope for reduction in technical loss on this account.

12.2 Commercial Loss

The following table gives state-wise figures of distribution loss for the years 2001-02 to 2006-07, the latest figure available from CEA. Distribution loss reported by utilities takes into account the billing of unmetered rural consumers.

In urban Solapur the distribution loss reported is 18% of which commercial loss contributes 12%. 18% distribution loss compares favourably with the Maharashtra average of 31.64%, which

includes both urban and rural areas. There is a scope for reduction of commercial loss in urban Solapur, which can be achieved in good measure by replacing old electromechanical meters by accurate electronic meters. This has been discussed in Section 11.2.

In rural Solapur, the greatest scope for commercial loss reduction lies in stopping direct tapping of bare overhead conductors. Conversion of overhead LT conductors by HVDS system offers a good solution for reduction of theft. This has been discussed in Section 11.2

State-wise Energy available (in GWH) and Transmission & Distribution Loss (%) (Central Electricity Authority)

		2001-02		2002-03		2003-04		2004-05		2005-06		2006-07	
No.	State Name	Electricity Available in the State (GWh)	% T&D Loss	Electricity Available in the State (GWh)	% T&D Loss	Electricity Available in the State (GWh)	% T&D Loss	Electricity Available in the State (GWh)	% T&D Loss	Electricity Available in the State (GWh)	% T&D Loss	Electricity Available in the State (GWh)	% T&D Loss
1	Andaman & Nicobar	128.75	29.20	134.93	19.78	152.88	25.95	125.86	12.63	153.64	24.32	177.68	23.10
2	Andhra Pradesh	43,027.31	26.81	45,006.30	30.11	47,279.37	27.73	51,309.12	23.96	49,821.81	20.06	56,389.79	18.65
3	Arunachal Pradesh	161.93	53.58	129.74	38.95	238.26	47.54	406.31	42.96	321.13	49.72	328.14	57.79
4	Assam	3,177.28	42.78	3,177.85	38.30	3,164.37	39.31	3,862.02	51.76	3,692.37	40.34	3,883.71	33.69
5	Bihar	6,396.71	51.70	5,989.94	37.98	5,921.18	36.66	6,493.58	38.88	7,178.88	43.96	7,756.12	50.67
6	Chandigarh	996.74	24.97	1,059.36	24.06	1,367.47	39.06	1,318.88	30.37	1,438.49	31.64	1,421.49	25.13
7	Chhattisgarh	9,292.80	33.75	11,214.41	37.86	10,881.22	42.55	11,770.16	28.06	12,746.84	31.06	13,828.62	31.71
8	Dadra & Nagar Haveli	1,099.24	27.22	1,503.95	40.26	1,821.48	15.10	2,104.90	16.00	2,656.77	19.94	3,061.47	11.22
9	Daman & Diu	799.83	7.52	965.60	14.95	1,103.68	16.88	1,186.36	15.56	1,387.48	21.58	1,496.88	22.09
10	Delhi	18,203.05	43.97	20,591.32	45.82	23,862.38	43.66	23,525.58	45.40	26,119.80	42.22	21,906.73	33.00
11	Goa	2,092.48	25.18	3,195.25	40.26	2,761.36	45.05	2,876.95	35.97	2,665.93	19.68	2,938.38	20.90
12	Gujarat	46,174.65	26.87	48,162.21	28.52	50,097.26	24.20	53,410.68	30.43	51,451.72	27.91	54,269.62	24.87
13	Haryana	17,331.97	39.22	18,799.78	37.65	19,013.86	32.07	20,402.93	32.11	22,198.74	30.51	24,969.46	33.35
14	Himachal Pradesh	4,091.74	25.55	4,401.50	21.16	5,620.41	22.76	5,738.37	28.90	4,668.00	23.55	5,360.45	19.77
15	Jammu & Kashmir	6,097.97	48.85	6,464.74	45.55	6,966.61	45.54	6,696.46	41.08	7,605.55	44.93	8,393.61	51.98
16	Jharkhand	9,689.27	26.39	8,975.59	21.19	10,705.90	25.35	11,154.10	19.62	12,773.89	26.82	14,704.79	26.21
17	Karnataka	29,982.26	33.83	29,383.21	24.57	30,171.10	23.29	33,523.92	26.08	36,596.94	29.77	41,425.93	25.91
18	Kerala	12,771.30	32.21	12,299.87	27.45	11,635.00	21.63	12,284.76	22.48	13,321.03	23.50	13,982.64	19.11
19	Lakshadweep	19.57	10.94	20.55	11.29	21.51	11.85	22.25	10.20	25.39	11.19	27.74	12.87
20	Madhya Pradesh	26,306.46	44.55	26,819.80	43.31	27,178.42	41.44	29,320.83	41.30	32,322.35	40.07	33,078.65	39.24
21	Maharashtra	74,042.29	37.28	75,723.08	34.01	78,668.00	34.12	82,075.33	32.40	85,870.39	31.60	91,092.15	31.64
22	Manipur	448.08	62.35	491.27	63.66	503.73	65.18	604.25	70.61	509.74	63.12	467.23	53.47
23	Meghalaya	810.81	22.66	935.35	21.92	966.40	16.73	1,290.49	28.35	1,212.54	40.19	1,203.99	35.34
24	Mizoram	263.57	49.77	278.09	46.91	292.16	55.54	385.53	66.14	221.21	39.19	234.78	38.18
25	Nagaland	245.91	52.32	292.24	56.71	302.76	55.00	354.03	48.26	353.09	58.99	346.16	54.79
26	Orissa	12,617.18	47.34	12,527.52	45.36	16,955.38	57.09	18,483.22	44.02	14,885.29	45.56	16,036.37	40.86
27	Pondicherry	1,829.43	12.00	1,960.86	21.10	2,030.03	11.60	2,222.38	18.15	2,291.45	18.48	2,492.52	18.76
28	Punjab	28,460.84	27.70	28,675.87	24.42	30,626.66	25.96	30,564.47	25.42	33,493.09	27.56	35,956.22	26.61
29	Rajasthan	24,815.74	43.06	26,689.50	42.61	27,157.26	43.74	30,158.55	44.68	29,982.35	39.92	31,109.57	35.60
30	Sikkim	180.63	31.73	162.28	54.85	404.90	54.99	528.42	50.49	233.75	10.73	289.75	26.86
31	Tamil Nadu	43,154.93	16.06	45,015.04	17.31	47,703.23	17.16	51,486.68	19.28	54,729.67	18.66	62,064.03	19.54
32	Tripura	636.15	40.38	674.49	40.64	835.46	46.44	1,129.03	59.54	629.48	41.11	604.71	34.75
33	Uttar Pradesh	41,787.44	37.62	38,466.34	34.16	41,974.46	35.17	42,992.45	34.39	45,083.14	32.63	51,937.13	33.49
34	Uttaranchal	3,279.87	32.39	5,340.34	25.17	6,887.63	49.23	5,503.69	39.30	5,460.68	35.96	5,930.59	34.48
35	West Bengal	24,715.27	31.67	24,815.76	25.93	29,347.26	31.01	30,874.45	28.54	27,882.55	24.84	29,620.99	23.64
	All India	45,129.45	33.98	510,343.93	32.54	544,619.04	32.53	576,186.99	31.25	591,985.26	30.42	638,788.09	28.65

Source : Central Electricity Authority, General Review 2007; Electricity data 2006-07

13. Way Forward

Following is the summary of recommended measures for reduction of technical and commercial losses.

i. Metering at all 33kV and 11kV feeders and metering of all distribution transformers: Without accurate and reliable metering it is not possible to arrive at reliable figures of distribution loss, making it difficult to work out costs and benefits of measures to reduce losses and to set priorities.

ii. Installing an in-house energy accounting system in place.

iii. Conversion of sections of rural distribution networks identified as theft prone to HVDS System.

iv. Replacement of sections of urban distribution networks identified as theft prone by HVDS System or LT ABC conductors.

v. Replacement of old electromechanical meters by accurate electronic meters.

ANNEXURES

Annexure 1: Format- Survey of Consumers Having Metered Connection

PARTICULARS OF CONSUMER AND METER READING				
1	Name Of Consumer			
2	Consumer Number			
3	Village			
4	Sanctioned Load (kW / KVA / BHP) Tick Any One			
5	Connected Load: kW rating of pump-set			
6	Depth of Tube Well in metres			
7	Meter Sl. No.			
8	Date Of 1st Meter-Reading			
9	1st Meter Reading			
10	Date Of 2nd Meter-Reading			
11	2nd Meter Reading			
12	Date Of 3rd Meter-Reading			
13	3rd Meter Reading			
Meters				
14	Is the meter functional?	Yes/ No		
15	Is there any evidence of meter tampering? Describe	No/Yes. ……		
16	If meter is not functioning, since when?	N.A./ ……		
Pump-Set				
17	Had the pump set been out of order since last meter reading?			
18	Dates between which the pump set was out of order			
Power Supply				
19	How long the power supply is generally available every day?			
20	Is the power supply available on all days in a week?			
21	If not, how many days a week is power available?			
22	Incidents of prolonged outages since last meter reading: Dates and durations			
Reading of Clamp-on Ammeter				
23	Current measured at site (A)	R	Y	B
24.	Voltage measured at site	RY	YB	BR

Annexure 2: Format - Survey of Consumers Having Unmetered Connection

PARTICULARS OF CONSUMER AND METER READING					
1	Name Of Consumer				
2	Consumer Number				
3	Village				
4	Sanctioned Load				
5	Connected Load: kW / KVA / BHP rating of pump-set				
6	Depth of tube well in metres				
Usage					
7	Number of hours the pump is run in dry summer season				
8	Number of hours the pump is run in monsoon season				
9	Number of hours the pump is run in winter/ spring/ autum seasons				
Availability of Power Supply					
10	How long the power supply is generally available every day				
11	Is the power supply available on all days in a week?				
12	If not, how many days a week is power available?				
13	Incidents of prolonged outages since last meter reading: Dates and durations				
CROPS GROWN, AREA UNDER CULTIVATION etc.					
		Crop 1	Crop 2	Crop 3	
14	Area Under Crop				
15	Irrigated Area				
16	Other methods of irrigation employed, if any				
Reading of Clamp-on Ammeter					
17	Current measured at site (A)		R	Y	B
18.	Voltage measured at site		RY	YB	BR

Annexure 3: Sub Division- wise AG Consumption and Index of MSEDCL

Sub- division wise AG Index (FY2007-08)						
Division	SUB division	B.U.	Month	AG Index (Units/ HP/ Month)	Unmetered Load (HP)	Assessed Unmetered Energy (Units)
SOLAPUR RURAL						
SOLAPUR RURAL	AKKALKOT S/DN.	1341	0706	147.35	50413	22285067
SOLAPUR RURAL	AKKALKOT S/DN.	1341	0709	161.91	50925.5	24736043
SOLAPUR RURAL	AKKALKOT S/DN.	1341	0712	168.62	50912	25754344
SOLAPUR RURAL	AKKALKOT S/DN.	1341	0803	136.91	50811	20869602
SOLAPUR RURAL	MOHOL S/DN.	1350	0706	130.33	61652.3	24105433
SOLAPUR RURAL	MOHOL S/DN.	1350	0709	130.16	63447.35	24774921
SOLAPUR RURAL	MOHOL S/DN.	1350	0712	167.34	64137.35	32198232
SOLAPUR RURAL	MOHOL S/DN.	1350	0803	167.55	63977.85	32158466
SOLAPUR RURAL	SOLAPUR R-I S/DN.	1325	0706	85.19	23954	6121924
SOLAPUR RURAL	SOLAPUR R-I S/DN.	1325	0709	78.56	24349	5738572
SOLAPUR RURAL	SOLAPUR R-I S/DN.	1325	0712	150.68	24814.5	11217147
SOLAPUR RURAL	SOLAPUR R-I S/DN.	1325	0803	131.87	22819	9027425
SOLAPUR RURAL	SOLAPUR R-II S/DN.	1333	0706	126.36	50074.81	18982359
SOLAPUR RURAL	SOLAPUR R-II S/DN.	1333	0709	95.68	50757.28	14569370
SOLAPUR RURAL	SOLAPUR R-II S/DN.	1333	0712	163.68	50886.78	24987444
SOLAPUR RURAL	SOLAPUR R-II S/DN.	1333	0803	127.84	48116.28	18453556
Sub-Total (MU's)						**315.98**
PANDHARPUR						
PANDHARPUR	MANGALVEDHA	6351	0706	132.19	38840.5	15402977
PANDHARPUR	MANGALVEDHA	6351	0709	108.83	39597	12928025

Sub- division wise AG Index (FY2007-08)						
Division	SUB division	B.U.	Month	AG Index (Units/ HP/ Month)	Unmetered Load (HP)	Assessed Unmetered Energy (Units)
PANDHARPUR	MANGALVEDHA	6351	0712	152.29	39462.5	18029232
PANDHARPUR	MANGALVEDHA	6351	0803	117.99	39297.5	13910136
PANDHARPUR	PANDHARPUR (U)	6319	0706	110.97	15	4994
PANDHARPUR	PANDHARPUR (U)	6319	0709	90.26	15	4062
PANDHARPUR	PANDHARPUR (U)	6319	0712	101.65	15	4574
PANDHARPUR	PANDHARPUR (U)	6319	0803	82.14	15	3696
PANDHARPUR	PANDHARPUR R-I S/DN	6327	0706	127.6	50601.02	19370070
PANDHARPUR	PANDHARPUR R-I S/DN	6327	0709	95.67	50838.52	14591164
PANDHARPUR	PANDHARPUR R-I S/DN	6327	0712	160.55	51157.52	24640020
PANDHARPUR	PANDHARPUR R-I S/DN	6327	0803	163.07	51096	24996674
PANDHARPUR	PANDHARPUR R-II S/DN	4715	0706	113.46	56596	19264146
PANDHARPUR	PANDHARPUR R-II S/DN	4715	0709	108.67	57903.5	18877120
PANDHARPUR	PANDHARPUR R-II S/DN	4715	0712	145.85	58176.5	25455128
PANDHARPUR	PANDHARPUR R-II S/DN	4715	0801	166.09	58077.5	28938276
PANDHARPUR	SANGOLA	6343	0706	45.16	64752.84	8772715
PANDHARPUR	SANGOLA	6343	0709	45.21	66167.84	8974344
PANDHARPUR	SANGOLA	6343	0712	120.64	65676.84	23769762
PANDHARPUR	SANGOLA	6343	0803	105.8	65436.84	20769653
Sub-Total (MU's)						**298.71**
BARSHI						
BARSHI	BARSHI (R) S/DN.	1392	0706	122.96	49975.02	18434785
BARSHI	BARSHI (R) S/DN.	1392	0709	123.59	50382.32	18680253
BARSHI	BARSHI (R) S/DN.	1392	0712	148.37	50668.62	22553109
BARSHI	BARSHI (R) S/DN.	1392	0803	120.42	50568.17	18268257
BARSHI	BARSHI (U) S/DN.	1384	0706	41.45	0	0
BARSHI	BARSHI (U) S/DN.	1384	0709	15.51	0	0
BARSHI	BARSHI (U) S/DN.	1384	0712	35.6	0	0
BARSHI	BARSHI (U) S/DN.	1384	0803	60.86	0	0

Sub- division wise AG Index (FY2007-08)						
Division	SUB division	B.U.	Month	AG Index (Units/ HP/ Month)	Unmetered Load (HP)	Assessed Unmetered Energy (Units)
BARSHI	JEUR SUB-Dn	4757	0706	181.87	31941.5	17427602
BARSHI	JEUR SUB-Dn	4757	0709	113.65	32043	10925061
BARSHI	JEUR SUB-Dn	4757	0712	157.11	32528.5	15331658
BARSHI	JEUR SUB-Dn	4757	0803	111.09	32516	10836607
BARSHI	KARMALA S/DN.	1376	0706	139.46	29325.07	12269023
BARSHI	KARMALA S/DN.	1376	0709	134.95	29908	12108254
BARSHI	KARMALA S/DN.	1376	0712	163.99	29920	14719742
BARSHI	KARMALA S/DN.	1376	0803	124.54	29843.5	11150128
BARSHI	KURDUWADI S/DN.	1368	0706	83.61	72430.7	18167792
BARSHI	KURDUWADI S/DN.	1368	0709	83.64	73616.4	18471827
BARSHI	KURDUWADI S/DN.	1368	0712	134.84	73578.9	29764137
BARSHI	KURDUWADI S/DN.	1368	0803	122.62	73525.4	27047054
Sub-Total (MU's)						**276.16**
AKLUJ O&M						
AKLUJ O&M	AKLUJ I SUB-DN.	6335	0706	136.42	20669	8458995
AKLUJ O&M	AKLUJ I SUB-DN.	6335	0709	142.91	21172.6	9077329
AKLUJ O&M	AKLUJ I SUB-DN.	6335	0712	138.75	20830.1	8670529
AKLUJ O&M	AKLUJ I SUB-DN.	6335	0803	135.74	20783.6	8463498
AKLUJ O&M	AKLUJ II SUB-DN.	4716	0706	170.66	43379.52	22209447
AKLUJ O&M	AKLUJ II SUB-DN.	4716	0709	69.78	43778.52	9164595
AKLUJ O&M	AKLUJ II SUB-DN.	4716	0712	151.19	43781.52	19857984
AKLUJ O&M	AKLUJ II SUB-DN.	4716	0803	133.83	43784.02	17578846
AKLUJ O&M	NATEPUTE	6360	706	86.35	38781	10046218
AKLUJ O&M	NATEPUTE	6360	709	69.15	38865	8062544
AKLUJ O&M	NATEPUTE	6360	0712	92.57	38792.5	10773065
AKLUJ O&M	NATEPUTE	6360	0803	64.53	38728.5	7497450
Sub-Total (MU's)						**139.86**
Assessed Unmetered Energy Consumption for Rural Division (MU's) for FY 2007-08						**1030.70**

Annexure 4: Accucheck and Energy Audit Report # 4579258

Accucheck and Energy Audit report, Solapur Urban Division									
Sub division: E			Sub Dn. Code: 4579					PC : 1	
DTC code : 4579258			KVA : 200 30.08.08			I.R.: 60211	Dt:		
DTC Name: Jambmuni MF: 03			Category: Residential Dt:05.09.08			F.R.: 61307			
Sr No	Consumer No.	NAME	Sanc. Load (kW)	Actual Load (kW)	Wire Length (Meter)	Initial Rdng. (kWh)	Final Rdng. (kWh)	Diff. =(FR-IR) (kWh)	Accucheck Results (%)
1	330240129906	SAYYAD BUKHARI DARGA	0.1	0.3	35	2479	2485	6	5.3
2	330240198118	B S INAMDAR	0.5	0.6	21	2549	2572	23	0.0
3	330240222795	G.M.TALIKOT	0.5	0.6	25	1001	1025	24	28.9
4	330240279363	JAGANNAT RAMCHANDRA KADAM	3.6	4	20	361	366	5	36.9
5	330240320304	RAMESH SUDAM SAPATE	0.5	0.5	21	413	420	7	9.1
6	330240428083	DEVIDAS GOPAL KAMBLE	h	0.5	17	1137	1148	11	0.0
7	330240435381	AMRUT YALAPPA NARAYANKAR	0.3	0.5	30	3368	3380	12	7.6
8	330240440199	ANNISAHEB MALHAPPA BIRAJDAR	0.4	0.5	15	7501	7509	8	13.5
9	330240441055	ABDUL JABBAR MOHIDHIN SHAIKH	0.2	0.5	32	2785	2794	9	-14.5
10	330240441349	SIKANKADAR ALLABANDE HANURE	0.3	0.5	30	712	722	10	0.0
11	330240442809	YALLAPPA RAMCHANDRA WAGHMARE	0.2	0.5	28	547	558	11	0.0
12	330240443112	SHRNTAPPA RAVAPPA BIRAJDAR	0.3					8	0.0
13	330240443121	DINKAR DATTATRAY KULKARNI	0.3	0.5	18	3970	3981	11	5.8
14	330240443520	MUKUND PARSHURAM PAWAR	0.3	0.5	19	2999	3018	19	3.3
15	330240443538	ABDUL GAFOOR APPABHAI SHAIKH	0.3	0.5	23	824	837	13	6.6
16	330240444151	YALLAPPA HANMANTU PAGE	0.2	0.5	19	973	987	14	17.4
17	330240444461	INDUBAI MACHINDRA KHALBATE	0.2	0.5	18	503	516	13	10.1
18	330240444674	DASHARATH BODHALA GUJAR	0.3	0.5	8	5027	5041	14	12.5
19	330240447321	HANMANTU TAYYAPPA SHINGADE	0.4	0.5	15	2891	2900	9	0.0
20	330240447479	RAMCHANDRA GANAPAT SAWANT	0.2	0.5	30	4510	4523	13	13.6

21	330240447592	KADARBI MAHIBUB SHAIKH	0.3					1	0.0
22	330240447690	DINKAR SHIVAJI CHAVAN	0.2	0.5	30	514	523	9	0.0
23	330240447762	A J M Y SHAIKH	0.3	0.5	25	333	340	7	9.1
24	330240448165	NAGAYYA RAMANYYA PARIT	0.3	0.5	20	1153	1168	15	0.0
25	330240451051	LACHMAYYA HUSENAPPA BHANDARE	0.4	0.5	32	513	519	6	0.0
26	330240451077	H C CHINCHOLKAR	0.3	0.5	18	3431	3441	10	0.0
27	330240451140	VYANKATESH KRISHNA KULKARNI	0.3	0.5	36	129	137	8	7.3
28	330240451379	MOHAN ANAND DHANAWARE	0.2	0.6	25	6489	6511	22	26.2
29	330240453509	PIRSO GHUDVSO SHAIKH	0.3	0.6	18	9960	9974	14	5.3
30	330240453860	PRABHAKAR BHIMRAO KASHAP	0.3	0.5	20	1904	1911	7	18.8
31	330240453878	KISAN M AISANDE	0.2	0.5	22	2645	2661	16	5.8
32	330240457385	h	0.2	0.5	17	493	501	8	18.0
33	330240457563	SIDRAM HANMANTU AGLUR	0.3		19			11	8.5
34	330240459701	SIDRAM NARASAPPA SAPATE	0.3	0.4	19	2422	2430	8	58.9
35	330240462621	HANMANTU BASAPPA SHAWANAK	0.2	0.6	20	7012	7025	13	38.1
36	330240462729	TIMAYYA RAJAPPA MADHEKAR	0.3	0.6	18	759	771	12	0.0
37	330240462745	SUMAN RAJARANG DIGE	0.2	0.6	15	458	464	6	0.0
38	330240463377	JAMBAYYA HUSANAPPA MADHEKAR	0.2	0.5	16	5254	5261	7	-12.2
39	330240468999	DEVIDAS JON SANGAJE	0.3	0.6	22	773	782	9	2.7
40	330240470071	SHARPNAPPA MAHALING KOLUR	0.3	0.6	21	927	937	10	13.1
41	330240472244	RAVAYYA VALAPPA GUWAL	0.3	0.6	16	13965	13970	5	20.0
42	330240475421	JALIMDAR S KAKADE	0.3	0.6	19	7019	7032	13	5.9
43	330240478986	HEBEI BHIMAYYA ANMOL	0.3	0.5	18	56	70	14	2.5
44	330240481111	DASTAGIR S KURESHI	0.2	0.5	20	11433	11438	5	5.1
45	330240481146	SUBHASH MAHAMAD TAMBOLI	0.4	0.5	24	8947	8953	6	0.0
46	330240481359	HANMANTU HULGAPPA MHETRE	0.4	0.5	10	3055	3061	6	7.8
47	330240483882	LAXMAN BHIMRAO MAHAGAONKAR	0.2	0.5	18	1532	1548	16	0.0

48	330240484251	RUSHANBI M SHAIKH	0.3	0.5	32	258	266	8	5.5
49	330240495406	SHIVSHAILAPPA UMANNAPPA WACHE	0.5	0.5	26	13886	13906	20	0.0
50	330240497719	YASHAWANT DHONDIBA PARKALE	0.2	0.5	20	11090	11112	22	0.0
51	330240500035	BISHP MOHAMAD SHAIKH	0.4	0.5	28	241	247	6	0.0
52	330240501074	JUBEDABI A SAYYAD	0.3	0.5	18	8855	8863	8	10.7
53	330240501520	MURLIDHAR R. PARANDEKAR	0.8	1	32	10839	10852	13	-12.9
54	330240501571	KAMAL PURUSHOTTAM DESPANDE	0.4	0.5	15	7584	7613	29	0.0
55	330240501660	VIRPAKSHAPPA JIVAJI BASUTKAR	0.5	0.5	15	4682	4713	31	40.9
56	330240501716	ANJANABAI DATTAATRY KAMBLE	0.3	0.6	19	10582	10594	12	8.6
57	330240501805	ISMAIL RAJA PATEL	0.5	0.6	20	1064	1075	11	0.0
58	330240501945	KALSUBAI MAHIBOOBSAB INAMDAR	0.5	0.6	15	210	230	20	24.7
59	330240502101	V M KULKARNI	0.5	0.6	18	578	589	11	0.0
60	330240505118	LINGAYYA GANGADHAR SWAMI	0.5	0.5	20	13410	13418	8	0.0
61	330240505169	KASHINATH REKWAD	0.2	0.5	20	2936	2956	20	26.3
62	330240505185	ANNRAO DHARMRAO KASTURE	0.5	0.5	26	12067	12068	1	0.0
63	330240505223	JAGNNATH LAXMAN KHOBARE	0.3	0.5	19	1352	1369	17	0.0
64	330240505266	SUDHA AMARAO KORE	0.5	1	28	14696	14724	28	5.1
65	330240505452	SIDRAM YASHWANTAPPA MALAGE	0.9	0.4	25	12017	12026	9	2.4
66	330240510791	SHIVMARI VISWANATH SWAMI	0.3	0.5	19	7173	7194	21	2.6
67	330240510880	NIVRITI DASHARATH RAUT	0.3	0.5	21	4399	4409	10	5.6
68	330240510944	SHUKRIYA USMAN SHAIKH	0.5	0.5	20	1039	1055	16	6.4
69	330240510961	M P VIBHUTE	0.5					9	0.0
70	330240510979	RADHABAI RAMKRISHNA PAWAR	0.4	0.5	28	7798	7805	7	-12.3
71	330240511134	RUKAMINIBAI SITARAM SHINDE	0.5	0.5	30	3937	3950	13	0.0
72	330240511177	NIRMALA GENU JADHAV	0.3	0.5	15	11916	11927	11	0.0
73	330240511240	MOHAMAD ABDULSAB ADIL	0.5	0.5	15	3570	3586	16	8.5
74	330240511274	ANANDA HANMANTA NARAYANKAR	0.3	0.5	15	13917	13927	10	14.2

75	330240512513	MARIYABI MAHAMADHUSEN JANWADKA	0.5	0.5	19	12438	12442	4	21.9
76	330240512556	KHURSHID MEHABUB BALEWALE	0.2	0.5	25	124	128	4	3.1
77	330240512564	CHANDRABAI DITATRAY MORE	0.4	0.5	18	167	188	21	9.6
78	330240512581	JAYRAJ VISHWAS HAR	0.2	0.5	14	1145	1159	14	5.6
79	330240512734	H V KULKARNI	0.5	0.5	20	3266	3277	11	8.0
80	330240513722	S S JADHAV	0.5	0.5	21	658	674	16	15.4
81	330240513790	DIGAMBAR YASHVATRAO KULKARNI	0.5	0.5	20	39015	39031	16	27.5
82	330240513811	ZARABI SULEMAN KORABU	0.2					7	0.0
83	330240513889	RANGANATH DATTOBA SHINDE	0.5	0.5	24	461	469	8	0.0
84	330240514028	MOHTSIM MAHIBUB SHAIKH	0.5	0.5	15	207	239	32	0.0
85	330240514184	RATNABAI SHASIKANT DULANGE	0.5	0.5	20	10866	10871	5	9.3
86	330240514273	USMAN RATESAHEB INAMADAR	0.2	0.4	22	178	201	23	8.9
87	330240514281	ABDUL MAZID HUSENHSO FULMADI	0.3	0.4	18	7904	7913	9	0.0
88	330240514435	SUGARAABI R RAJAK TODALBAG	0.5	0.4	12	1509	1541	32	5.5
89	330240514460	TAYAPPA SAYANNA MHETRE	0.3	0.5	21	1302	1319	17	4.6
90	330240514567	NARAHAR BHAI CHAVAN	0.2	0.5	20	8712	8721	9	24.8
91	330240515644	SHANKAR BALU SATHE	2.3	3.5	19	1263	1275	12	7.4
92	330240515709	A B VHANGAWADE	0.5	0.5	15	1264	1271	7	7.2
93	330240515733	RAMCHANDRA BASAPPA VALASNGAONK	0.2	0.6	12	2298	2313	15	8.7
94	330240516179	ARJUN TUKARAM UMATE	0.4	0.5	16	3093	3104	11	7.8
95	330240516187	MAHIBUB SAYYAD AKHABAR	0.2	0.5	24	4423	4447	24	5.2
96	330240516225	RATNSHEKHAR DIGAMBAR TAKALKAR	2.5	3	21	412	418	6	23.9
97	330240519356	MANOHAR BABURAO UTTARKAR	0.5	0.5	30	8487	8499	12	-14.5
98	330240519500	BAKRISHNA SIDRAM ZINGADE	0.4	0.5	32	4308	4320	12	-3.8
99	330240519763	K B GAIKWAD	0.3	0.5	20	503	514	11	0.0
100	330240519771	VIJAYADEVI DAMODAR JEVARE	0.5	0.5	18	4264	4277	13	12.8

101	330240520044	CHAMPABAI GURUNATH JEURGI	0.3	0.5	18	10399	10420	21	28.0
102	330240520206	DATTATRAY SHRAWAN SHIVIHARAN	0.3	0.5	19				24.0
103	330240520427	SUBHASH RAMCHANDRA TATE	0.5	0.5	18	7242	7259	17	3.4
104	330240520451	BISMILHA M ISAK MULLA	0.3	0.5	15	5628	5635	7	4.2
105	330240520559	BAKAJI GUNDIBA JADHAV	0.5	0.5	18	15583	15600	17	10.5
106	330240520613	VIMAL GOVIND SHINDE	0.4	0.5	32	626	631	5	5.7
107	330240520621	YESHWANT AMBADAS JADHAV	0.5	0.5	18	17	32	15	26.4
108	330240520630	TANAJI BAGAWAN SALGAR	0.3					20	0.0
109	330240523973	GIRIJABAI AMBADAS BANDGAR	0.3	0.5	20	15828	15842	14	0.0
110	330240524031	ANJANABAI HIRACHAND MORESHWAR	0.5	0.5	22	7377	7392	15	5.1
111	330240524091	C N BHAGWAT	0.3	0.5	18	9436	9449	13	5.7
112	330240524376	GANGUBAI ISMAL MAKLUR	0.5	1	17	598	608	10	0.0
113	330240524392	ABDUL GAFOOR KASIM SHAIKH	0.3	0.5	18	478	510	32	8.6
114	330240524775	M D INGALE	0.4	0.6	22	176	194	18	26.9
115	330240526735	H.B.BAGANE	0.5	0.5	18	1340	1353	13	38.5
116	330240526751	NARAYAN AMBAJI DHUMAL	0.5	0.5	18	977	996	19	0.0
117	330240526905	BALU AMBADAS KADAM	0.2	0.5	30	5325	5337	12	-14.6
118	330240526999	MURLIDHAR SADASHIV SALUNKE	0.4	0.5	18	6004	6036	32	8.7
119	330240527324	HAJARAB UMARSAB ATTAR	0.3	0.5	22	5599	5614	15	5.0
120	330240527588	K S SHINDE	0.5	0.5	21	2549	2554	5	6.8
121	330240527740	MAHAMAD EKHBARABDULLA SHAIKH	0.3	0.5	18	32142	32163	21	18.6
122	330240531305	BHIMRAO MAREPPA LOKHANDE	0.5	0.5	22	1191	1214	23	3.1
123	330240531780	DASGIR KADAR SHAIKH	0.4	0.5	24	7195	7210	15	-13.5
124	330240531895	SUNILKUMAR SHIVYOGI RUHI	0.5	0.5	20	5798	5809	11	32.0
125	330240533723	SUSHILA BABURAO SURYAWANSHI	0.5	0.5	15	2016	2042	26	0.0
126	330240534681	VITHUBA SETAPPA BAGALE	0.2	0.5	20	964	976	12	0.0
127	330240534967	M M MATHAPATI	0.4	0.5	12	1069	1091	22	8.5

128	330240535173	B.V. SHINDE	0.5	0.5	18	6823	6838	15	6.8
129	330240535181	DIGAMAR GANPAT PENDALWAR	0.3					18	0.0
130	330240537133	SURESH RANGANATH PAWAR	0.2	0.4	18	11729	11735	6	8.4
131	330240540134	KURMANNA BHIMRAO BHANDARE	0.3	0.4	30	762	774	12	22.8
132	330240540410	SHANTAPPA SHIVAPPA GAWADE	0.3	0.4	16	492	498	6	0.0
133	330240541238	MOHAHAMAD USMAN SHAIKH	0.4	0.6	22	59	59	1	7.9
134	330240544865	VIJAYKUMAR MARYAPPA MULE	0.4	0.6	10	8430	8443	13	5.4
135	330240558661	PRALHAD RAMJEE GAIKWAD	0.5	0.6	20	3815	3827	12	38.5
136	330240562243	SONYABAPU GANPATRAO PAWAR	0.3	0.6	20	4912	4919	7	0.0
137	330240564700	ABEDA MD SHERIF SHAIKH	0.2	0.6	21	550	560	10	20.8
138	330240564734	DIGAMBAR NAMDEO PANDHARKAR	2.2					6	0.0
139	330240566443	SHARDABAI BABURAO BHAGANGE	0.1	0.2	16	2833	2840	7	0.0
140	330240567121	RAMSING TIKARAM BADIWALE	0.5	0.5	18	1771	1792	21	18.6
141	330240569795	NAVNATH VITHOBA SURWASE	1.7	2.5	18	10875	10896	21	6.7
142	330240570165	MANIYAR MD ISMAIL ABUDULKADAR	0.4	0.5	12	2067	2075	8	5.5
143	330240581795	HASANSAHEB MAHSAHEB SHAIKH	0.2	0.5	15	1521	1529	8	5.8
144	330240588731	MALLESHA KHANDU MANE	0.3	0.5	17	16252	16267	15	6.9
145	330240589273	KESHAV NANA TUSHAMBEKAR	0.2	0.5	32	9861	9872	11	7.0
146	330240599503	NAJMUNNISA USMANSAB BAGALI	0.4					7	0.0
147	330240606313	RAJARAM TIPANNA BAVADE	0.3	0.4	22	882	901	19	5.8
148	330240615720	SUHAS G SONAVALE	0.4					7	0.0
149	330240638860	MALLAPPA GOKARAPPA HOLPALLE	0.2	0.4	17	9243	9251	8	8.9
150	330240650223	JUBEDADI DASTAGIR MASALIKAR	0.4	0.5	18	4708	4715	7	7.1
151	330240657945	IQBAL JABBAR SHAIKH	0.5	0.5	25	4708	4713	5	0.0
152	330240679809	DASTGAR AHAMAD NADAF	0.2	0.4	30	5792	5807	15	9.3
153	330240689430	I.H.PATTADKAL	0.5	0.6	15	14258	14264	6	5.9
154	330240692627	SUVATTIBAI DINKARRAO TELANG	0.5	0.7	28	5408	5420	12	5.8

155	330240801906	AHAMAD HUSEN ATTAR	0.2	0.4	20	6362	6381	19	6.1
156	330240810506	RAJARAM SHIVAPPA DOLLE	1	1.5	24	9291	9306	15	6.6
157	330240832801	DHARMA LAKULL PATRE	0.2	0.2	18	630	630	7	31.3
158	330240873532	VIJAYA VITTHAL SARDESHMUKH	0.4	0.5	19	1178	1209	31	36.7
159	330240901463	VAIJANATH TUKARAM GURAV	2	2	15	8093	8109	16	3.2
160	330240905183	NARSING HULGAPPA MEHTRE	0.3	0.4	16	3439	3454	15	0.0
161	330240913712	MAHIBOOB S.AKBAR SAYYADMULLA	0.3	0.5	20	578	587	9	0.0
162	330240913933	VISHAKHA GOPALRAO GHATE	0.4	0.5	22	580	599	19	28.2
163	330240913941	BASHA MEHABOOB BADEWALE	0.3	0.5	28	654	662	8	0.0
164	330240926539	BHIMAYYA B MADHEKAR	0.2	0.4	29			21	0.0
165	330240931737	AMRUTA GOPU CHAVAN	4	4	25	10787	10813	26	3.1
166	330240980371	LINGAPPA TAMANA KOLI	0.3	0.4	19	922	934	12	0.0
167	330241042294	VISHNU BALAJI JADHAV	1.7	2	15	11656	11674	18	8.4
168	330241045595	MOHAMAD-ALI GHUDUBHAI SHAIKH	0.3	0.4	24	361	366	5	5.3
169	330241090477	MALLINATH SIDRAM NAVALE	0.4	0.4	25	14418	14423	5	9.2
170	330241092500	HEMANTKUMAR ANANDRAO NARAYANKA	0.5	2	19	2728	2741	13	7.7
171	330241138259	AMIN LADALESO MASALIKAR	0.2	0.4	15	1187	1199	12	0.0
172	330241194116	YAMUNA SUKHDEO DONGARE	0.4	0.4	32	9730	9746	16	0.0
173	330241242145	GHAINABAI RAGHU DAHLE	0.3	0.5	20	427	441	14	29.8
174	330241337499	ARUN SHANKAR KAMBALE	0.4	0.4	22	13373	13386	13	7.9
175	330241477487	DNYANESHWAR JAGANNATH KADAM	0.2	0.5	22	225	231	6	32.5
176	330241495078	SHAHNAZBEGAM SHAHABUDDIN SANGA	0.3	2	18	755	768	13	0.0
177	330241509443	TIMAYYA TIPPANA KATTAMAYYA	1.3	0.5	24	10357	10382	25	7.1
178	330241622011	SHANKAR HANMANTU BOLUDOLU	0.2	0.5	17	1239	1254	15	3.1
179	330241652777	RAMLING HANMANTU POTGULKAR	0.4	0.5	20	4206	4220	14	27.1
180	330241781071	MOHAN SONYABAPU PAWAR	0.4	0.5	26	1398	1408	10	0.0
181	330241788369	SAYYED JALALI BUKHARI	0.5	0.6	20	1582	1603	21	0.0

182	330241799310	PRAKASH SHASHIKANT DULANGE	1	1	21	26014	26031	17	6.8
183	330241954684	KHATUNBI DAUD SHAIKH	0.2	0.4	22	380	414	34	0.0
184	330241954790	SIDDHAMMA BASAPPA MADHEKAR	0.5	0.5	26	317	323	6	0.0
					20.7			**2410**	

Annexure 5: LT Network Simulation Report # 4579258

Simulation Report - LT network of 4579258			
ID	**Rating 1**	Rating 2	kW Losses
Cable1	15 m	1 - 3/C 120	0.007
Cable2	15 m	1 - 3/C 120	0.007
C3	30 m		0.009
C4	30 m		0.002
C5	30 m		0.001
Cable7	10 m	1 - 3/C 185	0.096
C8	30 m		0
C9	30 m		0
C10	30 m		0
C11	30 m		0
C12	30 m		0
C13	30 m		0
C14	30 m		0.002
C15	30 m		0
C16	30 m		0.009
C17	30 m		0
C18	30 m		0
C19	30 m		0
C20	30 m		0
C21	30 m		0.025
C22	30 m		0.012
C23	30 m		0.032
C24	30 m		0.204
C25	30 m		0.444
C26	30 m		0.001
C27	30 m		0.074
C28	30 m		0.051
C29	30 m		0
C30	30 m		0.01
C31	30 m		0.005
C32	30 m		0
C34	30 m		0.002
C35	30 m		0
C36	30 m		0.005
C37	30 m		0
C39	20 m		0
C41	20 m		0
C42	20 m		0
C44	20 m		0
C46	20 m		0
C48	20 m		0
C50	20 m		0.083
C51	20 m		0.058
C52	20 m		0.008

Simulation Report - LT network of 4579258			
ID	**Rating 1**	Rating 2	kW Losses
C53	20 m		0.023
C54	20 m		0.051
C55	20 m		0.069
C56	20 m		0.174
C57	20 m		0.035
C58	20 m		0.013
C59	20 m		0.062
C60	20 m		0.238
C62	20 m		0.004
C64	20 m		0.056
C65	20 m		0.078
C66	20 m		0.023
C67	20 m		0.026
C68	20 m		0.001
C69	20 m		0.005
C70	20 m		0.031
C71	20 m		0.011
T1	11 / 0.44 kV	200 kVA	0.593
Loss in LT OH line (30m) in kW			**0.888**
Loss in incomer cable in kW			**0.096**
Loss in outgoing cable in kW			**0.014**

Calculations

(Average LLF = 0.399)

Energy loss in LT over head lines = 0.888 kW × 24 × 0.399 × 7 days Units = 57.66 Units

Energy loss in incomer cable = 0.096 kW × 24 × 0.399 × 7 days Units = 6.43 Units

Energy loss in outgoing cable = 0.014 kW × 24 × 0.399 × 7 days Units = 1.073 Units

Annexure 6: Accucheck and Energy Audit Report # 4087130

Accucheck and Energy Audit report, Solapur Urban Division									
Sub division: B			Sub Dn. Code: 4087			PC : 1			
DTC code : 4087130			KVA : 200			I.R.: 69182		Dt: 28.08.08	
DTC Name: Ramabai Ambedkar MF: 02			Category: Residential			F.R.: 70642		Dt:05.09.08	
Sr No	Consumer No.	NAME	Sanc. Load (kW)	Actual Load (kW)	Wire Length (Meter)	Initial Rdng. (kWh)	Final Rdng. (kWh)	Diff. =(FR-IR) (kWh)	Accucheck Results (%)
1	330240494051	S P MALIKNUR	0.4	0.4	16	938	942	4	7.4
2	330240525861	ABA MARUTI AHERKAR	0.2	0.4	15	5570	5581	11	8.0
3	330240536048	BALI KRUSHNA KAMBLE	0.3	0.4	16	3154	3162	8	0.0
4	330240536625	NILAPPA BASAPPA SHINDE	0.2	0.4	17	2915	2919	4	19.8
5	330240560925	TULSABAI BANDA GAIKWAD	0.3	0.4		6487	6495	8	10.4
6	330240568446	G L WAGHMARE	0.5	0.4	18	2719	2729	10	3.2
7	330240579944	ANUSAYABAI M GAIKWAD	0.2	0.4	18	1057	1064	7	0.0
8	330240587009	VYANKAT DOULA GAIKWAD	0.3	0.3	17	2355	2370	15	5.8
9	330240587017	VAMAN DHONDIBA WANJALE	0.5	0.4	14	4396	4406	10	8.2
10	330240587092	MARUTI SAMBHAJI JETTYTHORE	0.3	0.4	14	2857	2862	5	0.0
11	330240587114	SIDHRAM BHIMASHA GONI	0.2	0.4	23	10910	10920	10	9.7
12	330240598591	SIDRAM JAYAPPA KASBE	0.3	0.4	28	9030	9039	9	32.3
13	330240607433	PRABHAKAR BHIVA JADHAV	0.3	0.4	30	6237	6245	8	0.0
14	330240630249	HUSINAPPA PANCHAPPA KADAM	0.2	0.4	15	1812	1819	7	11.8
15	330240630419	RAJENDRA TULSHIRAM MANE	0.2	0.4		5877	5878	1	7.8
16	330240633299	AMBADAS RAMA GAIKWAD	0.3	0.4	20	3627	3639	12	0.0
17	330240633485	Y R WAMANE	0.2	0.4	16	7358	7361	3	7.5
18	330240641381	ARJUN TUKARAM SONAWANE	0.3	0.4	19	7278	7289	11	3.8
19	330240643081	NAGANATH MAHADEV KASBE	0.3	0.4	16	2071	2082	11	6.5
20	330240651050	SHANTABAI KERAPPA GAIKWAD	0.3	0.4	11	3351	3353	2	9.0
21	330240651556	M B GAIKWAD	0.5	0.4	10	3766	3771	5	0.0
22	330240655969	CHANDAPPA PULAPPA DHALE	0.2	0.4				18	0.0
23	330240660695	KHANDERAO SAMBHAJI TUPSAKHARE	0.3	0.4	17	4821	4825	4	8.1
24	330240661489	MADHUKAR KISAN BANSODE	0.3	0.4		4012	4018	6	2.2
25	330240687097	BASAPPA KALAPPA HIPPERGI	0.1	0.3	19	11060	11069	9	10.5
26	330240687496	ARVIND KUNOLIK KAMBALE	0.1	0.3	10	3519	3525	6	0.0
27	330240779277	B V GAIKWAD	0.3	0.4				12	0.0
28	330240805472	B R KAMBALE	0.3	0.4	19	9728	9737	9	0.0
29	330240805511	M B KAMBALE	0.2	0.4				24	0.0
30	330240806142	DADARAO NAMDEV SONWANE	0.3	0.5	14	2056	2062	6	5.8
31	330240806894	S S WAGHAMARE	0.3	0.5	13	7961	7968	7	5.8
32	330240815869	ARJUN RAMA MISAL	0.5	0.4	16	1105	1115	10	0.0
33	330240816342	HARIBA LAXMAN SHINDE	0.3	0.4		5072	5086	14	6.6
34	330240816377	RAMAPPA A SHINDE	0.3	0.4	18	997	1009	12	8.1

35	330240816385	S. B. SONAWANE	0.3	0.4	20	1848	1853	5	4.3
36	330240837587	VITHABAI UTTAM KARABU	0.3	0.4	22	16161	16169	8	7.7
37	330240837595	DHANRAJ D PRAKSHALE	0.3	0.4				16	0.0
38	330240854058	D M NAGTILAK	0.2	0.4	17	1943	1945	2	0.0
39	330240902486	AMRUT SHAMRAO MANE	0.1	0.2	16	2895	2909	14	0.0
40	330240904217	UTTAM MARGU GAVALI	0.1	0.2	15	5289	5297	8	4.7
41	330240922282	NAGANATH SIDRAM SHIVASHARA	0.2	0.4	18	5118	5126	8	8.6
42	330240923840	ASOK GULAB KASABE	0.2	0.4	12	1647	1656	9	13.5
43	330240923882	RAMESH VISHANATH KAMBLE	0.4	0.4	16	2965	2973	8	3.1
44	330240925737	JAGANNATH GOVIND WAGHMARE	0.3	0.4	18	4014	4024	10	10.6
45	330240929538	CHANDRAKANT NAMDEO VATKAR	2.0	0.4				24	0.0
46	330240932342	VISHNU KRISHNA RANKHAMBE	0.2	0.4		10811	10820	9	3.7
47	330240932687	KISAN BABURAO GAIKWAD	0.2	0.4	10	4948	4956	8	0.0
48	330240936313	JAGANNATH NIVRUTTI MASAKE	0.2	0.4	14	5668	5673	5	18.7
49	330240937395	RAKHAMAJI MARUTI MORE	0.2	0.4	14	6703	6713	10	12.5
50	330240942071	DHARMA DEVAPPA UBALE	0.2	0.4	11	10391	10402	11	6.4
51	330240944677	BHIMSHANKAR JANARDHAN SARVADE	0.4	0.4	10	4425	4429	4	0.0
52	330240947986	REVANSIDDH MALSIDH DHALE	0.1	0.4	12	8019	8023	4	0.0
53	330240963591	REVAN SADASHIV SATPUTE	0.2	0.4	20	3709	3722	13	4.7
54	330240967391	RAMESH BHAGWAN OHOL	0.3	0.4	16	2571	2577	6	0.0
55	330240986451	LAXMAN YALLAPPA BANSODE	0.3	0.4	20	5870	5876	6	8.4
56	330240991632	BABU APPA GAIKWAD	0.3	0.4	25	8366	8372	6	0.0
57	330240996961	V S THORAT	0.1	0.2	13	2386	2388	2	0.0
58	330241000532	M B VYAVAHARE	0.2	0.2	19	8480	8491	11	8.9
59	330241000664	SAVITA RAMDAS BANSODE	0.2	0.4	15	1284	1293	9	31.8
60	330241000761	JANARDHAN JYOTIBA DOLSE	0.2	0.4	22	4063	4075	12	0.0
61	330241000826	R H SHINDE	0.2	0.4	22	1128	1133	5	31.4
62	330241036243	REVANSIDHA BAPU GAIKWAD	0.2	0.4	30	5245	5254	9	3.3
63	330241039218	SHYAM TUKARAM KAMBLE	0.4	0.4	28	3209	3216	7	8.2
64	330241039323	RUKHMINIBAI PIRAJI LOKHANDE	0.1	0.2		3244	3259	15	9.0
65	330241039676	BHAGWAT KONDIBA BHALERAO	0.2	0.3		Disply imp			32.2
66	330241042464	VILAS SAVALARAM GAIKWAD	0.2	0.4	20	3735	3744	9	3.6
67	330241044009	JAGANNATH TUKARAM SABALE	0.2	0.4	31			22	0.0
68	330241053199	ULHAS GOPINATH WAGHMODE	0.1	0.4	25	1383	1395	12	8.5
69	330241063607	SURYABHAN NAGAPPA BHAGAT	0.2	0.4		5314	5319	5	9.9
70	330241063721	DAMU PANDURANG KASBE	0.2	0.4		4781	4789	8	3.5
71	330241070204	SHANKAR HANMANTU JOGDHANKAR	0.2	0.3		1863	1872	9	8.7
72	330241072428	MAREPPA SAWLA GHODKE	0.2	0.3		2963	2968	5	33.3
73	330241082521	KUSUM NAGANATH CHANDANSHIVE	0.3	0.4		519	523	4	0.0

74	330241084949	TUKARAM SOPAN KAMBALE	0.3	0.4	12	6990	7000	10	0.0
75	330241085406	ANKUSH PIRAJI GAIKWAD	0.1	0.4		8044	8051	7	0.0
76	330241088693	MUNIR AKBAR-RASHID INMADAR	0.3	0.4				10	0.0
77	330241090281	KURSHIDBANU KHAJA SHAIKH	0.2	0.4	14	1619	1624	5	2.2
78	330241096009	BALBHIM NAMDEO AAKHANDE	0.3	0.4		7000	7003	3	4.4
79	330241101436	SAGAR BALBHIM BAGALE	0.2	0.4		7630	7643	13	0.9
80	330241103391	MALANBI DASTGIR SHAIKH	0.4	0.4	19	3771	3779	8	19.5
81	330241106373	DHARMA BHAGAWAN KADAM	0.2	0.4	10	1361	1379	18	0.0
82	330241107311	SUDAM KRISHANA KAMBLE	0.3	0.4	13	6230	6238	8	6.2
83	330241107558	JAYASHREE RAJU GAIKWAD	0.2	0.4				6	0.0
84	330241108163	NAMDEO BHIMRAO SHIVSHARAN	0.2	0.4	10	4255	4265	10	3.3
85	330241119599	SRIRANG MARUTI GAIKWAD	0.2	0.4	10	3763	3769	6	0.0
86	330241128989	KAMALBAI BABU SHINDE	0.3	0.4		2963	2972	9	36.3
87	330241135161	BHARAT CHANGDEV AWARE	0.2	0.4	15	7546	7554	8	3.1
88	330241135454	ANWAR HAJARAT SHAIKH	0.2	0.4	16	3104	3113	9	6.6
89	330241141268	KERU RAMCHANDRA JADHAV	0.3	0.4	32	5499	5507	8	7.6
90	330241148068	RAMESH DHULAPPA DHEPE	0.3	0.4	15	4377	4383	6	8.9
91	330241158560	BHIMRAO KASHINATH DOLASE	0.2	0.4		4045	4053	8	5.8
92	330241161293	BAPU NAMDEO TONAPE	0.2	0.3	28	6797	6802	5	7.2
93	330241163369	RAJAK GULABSAB SHAIKH	0.2	0.4	32	2872	2879	7	4.5
94	330241174018	RAM MARUTI GAIKWAD	0.1	0.4	14	3511	3516	5	0.0
95	330241181634	ARUN NAGNATH SHIVSHARAN	0.2	0.4				8	0.0
96	330241182177	SAVITA KASHINATH GAIKWAWD	0.2	0.4	28	1920	1933	13	21.2
97	330241205452	SHAM HARIBA INGALE	0.2	0.3		4833	4837	4	2.5
98	330241216047	RAMESH SAWALARAM GAIKWAD	0.2	0.4	15	3904	3909	5	0.0
99	330241218899	GHORAK HARIBA INGALE	0.1	0.3		263	267	4	5.8
100	330241224066	CHABUBAI SHIVAJI MHETRE	0.1	0.3	30	2158	2161	3	4.3
101	330241246914	SHANKAR SIDRAM AAKADE	0.2	0.4	12	6945	6953	8	1.5
102	330241315860	BHARAT BABURAO SONAWANE	0.2	0.4	12	1979	1983	4	6.9
103	330241341101	DHONDUBAI MADHUKAR KAMBALE	0.2	0.3				1	0.0
104	330241347010	ARUN SOMNATH GAVATE	0.2	0.3	14	4396	4403	7	22.4
105	330241347770	GAUTAM DHARMANNA MAINDAGIKAR	0.2	0.4	18	6040	6051	11	0.0
106	330241357686	ROSHANBAI DIGAMBAR JEJHITHOR	0.3	0.4	10	6728	6739	11	0.0
107	330241364003	CHINTAMANI BALIRAM GAIKWAD	0.3	0.5	25	5295	5301	6	12.7
108	330241365409	ASHOK DIGAMBER PRAKSHALE	0.2	0.3		2644	2656	12	8.5
109	330241375561	SUNIL GULAB BHALERAO	0.1	0.3		6229	6233	4	4.9
110	330241376494	BALIRAM TUKARAM KALE	0.2	0.5		3542	3553	11	1.4
111	330241378900	DADARAO KALIDAS GAIKWAD	0.2	0.4		347	354	7	0.0
112	330241380840	DHARMRAJ MACHINDRA	0.3	0.3		3108	3118	10	2.2

		SONAVANE							
113	330241381099	NAGANATH JAIVANT KUCHEKAR	0.1	0.3		5660	5667	7	12.3
114	330241389154	NAGANATH YASHWANT KOLEKAR	0.2	0.3		4231	4236	5	13.4
115	330241393429	SHIVA LAXMAN UBALE	0.1	0.5	18	4248	4250	2	8.6
116	330241393712	BHAMABAI ARJUN KAMBALE	0.2	0.4	17	4772	4777	5	0.0
117	330241394581	BALU GANDAPPA GANTOL	0.2	0.4	28	3765	3771	6	36.0
118	330241401570	SHANKAR BHIMSHA GONI	0.2	0.4	19	561	572	11	0.0
119	330241401944	DHONDIBA MANIKRAO KOLATE	0.2	0.4		3886	3906	20	0.0
120	330241403297	RADHABAI NIVRUTTI SALAVE	0.2	0.4	18	2768	2776	8	0.0
121	330241403629	BHIMA NANA KAMBLE	0.2	0.3	32	4531	4541	10	30.5
122	330241405826	GAJENDRA PRABHU MANE	0.3	0.5	15	4834	4844	10	3.7
123	330241417697	ALKABAI CHANDRAKANT KAMBALE	0.2	0.4	16	5959	5970	11	10.6
124	330241423361	VIJAYANAND YASHWANT KALE	0.3	0.3	18	3194	3208	14	27.0
125	330241426866	ANIL HARI CHAVAN	0.3	0.5		6024	6029	5	8.2
126	330241428346	BANASIDH SIDRAM INGALE	0.2	0.4	31	3535	3543	8	3.8
127	330241437477	REVANSIDHA BHIMRAO SHINDE	0.2	0.4	18	6647	6651	4	6.1
128	330241440486	VITTAL SAMBHAJI MASKE	0.3	0.5		7284	7289	5	0.0
129	330241444988	VIJAY SHANKAR KAMBALE	0.1	0.3		3689	3691	2	3.3
130	330241446077	MAHADEVI SIDRAM SONKAMBALE	0.1	0.3	15	4078	4084	6	0.5
131	330241449025	MAHADEO NAGNATH SURVASE	0.4	0.3	1.5.18	3204	3217	13	6.6
132	330241451054	NIVRUTI DEVABA GADEKAR	0.1	0.2	26	6047	6052	5	0.0
133	330241480585	RAMA VITTHAL GHAGARE	0.3	0.4	17	2947	2950	3	5.1
134	330241481263	PARASURAM ATTAYAPPA TALBHANDAR	0.2	0.4		9253	9257	4	28.8
135	330241499286	DILIP PANDURANG SURVASE	0.3	0.5	15	1121	1126	5	26.7
136	330241499448	CHANDRAMANI BHAGWAN OHAL	0.1	0.4	24	1561	1562	1	0.0
137	330241499499	DIPAK KERAPPA GAIKWAD	0.2	0.4	14	4662	4667	5	3.2
138	330241503887	MARUTI VITHALRAO TAMBARE	0.2	0.4		2235	2244	9	0.0
139	330241504182	DNYANU KESHAV SABALE	0.3	0.6	24	2982	2988	6	3.1
140	330241505332	GAUTAM MARGU GAVALI	0.3	0.5	28	4254	4257	3	0.0
141	330241507173	TUKARAM DASHARATH CHANDANSHIVE	0.4	0.5	24	1105	1109	4	0.0
142	330241511430	SUNIL PANDURANG JADHAV	0.3	0.4		2037	2041	4	3.9
143	330241513793	MAHADEO SIDRAM BHANDKUMBE	0.1	0.3	16	2635	2638	3	0.0
144	330241514536	SHAHU GORAKHANATH DAWANE	0.2	0.3		4060	4070	10	40.9
145	330241529126	BHUJANG MAHADEV GAVALI	0.1	0.3		4495	4502	7	9.9
146	330241536262	ANITA KISHOR BHANDARE	0.4	0.5	24	23904	23917	13	4.6
147	330241538338	MANGESH NAGNATH KAMBLE	0.1	0.2	28	1625	1633	8	10.0
148	330241539709	SUNANDA MOHAN DHEPE	0.3	0.4		6623	6631	8	30.8
149	330241559505	RAJSHREE KUMAR SHINDE	0.5	0.5		6395	6402	7	0.0

150	330241560775	MADHUKAR DAJI SHINDE	0.1	0.3				16	0.0
151	330241561895	NAGANATH ARJUN KAMBLE	0.1	0.2		3652	3662	10	12.3
152	330241562468	DRAUPADIBAI ISHWAR GAIKWAD	0.1	0.2	13	6089	6095	6	8.7
153	330241565505	DAGADU UMAJI NARAYANKAR	0.3	0.3	20	1214	1222	8	1.3
154	330241565556	VIJAY JAGANNATH DOLASE	0.2	0.4				35	0.0
155	330241566081	BABURAO NAGNATH VHANKADE	0.4	0.5		1116	1124	8	0.0
156	330241575578	DHANAWABAI SIDHARAM INGALE	0.5	0.5		2698	2711	13	10.4
157	330241576884	PRAKASH UDHAY GAIKWAD	0.2	0.4	28	353	359	6	0.0
158	330241577236	HARIBA SIDRAM SARAWADE	0.2	0.4	10	3963	3972	9	10.4
159	330241583791	KONDIBA MAHADEO GAIKWAD	0.2	0.4	18	187	195	8	0.0
160	330241596168	SHASHIKALA SRISHAIL KATTIMANI	0.2	0.4	18	5232	5239	7	12.4
161	330241596303	BHANUDAS RAMA MORE	0.3	0.3	30	608	619	11	0.0
162	330241598144	DHARMA RAMA MISAL	0.3	0.3	15	2161	2169	8	5.3
163	330241600599	ASHOK MARAGU GAWALI	0.2	0.4	25	3541	3549	8	5.7
164	330241602231	PRAKASH DHANAPPA THORATH	0.2	0.4	26	2454	2465	11	2.7
165	330241605787	BAPU RAMA SAWANT	0.3	0.5		2989	3001	12	34.2
166	330241618757	MOHAN SADHU GAIKWAD	0.1	0.3	25	4073	4080	7	8.1
167	330241625044	CHANDRAKANT ARJUN SHERAKHANE	0.3	0.4	18	1605	1614	9	2.6
168	330241625371	ABHIMANYU RAMCHANDRA BABARE	0.2	0.3	20	2202	2211	9	26.4
169	330241636241	MUKTABAI MALLINATH GONI	0.2	0.3	16	1599	1602	3	8.5
170	330241636844	SUNANDA PRAKASH SHINDE	0.5	0.5	15	3946	3951	5	0.0
171	330241637280	SIDRAM NAMDEO BANSODE	0.3	0.4	33	4677	4684	7	27.0
172	330241637603	SUMAN SURESH BANSODE	0.3	0.4		3059	3072	13	7.8
173	330241637808	MAHAMADSO HUSSENSO SHAIKH	0.2	0.3				0	0.0
174	330241639444	SANTOSH SHAHU WAGHMARE	0.5	0.3		2784	2794	10	7.1
175	330241640361	MARUTI BHIMRAO NIKALJE	0.2	0.4				16	0.0
176	330241665852	VAISHALI VIJAY WAGHMARE	0.2	0.3		879	883	4	4.0
177	330241666093	DHEPE SANTOSH MAHADEO	0.3	0.4	17	2201	2212	11	10.1
178	330241666379	VINAYAK KISANRAO WADAVERAO	3.4	3.5		1888	1897	9	24.6
179	330241667120	MILIND BHIMRAO SURWASE	0.3	0.4		4825	4829	4	10.1
180	330241667499	DHONDUBAI PRABHAKAR KAMBALE	0.1	0.3	25	5133	5146	13	1.4
181	330241667871	DHANANJAY MASAJI KARAPE	0.1	0.3	19	574	576	2	25.9
182	330241668878	PARAMESHWAR UTTAM MANE	0.6	1	18	3123	3129	6	6.9
183	330241698009	MALLIKARJUN ATYAPPA TALBHANDAR	0.4	0.6	12	579	590	11	0.0
184	330241698483	SHEKUMBHAR BHIMRAO BAGADE	0.2	0.4	19	352	365	13	0.0
185	330241698661	ARAVIND VISHWANATH	0.1	0.3		idf			0.0

		MANE							
186	330241699030	LATA PANDURANG WAGHMARE	0.3	0.4	14	529	535	6	0.0
187	330241699072	SONALI ASHOK BANSODE	0.4	0.5	25	402	411	9	0.0
188	330241699081	PARUBAI MANIK MASKE	0.2	0.5	25	128	130	2	5.2
189	330241699277	GOVIND BHIKAJI SHINDE	0.2	0.5	14	58	61	3	0.0
190	330241699366	AMBUBAI VITTAL GANDALE	0.3	0.4	13	174	182	8	8.1
191	330241699374	INDUMATI BALBHIM GAVALI	0.2	0.4	15	307	317	10	30.1
192	330241699421	RAMCHANDRA NAGANATH CHANDANSHI	0.4	0.4	16	340	347	7	0.0
193	330241699617	SURYAKANT ARJUN GAIKWAD	0.2	0.3	14	116	118	2	6.7
194	330241699633	TUKARAM DAGADU JADHAV	0.3	0.4	10	238	241	3	0.0
195	330241699668	MILIND VISHWANATH KAMBLE	0.3	0.4	13	195	200	5	0.0
196	330241699731	MUKUND TUKARAM GAIKWAD	0.4	0.4	10	1082	1090	8	0.0
197	330241699781	ARVIND SHRIRANG THORATH	0.2	0.4	15	190	197	7	8.9
198	330241800164	SHARADA SHANKAR GAIWAD	1.0	1.5		2158	2167	9	0.0
199	330241802574	ASHOK BHAIRU RANSHUR	0.5	0.5	13	1367	1378	11	0.0
200	330241802663	MAHALING BABURAO RAJGURU	0.3	0.3	15	625	626	1	7.1
201	330241802922	SAMPADA KISAN BENDARE	0.5	0.4	28	1149	1162	13	0.0
202	330241803244	USHA SHARAWAT MANE	0.5	0.3	10	2656	2663	7	9.6
203	330241803554	RAHUL MALHARI KAMBALE	0.2	0.3	18	2580	2589	9	0.0
204	330241803783	DATTATRAY DASU CHANDANSHIVE	0.2	0.3		1540	1549	9	8.1
205	330241803821	BHARAT GORAKH LONDHE	0.4	0.5	12	1456	1465	9	22.1
206	330241804101	SHAIKHAR SHITARAM CHANDANSHIVE	0.4	0.5		1180	1191	11	4.2
207	330241804445	VIDHYADHAR DIGAMBAR PRAKSHALE	1.2	1.6	25	2259	2263	4	0.0
208	330241806049	HARICHAND SHIVAPPA GAIKWAD	0.4	0.5	32	2958	2964	6	0.0
209	330241806472	SUNIL PANDURANG THORAT	0.5	0.5				27	0.0
210	330241806481	SHIVRAM DHARMA KAMBLE	0.5	0.5	32	1461	1471	10	30.1
211	330241807436	RAJENDRA GURUNATH GAIKWAD	0.4	0.5	2.5/12	2388	2394	6	0.0
212	330241808122	BHIMRAO SHITARAM GAIKEAD	0.5	0.6		1479	1487	8	0.0
213	330241809196	PADMINI NANDKUMAR ALANDKAR	0.1	0.3	28	1098	1104	6	0.0
214	330241809315	SANATAN SHIVAPPA DAWARE	0.4	0.3	16	1951	1963	12	13.1
215	330241810208	SANTOSH KESHAV DILPAK	0.4	0.3	20	1865	1875	10	12.5
216	330241810623	SUKUMAR RAM BORADE	0.5	0.6				8	0.0
217	330241810682	AMBADAS MALSIDDHA DHALE	0.5	0.7		708	711	3	35.7
218	330241810763	SHAKUNTALA ULHAS WAGHMAMODE	0.5	0.6		1706	1718	12	7.8
219	330241811085	TULASABAI SHINPPA MATE	0.4	0.5	11	1410	1417	7	9.5
220	330241811140	UTTAM BHASKAR NIKAMBE	0.3	0.5	15	4465	4469	4	7.5
221	330241812227	SHIVAJI SHATRUGHAN RASERAO	0.4	0.6	30	2712	2720	8	18.8
222	330241813100	BHUJANG SHRIPAD	0.2	0.3				7	0.0

		LOKHANDE							
223	330241814394	RAMESH DIGAMBAR WAGHMARE	0.2	0.3	32	IDF			0.0
224	330241814882	ANAND KISAN MHASKE	0.2	0.4				30	0.0
225	330241815129	SUNITA SHIVAJI KHANDARE	0.2	0.3	31	92	101	9	0.0
226	330241815137	YASHWANT ROHIDAS SABALE	0.5	0.7	16	1208	1212	4	0.0
227	330241815153	KRISHNA HARI THAMBARE	0.2	0.3				20	0.0
228	330241815196	GUNDU DHONDIBA BANSODE	0.3	0.4		1190	1203	13	26.9
229	330241815226	MALKAPPA SHARNAPPA NIMBARGIKAR	0.3	0.5	20	2199	2211	12	25.9
230	330241815277	MURLIDHAR MARRAPPA JADHAV	0.4	0.5	25	2322	2329	7	10.1
231	330241815722	SUMAN BHIMA TONPE	0.4	0.5				30	0.0
232	330241815765	TANUBAI SURESH WAGHMARE	0.2	0.3	25	1178	1186	8	6.5
233	330241816028	SUDAMATI MAHADEO MADHULE	0.2	0.8		435	446	11	8.9
234	330241816249	SHALAN ASHOK KAMBLE	0.5	0.7		2565	2570	5	9.4
235	330241816320	KISHOR ARJUN INGALE	0.3	0.5	18	1129	1139	10	28.1
236	330241817539	DAYANAND PANDURANG JADHAV	0.6	0.8	16	IDF			0.0
237	330241818667	GAIKWAD SUJATA GOPAL	0.3	0.6		439	452	13	10.2
238	330241818977	ULPA ABHIMANYU SURAWASE	0.3	0.3	15	553	562	9	0.0
239	330241819663	LAXMIBAI KISAN KAMBLE	0.3	0.3	10	24143	24149	6	22.4
240	330241819868	GOVIND YALLAPPA WAGHMARE	0.5	0.6	15	9312	9320	8	0.0
241	330241820645	RAVINDRA KRISHNA BANSODE	0.4	0.5	10	712	725	13	21.4
242	330241820785	MANIK KISAN KAMBLE	0.8	0.8				0	0.0
243	330241820815	MAHANANDA DATTA MATE	0.4	0.4	10	1088	1091	3	5.3
244	330241820831	SURYABHAN SITARAM NIKAMBE	0.5	0.5	32	5726	5740	14	20.3
245	330241821307	BALU DURGAPPA SARVADE	0.4	0.5				3	0.0
246	330241821323	REVAN SADASHIV SURVASE	0.2	0.6	13	7093	7108	15	13.8
247	330241824489	LAXMI RAMESH PAWAR	0.5	0.6				0	0.0
248	330241824497	RAGHUNATH GUNDAPPA GONTUL	0.5	0.5	18	576	583	7	0.0
249	330241830225	KALAVATI GAUTAM MANE	0.3	0.4	16	329	339	10	8.2
250	330241830250	POPAT SADASHIV KAMBALE	0.2	0.3	28	68	75	7	12.3
251	330241830349	MALLAVVA MALLIKARJUN BABARE	0.2	0.4		282	293	11	3.1
252	330241830781	SHIVAJI NAGANATH GAIKWAD	0.4	0.4				0	0.0
253	330241831060	RAMCHANDRA GANAPAT SIRSAR	0.4	0.4	32	344	353	9	0.0
254	330241831167	DESHMUKH REVANSIDHA VAMNE	0.4	0.4	20	4	6	2	0.0
255	330241831205	ANITA POPAT RANASURE	0.4	0.4		79	95	16	0.0
256	330241831264	SAIDA RAJAK SAHIKH	0.4	0.4	28	252	260	8	0.0
257	330241831418	SHARANAVVA SHARANAPPA CHINCHOL	0.4	0.4	25	232	248	16	0.0
258	330241832180	SATISH BHIMRAO KAMBALE	0.4	0.5	10	393	403	10	0.0

259	330241832350	RAHUL MANIK BOKEKODE	0.4	0.6	10	177	185	8	0.0
260	330241832414	SARUBAI PRAKASH SHINDE	0.4	0.4	10	241	249	8	0.0
261	330241832562	BALU ANAND SABALE	0.2	0.3				0	0.0
262	330241832643	VANDANA PARMESHWAR JETHITHOR	0.1	0.3	18	66	78	12	0.0
263	330241832708	SUNANDA HUSENI KAMBLE	0.4	0.5	28	129	133	4	0.0
264	330241832929	DAMODHAR RAMCHANDRA GAIKWAD	0.3	0.4	28	229	241	12	0.0
265	330241832970	SHANTABAI BHIMRAO GAIKWAD	0.4	0.4		169	185	16	0.0
266	330241832988	SUKUMAR DATTA PRAKSHALE	0.1	0.2	20	173	180	7	0.0
267	330241833411	CHAYA PRAKASH NAIK	0.2	0.4	18	247	258	11	0.0
268	330241833631	KRISHNA DADU SAVANT	0.4	0.4	18	97	102	5	0.0
269	330241834131	IRAPPA NAMDEO GAJDHAN	0.2					0	0.0
270	330241834247	SHANKAR ARJUN SONAVANE	0.2					0	0.0
271	330241834433	VITTHAL MALLIKARJUN RAUT	0.2					0	0.0
					18.8			**2228**	

Annexure 7 : LT network Simulation Report # 4087130

Simulation Report - LT network of 4087130			
ID	Rating 1	Rating 2	kW Losses
Line1	30 m		0.323
Line2	20 m		0.002
Line3	30 m		0.322
Line4	30 m		0.202
Line5	30 m		0.321
Cable6	20 m	1 - 3/C 185	0.007
Line7	30 m		0.301
Line8	30 m		0.077
Line9	30 m		0.043
Line10	20 m		0.003
Line11	30 m		0.02
Line12	30 m		0.052
Line13	30 m		0.299
Line14	20 m		0.032
Line15	20 m		0.01
Line16	20 m		0.015
Line17	20 m		0.009
Line18	20 m		0.001
Line19	20 m		0.009
Line20	20 m		0.002
Line21	20 m		0.017
Line22	20 m		0.064
Line23	20 m		0.01
Line24	20 m		0.016
Line25	20 m		0.01
Cable26	20 m	1 - 3/C 185	0.002
Line27	30 m		0.111
Line28	30 m		0.078
Line29	30 m		0.045
Line30	30 m		0.024
Line31	30 m		0.008
Line32	20 m		0.016
Line33	30 m		0
Line34	30 m		0.001
Line35	30 m		0.004
Line36	30 m		0.004
Line38	30 m		0
Line39	20 m		0.002
Line40	30 m		0
Line41	30 m		0.017
Line42	30 m		0.005
Line43	30 m		0
Line44	20 m		0.002
Line45	20 m		0.001

Simulation Report - LT network of 4087130			
ID	**Rating 1**	**Rating 2**	**kW Losses**
Cable47	10 m	1 - 3/C 240	0.007
T1	11 / 0.44 kV	200 kVA	0.089
Loss in LT OH line (30m) in kW			**2.257**
Loss in incomer cable in kW			**0.007**
Loss in outgoing cable in kW			**0.009**

Calculations

(Average LLF = 0.399)

Energy loss in LT over head lines = 2.257 kW × 24 × 0.399 × 8 days Units = 172.90 Units

Energy loss in incomer cable = 0.007 kW × 24 × 0.399 × 8 days Units = 0.13 Units

Energy loss in outgoing cable = 0.009 kW × 24 × 0.399 × 8 days Units = 0.60 Units

Annexure 8 : Accucheck and Energy Audit Report # 4099041

Accucheck and Energy Audit report, Pandharpur Division									
Sub division: PPR(U)			Sub Dn. Code: 6319 ; PC : 2						
DTC code : 4099041			KVA : 200 ; I.R.: 440865 Dt: 01.10.08						
DTC Name: Ganesh Nagar MF:03			Category :Resi ; F.R.: 442596 Dt:07.10.08						
Sr No	Consumer No.	NAME	Sanc. Load (kW)	Actual Load (kW)	Wire Length (Meter)	Initial Rdng. (kWh)	Final Rdng. (kWh)	Diff. =(FR-IR) (kWh)	Accucheck Results (%)
1	337010042229	NARAYAN RAMCHANDRA MULIK	2.5					0	
2	337010234381	PRAVIN NARAYAN PAI	0.8					0	
3	337010234128	AJIT VILAS YELE	0.5		12	253	264	11	
4	337010232699	VANDANA GANESH BAGADE	0.5	1	12			14	
5	337010231536	KALAPPA RAMU TAVASE	1.6	2	25	1106	1125	19	7.69
6	337010231471	SHIVAJI SAUDAGAR GAIKWAD	0.4		28	3642	3658	16	
7	337010228462	MANISHA MANOJ PATIL	0.6	1	30	485	502	17	-18.65
8	337010215786	SUREKHA ADINATH KOLINGE	0.5	1				0	1.96
9	337010215042	SWATI GOPAL UTPAT	0.8	1	42			0	9.85
10	337010213902	VINAYAK RAJARAM SHETE	0.6		20	620	633	13	
11	337010213350	SHIVAJI YUVRAJ CHARHATE	0.9	1.5	18	1863	1880	17	3.57
12	337010212884	SADHANA GHANSHAM NARKAR	0.5		19	1942	1951	9	
13	337010212329	DEEPAK DATTATRAY DESHPANDE	1.7	2	20	5046	5077	31	-1.16
14	337010211039	VIJAYALAXMI NARHARI SHETE	1	1	20	1069	1076	7	3.41
15	337010208623	SANJIV KESHAV RAMDASHI	1.8			3680	3699	19	
16	337010207830	SNEHAL HANUMANT BHAPKAR	4	4	20	6469	6499	30	-1.481
17	337010206035	GHODAKE SANJAY HARIBHAU	1.5	1.5	38	3885	3901	16	1.29
18	337010204024	TARLEKAR SHRIPAD VIJAYKUMAR	3	3	18	1183	1200	17	-1.35
19	337010203443	YELE RANGUBAI TRIMBAK	0.3	0.5	20	728	745	17	25.15
20	337010203109	KULKARNI SHRIKANT DATTATRAYA	1.6	2	28	6847	6889	42	5
21	337010202226	KARADE JITENDRA JAYPRAKASH	3.2	3	25	9071	9106	35	-3.09
22	337010200584	SURYAVANSHI SANJAY VINAYAK	1.8		22	5005	5028	23	
23	337010199071	JOSHI CHANDRASHEKHAR LAXMAN	1.9	2	22	1691	1716	25	1.4
24	337010198768	SADANANDE PRABHAKAR NAGNATH	2.9	3	20	1573	1601	28	2.08
25	337010198385	UTPAT RAMCHANDRA ARUN	0.8	1	20	4955	4963	8	-11.57

26	337010196935	BADAKE RAMCHANDRA SADASHIV	1.5	1.5	28	631	646	15	-1.88
27	337010196064	VAIDHYA MAKARAND JAGANNATH	1.4					0	
28	337010194410	UTPAT RAGHAVENDRA HANUMANT	0.8	1	26	1256	1285	29	2.22
29	337010194339	YELE PRITAM SAHEBRAO	0.3	0.5	24	1958	1984	26	1.582
30	337010193936	GAIKAWAD SURESH BHIMRAO	2.6	3	22	11873	11904	31	1.29
31	337010193910	LAKHERI RAJKUMAR MOHANLAL	0.4		19	6415	6467	52	
32	337010190732	PATKULKAR SHRIRAM MAHALING	0.9		18	595	608	13	
33	337010190597	SALUNKE NIVRUTTI RAMCHANDRA	2.9	3	10	1520	1548	28	6.34
34	337010189319	MHETRE SUNANDA PANDURANG	1.4	1.5	24	1462	1490	28	0.45
35	337010188525	SALGAR JAGANNATN LAXMAN	0.5	1	18	1609	1642	33	5.847
36	337010187545	KULKARNI WAMAN SADASHIV	2.5	3	22	1124	1146	22	5.55
37	337010187286	KAGADE MIRA SURESH	2.5					0	
38	337010184651	NARAKR MANI KRISHNA	0.2	0.5	30	2144	2175	31	-0.626
39	337010184384	YELE SHYAM LIMBAJI	2	2	18	4198	4225	27	4.927
40	337010182357	SOLE DIPAK VASANTRAO	2	2	20	642	653	11	-19.421
41	337010180044	KULKARNI ARUNKUMAR GOPAL	1.5	2	30	12999	13037	38	-8.0664
42	337010179895	KOKANE DHANANJAY BABURAO	2	2				8.1	
43	337010175806	TOLNURE CHAUNDAPPA KALLAPPA	0.4	1	41	883	894	11	-2.5
44	337010175113	JAGDHANE MANGESH DINESH	0.9	1	25	1186	1199	13	0.64
45	337010171339	YELE VILAS LIMBAJI	0.6	1	10	4540	4548	8	25.22
46	337010168851	PRAKASH DATTATRAYA NIKATE	1.6	2	10	3135	3191	56	3.15
47	337010168494	UJAWALA ABHAYKUMAR WADGAVE	0.6	1	18	499	518	19	3.34
48	337010168257	MEERA RAMCHANDRA WAGH	1.4	1.5	32	845	859	14	3.03
49	337010168095	MUKUND MADHAV TATHE	0.7	1	15	379	379	0	3.06
50	337010163824	VIJAYA MURALIDHAR HAKE	2.9		20	2149	2182	33	
51	337010155651	SANJAY VISHWANATH HANKARE	0.2	1	25	20230	20466	236	-7.4783
52	337010154345	RAVINDRA ARVIND KHISTE	0.8	1	20	7021	7033	12	1.49
53	337010154299	KALINDI CHINTAMANI SURYAWANSHI	0.8	1	10	939	950	11	0.57
54	337010151966	SANJAY KRISHNAJI	0.2	0.5	18	845	859	14	5.853

		KULKARNI							
55	337010149121	RAVINDRA MADHUKAR RAYBAGI	2	2	20	2477	2511	34	2.34
56	337010148515	SULOCHANA DEVDAS PAWAR	2	2	20	3527	3538	11	5.79
57	337010148329	MADHUKAR BANDU GAWALI	0.4	0.5		14719	14730	11	-4.958
58	337010148167	KHISTE BHAGYASHRI MAKRAND	0.5	1	22	5848	5870	22	1.014
59	337010146491	KULKARNI PRADIP VITAL	0.5	1	18	1905	1915	10	-0.722
60	337010143190	YOGI PRATHVIRAJ NARAYAN	0.2	0.5	22	1023	1037	14	1.33
61	337010139729	ANATH PANDURANG KULKARNI	1			871	884	13	
62	337010139702	SANTHOSH SADASHIV KULKARNI	0.2	0.5	24	1805	1840	35	4
63	337010127968	ARVIND DAMODHAR PANSARE	2	2	22	1590	1616	26	3.32
64	337010103287	YOGI PRUTHWIRAJ N.	0.5	0.5	22	1816	1848	32	2.08
65	337010101888	SAPTASHWA ANANAT BHALCHANDRA	0.4	1	28	1368	1392	24	-6.32
66	337010101659	KULKARNI NANDAKUMAR VASUDEV	0.5	0.5	20	534	542	8	-2.04
67	337010101608	YELE SUBHASH LIMBAJI	0.2	1	25	1006	1006	0	-0.96
68	337010101586	ANKUSH GOVIND DHANAVE	2.8	3	25	936	949	13	2.32
69	337010101594	SWAMI BASAWWABAI RAMAYYA	0.3					0	
70	337010101560	A S KOPARDE	0.2	0.5	20	10315	10338	23	-7.6659
71	337010101527	MANDAKE SNEHALATA BHALCHANDRA	0.5	0.5	25	825	837	12	3.15
72	337010101501	KONDAJKAR SUHAS BHAGAWAN	0.5	1	33	6653	6689	36	9.85
73	337010101519	DARSHANE LAXMAN GANGADHAR	0.5	1	32	6347	6376	29	-4.13
74	337010101471	KSHIRSAGAR KASHIBAI PRAHLAD	2.2	2.5	31	3688	3706	18	3.12
75	337010101497	YELE SAHEBRAW LIMBAJI	0.3	0.3	30	4318	4333	15	-2.53
76	337010101390	KHISTE RATNAKAR PURUSHOTTAM	0.6	1	18	1275	1303	28	-4.091
77	337010101357	LOKHANDE BALASAHEB BALAJI	0.4	1	19	5286	5310	24	1.48
78	337010101284	ANURADHA V.JOSHI	0.3	0.3				17	
79	337010101250	DHOBALE SHALINI N.	3.4	4	20	13725	13756	31	-4.05
80	337010101268	KULKARNI PANDURANG DATTATRAYA	0.6	1	20	848	868	20	-19.33
81	337010096183	MALLIKARJUN S.N.	0.6					0	
82	337010096132	DESHPANDE PARWATIBAI S.	0.5					0	
83	337010095659	BHANDARKAWATHEKAR	0.8					0	

		S.V.							
84	337010044973	BARAGE SHIVAJI DATTATREY	1.2					40.3	
85	337010044817	VAIDYA JAGANNATH VISHWANATH	3					12.6	
86	337010044752	PATIL SUDHAKAR BALASAHEB	0.3	0.5	15	4899	4915	16	2.832
87	337010044761	YELE VILAS LIMBAJI	0.5	0.5	12	911	933	22	-1.371
88	337010044779	YELE SAHEBJI LIMBAJI	2.3					0	
89	337010044736	LAXMIKANT VASUDEO UTPAT	0.1	1	17	9640	9662	22	2.4
90	337010044744	DESHMANE JAYAKUMAR VITTHAL	0.3		12	7770	7787	17	
91	337010044701	TONDE KAMAL SHRIRAM	3	3	30	10837	10887	50	-0.598
92	337010044710	ATTAR AYUB ABDULLA	3					0	
93	337010044728	KULKARNI SUDHAKAR SHANKAR	3					0	
94	337010044680	DESHPANDE MANGALA VITHAL	3	3	12	764	780	16	1.286
95	337010044698	FALAKE DATTATRAYA NARAYAN	0.7	1.5	15	9482	9498	16	1.418
96	337010044655	WEDAPATHAK VASUDEV JANARDAN	3		18	1665	1677	12	
97	337010044663	PITAMBARE SHITALA SHANKAR	3	3	20	1177	1200	23	-2.43
98	337010044671	KATTI PRAKASH BADRINATH	3	3	20	2112	2148	36	1.239
99	337010044639	SAWANT SHANKAR PANDURANG	3	3	18	1075	1102	27	-0.049
100	337010044647	BEWOOR BHIMRAO HANMANRAO	3		18	3035	3081	46	
101	337010044604	DATE BHALCHANDRA LAXMAN	3	3.5	18	1090	1111	21	3.57
102	337010044612	DATE ANANT LAXMAN	3	3	20	1190	1206	16	2.08
103	337010044621	SALUNKHE VIMAL B.	3	3	22	2881	2936	55	-0.237
104	337010044582	KULKARNI NANDKUMAR VASUDEV	1	1	20	2688	2729	41	-5.12
105	337010044591	KULKARNI TUKARAM RAMKRISHNA	0.8	1	32	1625	1662	37	-3.1
106	337010044558	SABANIS GOVIND RAGHUNATH	3	3	18	1097	1118	21	3.5
107	337010044566	MORE VIJAYA SURESH	3	3	20	2185	2224	39	1.13
108	337010044574	KULKARNI SHARMILA PRAMOD	0.5	1	16	2322	2358	36	0.89
109	337010044531	RAYKAR UDAY VITHAL	3	3	20	1367	1399	32	25.251
110	337010044540	RAYAKAR UMESH VITHAL	2.5	3	20	2016	2064	48	0.973
111	337010044507	MACHNURKAR SUBHASH	3	3	20	1722	1754	32	6.52

1		SHRIKANT							
112	337010044515	ANUSE BABURAW JIVAPPA	3	3.5	17	2004	2038	34	1
113	337010044523	BENARE VAIJAYANTI SHARAD	3	2.5	21	1392	1415	23	-0.625
114	337010044485	KONDEJKAR AVINASH BHAGAWAN	2	2	18	2027	2074	47	2.02
115	337010044493	KARVE MADHUSUDAN VAIJANATH	0.5	1	31	1297	1321	24	15.25
116	337010044451	ANKUSH GOVIND DHANAVE	0.5	1	25	811	827	16	1.38
117	337010044469	VARMA KANTA DINDAYAL	3	3	20	1551	1580	29	8
118	337010044477	KULKARNI RAJAN SADASHIV	2	1.5	20	893	912	19	-1.98
119	337010044434	CHAVAN DINANATH JAGANNATH	1.5	1.5	18	2461	2479	18	-5.88
120	337010044442	KULKARNI BHALCHANDRA GANESH	3	2.5	26	442	450	8	3.37
121	337010044400	DESHPANDE MOHAN PANDURANG	3	3.5	15	834	845	11	3.06
122	337010044418	MANDAKE SNEHLATA BHALCHANDRA	1.5	1.5	25	534	542	8	2.1
123	337010044426	DESHPANDE SHRIPAD MANIK	2	2	30	2211	2234	23	2.97
124	337010044388	KORTIKAR ASHOK WAMAN	3	1				14.23	
125	337010044396	DESHMUKHA BALKRISHNA MANOHAR	0.5		12	481	488	7	
126	337010044353	DANGE BALAJI JAGANNATH	3	3	40	550	565	15	-1.75
127	337010044361	PATIL LAXMAN B.	1		24	1225	1238	13	
128	337010044370	KULKARNI DYNANESHWAR RANGNATH	0.5	1	41	1737	1769	32	-2.54
129	337010044337	ZENDE RAMCHANDRA NARAYAN	0.3	0.6	30	1767	1797	30	45.09
130	337010044345	MISAL APPA DATTY	0.5	0.6	25	2299	2319	20	0.93
131	337010044302	YEWANKAR JAWAHAR VISHVANATH	1	1	17	450	459	9	-1.26
132	337010044311	PANDURANG SAKHARAM AITWADKAR	3	2.5	32	4414	4433	19	2.7
133	337010044329	DABAK GAJANAN BHASKAR	3	2.5	32	1602	1629	27	3.06
134	337010044281	PACHCHAPURKAR TRIVENI WAMAN	0.5					0	
135	337010044299	KULKARNI ARUN DIGAMBAR	1.8	2	17	897	915	18	3.505
136	337010044256	KULKARNI GOPAL BALWANT	1.4	1.5	20	4871	4897	26	2.32
137	337010044264	SALUNKE RAVINDRA NAMDEV	3	3	20	895	910	15	7.715

138	337010044230	WAGH RAMKRISHNA VINAYAK	3	3	18	2427	2476	49	2.42
139	337010044248	KULKARNI KRISHNAJI GOVIND	0.8	1	20	743	755	12	6.291
140	337010044205	MHAMANE RATNAPRABHA REWAN	0.4	0.8	15	2836	2847	11	2.54
141	337010044213	SHINDE SANDHYA PRATAP	0.9	0.9	18	12553	12571	18	-34.708
142	337010044221	CHAIRMAN PUNDALIK GRUH NIRMAN	0.3	1	12	843	864	21	-2.41
143	337010043837	UMATE VASANTARAW	0.3					0	
144	337010042750	SURAYAWANSHI CHINTAMANI NAMDEW	2	2	9	8334	8354	20	2.54
145	337010042776	KAWATHEKAR SURENDRA BHALCHANDRA	3	3	25	4115	4166	51	-5.355
146	337010042733	KULKARNI ANIL KESHAWRAW	2	2.5	24	859	878	19	3.03
147	337010042709	KULKARNI VASANT ANANTRAW	0.4	0.8	20				
148	337010042717	KULKARNI BALAWANT RAGHAWENDRA	3	3.5	22	1229	1249	20	7.04
149	337010042725	KULKARNI RAGHUNATH PURUSHIOTTAM	3	3	32	1082	1100	18	13.13
150	337010042687	JOSHI VITHAL BHIKAJI	0.6	1	22	898	912	14	1.4
151	337010042695	DESHPANDE PRABHAKAR JAGANNATH	3			1187	1206	19	
152	337010042661	DESHPANDE DYNANESHWAR MADHAWRAW	1	1	20	3588	3628	40	17.39
153	337010042679	PITAMBARE MADHUKAR VASUDEV	3	3	20	2010	2053	43	4.1
154	337010042636	SAMARTH DIGAMBAR NARSINH	2	2	24	1485	1513	28	1.23
155	337010042644	MAHUDKAR SUDHAKAR MAHADEV	3	3.5	27	24952	24953	1	16.66
156	337010042610	FADAKE MURALIDHAR MADHAV	3	2.5	30	1016	1049	33	-3.92
157	337010042628	GHATULE PANDURANG SUKHADEW	2		25	1597	1632	35	
158	337010042440	VANASALE SHIVAJI SAMBHAJAI	1.4	1.5	22	1040	1060	20	1.29
159	337010042300	SHEKHA HUSAIN GULAB	3					0	
160	337010042318	SHEKHA HUSAIN GULAB	0.5	1	12	2514	2557	43	1.03
161	337010042326	KULKARNI RANGNATH VASUDEV	0.5	1	24	1010	1032	22	-3.3
162	337010042288	GAYAKWAD SUHAS JAGANNATH	0.8	1	10	2292	2340	48	1.87
163	337010042296	BHAGANAGARE BHIMASHANKAR APPA	3	0.8	24	2136	2181	45	4

164	337010042270	JAGTAP PADMINIBAI BHAGWAN	0.5		24	526	535	9	
165		Nagar Paluka Pump			20	1018	1029	11	
166	337010042652			1.2	32	1339	1472	133	1.29
167		Street Light			10	1358	1609	251	
168	337010128310				20	7437	7526	89	-5.31
					22			**4101**	

Annexure 9: LT network Simulation Report # 4099041

Technical Loss Low Tension Network of 4099041					
Circuit Elements	Rating 1(Mtr)	PF%	Voltage Drop %	kW Losses	kVAr Losses
1 - 3/C 240	10	85.77	0.05	0.038	0.023
1 - 1/C 185	20	85.83	0.12	0.063	0.061
1 - 3/C 185	20	84.49	0.01	0.062	0.051
Line4	18.288	80.43	0.03	0.001	0
Line6	25.908	88.69	0.16	0.01	0
Line7	18.288	88.34	0.17	0.017	0.001
Line8	35.052	89.59	0.47	0.064	0.003
Line9	45.72	89.69	0.64	0.092	0.004
Line10	25.908	88.45	1.1	0.499	0.022
Line11	50.292	83.32	0.07	0.001	0
Line12	39.624	88.34	1.9	0.967	0.043
Line13	27.432	88.08	0.05	0.001	0
Line14	15.24	80.46	0.03	0.001	0
Line15	48.768	88.31	2.5	1.364	0.06
Line17	48.768	87.8	2.65	1.558	0.069
Line18	45.72	87.28	2.79	1.861	0.082
Line20	25.908	86.85	1.64	1.141	0.05
Line21	35.052	86.72	2.38	1.775	0.078
Line22	27.432	85.08	0.03	0	0
Line49	22.86	86.11	0.24	0.029	0.001
Line50	24.384	85.03	0.19	0.016	0.001
Line52	18.288	80.43	0.03	0.001	0
Line53	18.288	80.42	0.03	0.001	0
Line54	45.72	85.23	0.23	0.013	0.001
Line56	18.288	87.19	0.4	0.097	0.004
Line58	18.288	86.55	0.32	0.06	0.003
Line60	33.528	86.53	2.42	1.937	0.085
Line62	42.672	84.99	0.14	0.005	0
Line66	60.96	84.95	0.06	0.001	0
T1		85.49	1.13	0.345	1.065
Energy Loss in LT overhead Line (kWh)				**11.63**	
Energy Loss in Cable 240 sq mm (kWh)				**0.038**	
Energy Loss in Cable 120 sq mm (KWh)				**1.125**	

Calculations

Energy loss in LT over head lines = 11.63 kW × 24 × 0.2 × 6 days Units = 335 Units
Energy loss in incomer cable = 0.028 kW × 24 × 0.2 × 6 days Units = 2 Units
Energy loss in outgoing cable = 0.125 kW × 24 × 0.2 × 6 days Units = 4 Units

Annexure 10 : Accucheck and Energy Audit report # 4090122

Accucheck and Energy Audit report, Barshi Division									
Sub division: BARSHI(U)			Sub Dn. Code: 1384		PC : 2				
DTC code : 4090122			KVA : 100		I.R : (421148) Dt: 03.10.08				
DTC Name: MULGEWADA MF: 2			Category: Residential +Agricultural F.R: (422905) Dt: 09.10.08						
Sr No	Consumer No.	NAME	Sanc. Load (kW)	Actual Load (kW)	Wire Length (Meter)	Initial Rdng. (kWh)	Final Rdng. (kWh)	Diff. =(FR-IR) (kWh)	Accucheck Results (%)
1	333010071410	SUNIL BODHALA RANAZUNJARE	0.2	0.3	22	447	464	17	1.75
2	333010071754	BABU SOPAN LOKHANDE	0.2	0.2	34	2868	2882	14	21.87
3	333010071797	DNYANDEV BHANUDAS CHAKORA	0.2					10.5	
4	333010073579	SHANTABAI HIRAJI JADHAWAR	0.2	0.2	20	2551	2560	9	-1.682
5	333010073951	PUSHPA ANKUSH ZALATE	0.2	0.5	21	394	400	6	3.159
6	333010076161	SUDHAKAR KRISHNA YADAV	0.5	0.5	25	2493	2502	9	2.43
7	333010076608	MOTILAL KANTILAL GHULE	0.2	0.4	22	2802	2828	26	1.872
8	333010076985	BHARAT RAMBHAU SUPEKAR	0.5		20	515	522	7	
9	333010077442	KAMAL TULSHIRAM KUMBHAR	0.5	0.5	17	1556	1573	17	2.356
10	333010079402	RANI MACHINDRA BHARATE	0.5	0.7	23	1520	1539	19	-1.517
11	333010079518	SUMAN VISHNU PAWAR	0.5	0.8	20	156	159	3	4
12	333010081075	BHIKAJI VISHWANATH KADAM	0.5	0.5	24	3420	3432	12	5.4
13	333010081172	DHANAJI RAMHARI ANDHARE	0.5	0.6	20	1372	1380	8	5.88
14	333010081181	SAVITA SURESH AGLAVE	0.5	0.9	25	1728	1734	6	2.83
15	333010081199	JAISHRI TANAJI KAKADE	0.5		22	1212	1237	25	
16	333010081202	CHANDRABHAGA BALI CHAVAN	0.5					8.4	
17	333010083922	BABASAHEB DYANDEV SURVASE	0.5	0.5	25	2850	2858	8	-2.571
18	333010085321	SACHIN SHAHURAO BOKEPHODE	0.5	0.8	20	4986	5004	18	4.91
19	333010085364	GORAKH JAGANNATH GARAD	0.5	0.5	23	1386	1400	14	-1.53
20	333010085631	SHABANA SALIM SHAIKH	0.5		25	1082	1089	7	
21	333010087103	DNYANESHWAR BALASAHEB KAKADE	0.5	0.9	26				-9.71
22	333010087782	SHARIF MAINODDIN SHAIKH	0.5	0.5	29	1332	1343	11	1.03
23	333010088151	DASHARATH MAHADEO DESHMUKH	0.5		27			13.8	
24	333010088266	HARIDAS NAGANATH KAKADE	0.5		22	1671	1679	8	
25	333010089165	SHIDHESHWAR ASHOK MULE	0.5	0.6	28	1243	1247	4	3.7
26	333010089211	RAVINDRA JALINDHAR JADHAV	0.5	0.7	28	1671	1682	11	5.88
27	333010089742	SURESH SAMBHAJI GAIKWAD	0.5	0.5	29	1681	1692	11	-3.26
28	333010089874	DADARAO GANGARAM WAGHMARE	0.5	0.9	18	2144	2161	17	9.67
29	333010090074	NURKHA ABBAS PATHAN	0.5	0.6	21	1729	1740	11	2.63
30	333010090473	BALASAHEB MANOHAR	0.5	0.7	27	1793	1801	8	1.17

		BANSODE							
31	333010090538	SANDIP PRAKASH JANRAO	0.5		23	2345	2363	18	
32	333010091321	DATTATRAY SUBHASH GUND	0.5	0.8	17	181	193	12	0.92
33	333010091330	PUSHPA DASHARATH BANGAR	0.5	1	27	1952	1966	14	-5.869
34	333010091623	TUKARAM ABHIMAN KONDHARE	0.5					0	
35	333010091798	BALU DAMU KUDVE	0.5	0.8	28	2017	2024	7	1.2
36	333010092123	KISAN DIGAMBAR BADALE	0.5	0.5	20	4013	4030	17	2.63
37	333010092131	RAJSHRI KUNDAN GONDKAR	0.5			253	276	23	
38	333010093057	MANDAKINI KUMAR SALUNKHE	0.5		26	2776	2792	16	
39	333010093073	NITIN PRAKASH BAGAL	0.5		20	789	798	9	
40	333010093201	DATTU YEDA KHARATE	0.5	0.9	25	1746	1756	10	-3.129
41	333010093332	DHANAJI MANOHAR KIRATKARVE	0.5	1	35	519	529	10	-0.743
42	333010093634	VILAS LAXMAN KAWATHALKAR	0.5	0.6	25	752	759	7	-1.63
43	333010093936	RAOSAHEB VITHAL PAWAR	0.5	0.8	22	2375	2383	8	2.85
44	333010094096	PRAKASH BIBHISHAN BHARATE	0.5	1.1	28	1509	1558	49	0.5
45	333010094134	JIJABAI AMBADAS RAUT	0.5	0.5	23	1439	1449	10	2.17
46	333010094461	ANIL BHAGWAN DEVKAR	0.5	0.7	16	2721	2724	3	9.85
47	333010094479	SHAILESH VIJAY MANE	0.5	0.8	26	2004	2016	12	1.58
48	333010095114	PRABHAKAR NAMDEO KUMBHAR	0.5	1	18	834	844	10	5.4
49	333010095645	MEHTABEE IMAM SAYYAD	0.5	0.5	25	1110	1117	7	1.49
50	333010095882	MADHUKAR BHIKAJI SONAVANE	0.5	0.5	25	2476	2501	25	3.33
51	333010096552	ANKUSH MAHADEO KOLI	0.5	0.9	23	1399	1420	21	1.29
52	333010096811	LAKHPATI SURYABHAN PAWAR	0.5	0.7	28	827	840	13	1.9
53	333010097141	ANEETA RAJU SHAHAPURE	0.5	0.9	34	1165	1173	8	1.37
54	333010098261	CHITRAKALA DADASAHEB PATIL	0.5	0.6	28	1311	1323	12	1.29
55	333010098440	VIKAS RAGHUNATH BASATE	0.1					22.2	
56	333010098831	CHANDRAKANT GANPAT RAUT	0.1	0.3	25	2315	2330	15	0.93
57	333010183242	RENUKA BHANUDAS SHINDAKE	0.2	0.4	10	546	564	18	-1.25
58	333010185261	ALKA GOKUL PAWAR	0.2					22	
59	333010227002	MALANBAI SUBRAO SURWASE	0.2	0.5	24	1204	1218	14	1.66
60	333010230020	RAMLING N.PANCHALE	0.2	0.3	21	53	67	14	0.63
61	333010230259	ASHOK BAJRANG GALANDE	0.2	0.4	12	995	1029	34	2.08
62	333010230429	MARUTI NARSU KOLI	0.2	0.2	18	12	13	1	1.03
63	333010230453	HARIDAS BAPU GADHAVE	0.1	0.5	21	2300	2309	9	2.02
64	333010230461	SARJERAO R.RAUT	0.2					13.5	
65	333010230470	GORAKH MURAD KALE	0.2	0.4	20	1553	1563	10	36.11
66	333010230488	GUJRANG SAMBHA GORE	0.1					10.2	
67	333010230496	NANDKUMAR BABURAO CHAVAN	0.2	0.4	22	2105	2121	16	2.64

68	333010230500	MALAN KASHINATH PAWAR	0.1	0.3	20	35	41	6	-15.436
69	333010230518	UTTARESHWAR M.RUDRAKE	0.2		25	5008	5016	8	
70	333010230526	HEMENT UTTRESHWAR RUDRAKE	0.2		30	1355	1369	14	
71	333010230542	RAVINDRA M.MULGE	0.2		25	5358	5370	12	
72	333010230551	SUBHASH M.MULGE	0.2	0.4	20	903	915	12	-1.88
73	333010230577	SURYAKANT M.MULGE	0.2	0.2	22	12609	12617	8	3.799
74	333010230623	DIGAMBAR MADHAV JADHAVAR	0.2	0.4	24	4457	4475	18	3.57
75	333010230631	SHRIRANG WAMAN KADAM	0.2			1971	1985	14	
76	333010230640	MAHADEO NAMDEO KHALADKAR	0.2	0.4	19	404	407	3	0.939
77	333010230691	DATTU NAMDEO RANZUNZARE	0.2	0.6	15	900	925	25	1.13
78	333010230755	SOMNATH KHELBA ZINGARE	0.2					26.7	
79	333010230801	SARASWATI VITTHAL GORE	0.2	0.3	22	1902	1912	10	0.83
80	333010230810	BABANBAI PANDHARINATH TAGAD	0.2	0.4	20	821	840	19	-1.33
81	333010230828	ANIL MANMATH MULGE	0.5		20	10492	10505	13	
82	333010230836	SHRIDHAR BAPURAO PADVAL	0.2	0.3	25	7082	7100	18	1.33
83	333010230844	ANIL DADARAO LOKARE	0.5	0.8	22	586	590	4	1.23
84	333010230852	SHRIMANT SOPAN DARADE	0.1	0.4	23	737	751	14	-7.856
85	333010230879	BABAN UTTAM SHINDE	0.4	0.4	24	4513	4528	15	1.72
86	333010230895	SANJAY PRABHU KAKADE	0.3	0.4	20	3531	3540	9	1.96
87	333010230917	SHRIMANT HARIDAS KHANDAGALE	0.4	0.5	24	4259	4272	13	1.36
88	333010230925	JAGANNATH SHAMRAO BADE	0.2	0.4	20	6812	6822	10	2.32
89	333010230933	BHAGWAN VITTHAL KSHIRSAGAR	0.2	0.4	19	1036	1043	7	1.96
90	333010230950	CHANGADEV BHAGAWAT WAGHAMARE	0.2	0.4	28	65	73	8	2.83
91	333010230976	HIRABAI PRALHAD MALVE	0.2					18	
92	333010230992	SUBHASH SOPAN KALE	0.2	0.4	35	4050	4079	29	2.63
93	333010231026	BALBHIM PANDURANG KHALADKAR	0.2	0.4	19	1873	1889	16	-49.07
94	333010231042	SANDIP NAMDEV PAWAR	0.2		18	3348	3375	27	
95	333010231051	BHARAT BHAGWAN VHALE	0.2					4.2	
96	333010231085	LALITA NAGNATH RANZHUNJARE	0.2		20	331	337	6	
97	333010231107	KASHIBAI VILAS CHAVAN	0.2	0.4	21	4529	4542	13	3.7
98	333010231115	NAGNATH HIRALAL SHINDE	0.2					1	
99	333010236346	DATTATRAYA VITTHALRAO PATIL	0.1	0.3	25	327	353	26	1.165
100	333010242761	SUBHADRA BHARAT GAIKWAD	0.2					11.7	
101	333010242770	SUVARNA MANOHAR BADE	0.2	0.3	25	665	677	12	3
102	333010244454	CHTURBHUJ NAMDEO KHALADKAR	0.3	0.3	35	3454	3459	5	2.29
10	333010244501	MANDAKINI NARSINGHRAO	0.2	0.5	26	3177	3190	13	-48.269

3		DESHMUKH							
104	333010245949	LILABAI VITTHAL GHULE	0.2					0	
105	333010246074	NARAYAN BALI PAWAR	0.2	0.2	22	78	84	6	-3.213
106	333010246082	UMESHWAR RAMLING KADAM	0.1	0.2	18	779	787	8	-5.34
107	333010246091	NIVRUTTI JANARDHAN CHAKOR	0.2	0.4				12.6	1.183
108	333010246112	DEVIDAS SHIVAJI GHUGE	0.2	0.3	27	3911	3935	24	0.68
109	333010246741	RADHAKISAN SAHEBRAO NAIKNAWARE	0.2	0.4	18	12309	12320	11	6.89
110	333010247062	LAXMIBAI BHAGWAT CHKORE	0.3	0.4	20	3562	3574	12	-2.58
111	333010247071	NARHARI KISANRAO CHOPADE	0.2	0.4	22	1083	1089	6	2.093
112	333010247917	SANTOSH KUNDALIK UMATE	0.3	0.4	20	2113	2121	8	1
113	333010248271	SADHANA DATTATRAYA GARAD	0.1		20	313	328	15	
114	333010249499	DILIP G BANSODE	0.2	0.3	35	145	152	7	3.26
115	333010249863	SANGALE SARJERAO DAGADU	0.2	0.3	25	1649	1660	11	-3.41
116	333010249871	ARIF ABU PIRJADE	0.2		26	IDF			
117	333010250179	SHIVAJI SADASHIV BHOSALE	0.1	0.2	26	6276	6291	15	-1.29
118	333010250420	SHIVAJI SAMBHAJI KATE	0.4	0.6	20	3239	3250	11	27.523
119	333010250519	SAMBHAJI SADASHIV BHOSALE	0.1	0.3	28	2208	2217	9	5.55
120	333010296811	CHAYA DHONDIBA PANDHARE	0.2		24	925	933	8	
121	333010300591	LAXMIBAI RAOSAHEB SATHE	0.2					0	
122	333010470861	MOHANISH SURYAKANT KESAKAR	1					15	
123	333010471973	NIVRUTI JANARDHAN MATE	1.5	2	25	555	564	9	1.33
124	333010471990	ANIL BHAGWAT KOREKAR	0.5	0.6	30	1383	1392	9	2.08
125	333010472091	SUNIL BANSHI GADE	0.5	0.7	28	478	481	3	3.65
126	333010472244	PURNJEET VASANT SONAWANE	0.1	0.2	30	232	236	4	3.22
127	333010472261	VYANKATESH GAJENDRA BORADE	0.2	0.4	28	924	929	5	6.38
128	333010472902	SUVARNA MANMATH GADHAVE	0.4	0.5	27	632	677	45	0.65
129	333010472953	RAMLING PARSHURAM KANGALE	0.5	0.9	20	319	325	6	1.64

130	333010473593	VISHNU NARAYAN VADANE	0.4					5.1	
131	333010482215	HIRABAI LAXMAN SHENGAR	0.3	0.4	23	390	398	8	-5.08
132	333010500051	KALAVATI RAMESH EKSHINGE	0.2					0	
133	333010501309	SANJAY TRAMASIK MOHITE	0.4		28	503	508	5	
134	333010501554	NAGANATH MARUTI GORE	0.2	0.4	35	134	140	6	1.05
135	333010501571	SANGITA DATTATRAYA GHALAKE	0.2	0.4	33	780	785	5	4.22
136	333010501597	PRABHAWATI GAJANAN MESE	0.2	0.4	26	45	51	6	-4.286
137	333010501929	ABHIMANUE MADHAVRAO MULE	0.2	0.4	38	240	259	19	0.97
138	333010502330	ANKUSH RAMA PAWAR	0.5	0.6	30	981	990	9	3.65
139	333010502348	SHIVLAL CHANGDEO KHALADKAR	0.2	0.2	29	1075	1082	7	-2.97
140	333010503069	BABURAO EKANATH MISKIN	0.2	0.2	27	214	220	6	0.78
141	333010503212	EKANATH TUKARAM CHAKOR	0.2	0.3	18	355	356	1	7.58
142	333010503239	MAHDEO ADINATH GAWALI	0.2		22	653	662	9	
143	333010503387	PRIYANKA BALIRAM INGOLE	0.2		19	IDF			
144	333010503484	SHAMAL SHIVAJI SURWASE	0.2	0.4	17	601	610	9	1.33
145	333010503581	ASHABAI BAPURAO JADHAV	0.2	0.4	35	565	568	3	2.02
146	333010504855	DADA MAROTI KALE	0.2	0.4	25	496	509	13	6.31
147	333010507447	SUBHASH PRABHAKAR MULE	0.2	0.4	26	958	971	13	1.96
148	333010507838	GAUTAM ATMARAM BHALERAO	0.5		20	4165	4175	10	
149	333010507919	ASHA NAMDEO PAWAR	0.2					31.8	
150	333010508087	VISHWANATH BABAN NAWALE	0.2	0.4	24	943	957	14	5.4
151	333010509717	MANGAL BABRUVAHAN SALUNKHE	0.2	0.4				5.4	3.7
152	333010509849	JAKIR NOORKHA PATEL	1	1.2	24	1719	1740	21	-4.91
153	333010510111	CHANDRAKANT SAMBHAJI GAIKWAD	0.2	0.3	20	527	532	5	1.49
154	333010510189	BIBI ISHMAIL SHAIKH	0.2	0.3	24	412	419	7	-1.785
155	333010510758	KANTIBAI SOMA LONDHE	0.2	0.3	26	828	837	9	1.38
156	333010513269	GODHAVARI SHIVAJI KOTHIMBIRE	0.2	0.4	30	881	893	12	0.159

157	333010515016	CHHAWABAI KERBA CHAVHAN	0.5	0.7	24	659	663	4	3.333
158	333010515377	SHOBHA KHANDU GAVALI	0.3	0.5	26	425	437	12	1.58
159	333010515849	JADHAV SHAM ARJUN	0.2	0.4	22	214	222	8	2.43
160	333010516641	RAUT SUDHAKAR RUGHUNATH	0.2	0.3	24	671	693	22	4.34
161	333010517175	BHAGWAN DAGADU KAMBLE	0.2	0.4	19	775	784	9	0.93
162	333010517779	DILIP KERBA CHAVAN	0.2					8.7	
163	333010517892	SAI CONSTRUCTION & ENGINEERING	1					0	
164	333010519551	KRUSHNATH BHAGWAT KHATAL	0.2	0.5	20	347	356	9	-1.42
165	333010520371	DYNANDEV NAGU PALAKE	0.5	0.8	22	137	149	12	-1.38
166	333010520494	SANGEETA VIJAY JAMDAR	0.2	0.4	21	28	33	5	1.14
167	333010521261	NANA DHONDIRAM KEVATE	0.5		24	242	248	6	
168	333010521431	SHRIMANT VAIJINATH MULE	0.5		16	210	215	5	
169	333010521458	PETKAR ANIL HANUMANT	0.5	0.5	18	404	412	8	1.75
170	333010523167	NAGUBAI NAGNATH SURWASE	0.5	0.9	26	177	185	8	2.32
171	333010524015	SOMNATH NARAYAN MANE	0.5	1	25	67	69	2	2.77
172	333010524953	DATTATRAYA VITTHAL PATIL	0.5	0.8	18	533	561	28	1.47
173	333010525852	ANKUSH BABURAO PACHPUND	0.5	1.2	20	76	90	14	0.78
174	333012490932	CHAYA SHAMLAL TIWARI	0.2	0.5	30	2691	2710	19	-1.26
175	333012491009	SHAKUNTALA VIJAY KHANDARE	0.4	0.9	28	4349	4360	11	2.02
176	333010700361	A M MULGE	3HP	5HP		6669	6721	52	
177	333010703599	S B RAUT	5HP	5HP		42277	42277	0	
178	333010703742	J A BAGMAR	3HP	5HP		5762	5762	0	
179	333010097790	M D SURVARE	3HP	5HP		5152	5192	40	
180	333010088665	C G RAUT	3HP	5HP		8781	8784	3	
181	333010703351	S U RUDRAKE	3HP	5HP		24572	24619	47	
182	333010700182	S M MULGE	5HP	5HP		7602	7658	56	
183	333010700212	S M MULGE	5HP	5HP		4589	4589	0	

184	333010700255	R M MULGE	5HP	5HP		2854	2854	0	
185	333010095009	B S PATIL	3HP	5HP		5167	5167	0	
186	333010703386	P R RUDRAKE	3HP	5HP		24769	24769	0	
187	333010703556	U S RUDRAKE	5HP	5HP		11000	11000	0	
188	333010702835	G J RAUT	3HP	5HP		37001	37001	0	
189	333010703203	D HARICHANDRA	5HP	5HP		1822	1858	36	
190	333010703521	T KULKARNUI	5HP	5HP		12	12	0	
191	333010703602	DHARICHANDRA	5HP	5HP		62268	62268	0	
192	33301071541	S RAUT	5HP	5HP		4458	4458	0	
193	333010703564	h g raut	5HP	5HP		3063	3102	39	
194	333010505061	p d raut	3HP	5HP		1464	1472	8	
195	333010702312	s b raut	5HP	5HP		1755	1755	0	
196	333010703815	s v raut	5HP	5HP		1486	1501	15	
197	333010703645	s v raut	5HP	5HP		21633	21633	0	
198	33301070758	H U RUDRAGE	5HP	5HP		Lock			
199	33301092891	D H SRIMAL	3HP	5HP		2380	2380	0	
200	333010700263	M D SURVARE	5HP	5HP		3205	3231	26	
201	33301078571	C G RAUT	5HP	5HP		3205	3205	0	
202	333010519739	S U RUDRAKE	2HP	5HP		8467	8569	102	
203	333010702274	S M MULGE	5HP	5HP		11962	70	70	
204	333010703815	DHARICHANDRA	5HP	5HP		1486	1486	0	
205	MTR NO 6388240	Aata Chakki	10HP	10HP		2669	2841	172	
					24			**2683**	

Annexure 11 : LT Network Simulation Report # 4090122

Technical loss Low Tension Network of 4090122					
Circuit Elements	Rating 1(Mtr)	PF%	Voltage Drop %	kW Losses	kVar Losses
1 - 3/C 240	10	89.95	0.19	0.292	0.115
1 - 1/C 185	4.572	91.82	0.04	0.028	0.012
1 - 3/C 185	4.572	88.09	0.04	0.035	0.015
Line10	30	0	0	0	0
Line13	20	77.27	0	0	0
Line15	20	85.05	0.08	0.002	0
Line16	20	85.02	0.08	0.002	0
Line19	20	48.27	0	0	0
Line20	20	58.3	0	0	0
Line24	20	47.39	0	0	0
Line27	20	87.92	1.99	1.017	0.035
Line28	20	88.05	0.89	0.263	0.007
Line33	20	87.85	0.89	0.263	0.007
Line34	20	87.85	0.88	0.16	0.007
Line35	20	88.07	0.39	0.05	0.001
Line36	20	87.77	0.69	0.158	0.004
Line37	20	88.51	0.29	0.027	0.001
Line38	20	89.49	0.19	0.011	0
Line39	20	88.96	0.1	0.003	0
Line41	20	89.19	2.21	1.582	0.042
Line44	20	88.76	2.11	0.055	0.039
Line46	20	88.37	2.09	0.046	0.039
Line47	20	89.61	2.22	0.581	0.042
Line52	20	89.97	2.23	0.086	0.043
Line53	20	90.31	2.24	1.591	0.043
Line54	20	90.53	2.34	0.722	0.046
Line55	20	90.89	2.35	0.026	0.046
Line64	20	90.7	2.69	0.0074	0.061
Line65	20	91.15	2.7	0.277	0.061
Line66	20	91.59	2.72	0.279	0.061
Line67	20	92.01	2.73	0.28	0.061
Line68	20	85.07	0.08	0.002	0
Line69	20	70.11	0	0	0
Line70	20	75.83	0	0	0
Line71	20	81.26	0	0	0
Line104	20	90.61	0.09	0.003	0
Line106	20	87.17	0.1	0.003	0
Line109	20	86.56	0.1	0.004	0
Line110	20	87.04	0.1	0.003	0
Line112	20	54.44	0	0	0
Line119	20	54.98	0	0	0
Line120	20	54.48	0	0	0
Line121	20	54.54	0	0	0
Line122	20	54.78	0	0	0
Line123	20	54.6	0	0	0

Technical loss Low Tension Network of 4090122					
Circuit Elements	Rating 1(Mtr)	PF%	Voltage Drop %	kW Losses	kVar Losses
Line124	20	54.71	0	0	0
Line129	20	54.91	0	0	0
Line130	20	54.32	0	0	0
Line131	20	54.47	0	0	0
Line132	20	54.59	0	0	0
Line138	30	87.73	0.15	0.005	0
Line139	20	55.01	0	0	0
Line140	20	54.38	0	0	0
Line141	20	54.49	0	0	0
Line142	20	54.61	0	0	0
Line146	20	87.02	0.1	0.003	0
Line147	20	88.16	0.1	0.003	0
Line148	20	53.41	0	0	0
Line152	30	86.97	1.2	0.324	0.009
Line153	20	86.5	0.7	0.167	0.004
Line154	20	87.64	0.1	0.003	0
Line156	20	85.96	0.3	0.032	0.001
Line160	35	49.26	0	0	0
Line161	20	48.68	0	0	0
Line162	20	49.39	0	0	0
Line164	20	48.32	0	0	0
Line169	35	86.97	0.16	0.005	0
Line170	100	87.21	0.45	0.014	0
Line171	20	86.71	0.09	0.003	0
Line172	60	86.93	0.27	0.008	0
Line174	20	86.62	0.09	0.003	0
Line176	20	86.58	0.09	0.003	0
Line177	20	49.13	0	0	0
Line179	20	49.01	0	0	0
Line182	20	50.09	0	0	0
Line183	20	49.05	0	0	0
Line184	20	85.74	0.09	0.003	0
Line185	20	85.85	0.09	0.003	0
Line186	20	49	0	0	0
Line187	20	48.93	0	0	0
Line188	20	49.53	0	0	0
Line189	20	48.97	0	0	0
Line192	20	88.09	2.98	0.59	0.079
Line194	20	87.86	2.41	0.04	0.052
Line196	20	87.22	2.39	0.08	0.052
Line200	20	86.44	1.17	0.373	0.013
Line201	20	86.51	1.79	0.0097	0.029
Line202	20	87.02	1.8	0.097	0.029
Line210	20	43.8	0	0	0
Line211	20	85.38	0.53	0.098	0.003
Line212	20	85.58	0.53	0.098	0.003
Line213	20	85.69	1.16	0.073	0.013

Technical loss Low Tension Network of 4090122					
Circuit Elements	**Rating 1(Mtr)**	**PF%**	**Voltage Drop %**	**kW Losses**	**kVar Losses**
Line214	20	86.04	1.17	0.074	0.013
T1		88.88	2.36	0.038	5.37
Energy Loss in LT overhead Line (kW)				**8.125**	
Energy Loss in Cable 240 sq mm (kW)				**0.3**	
Energy Loss in Cable 120 sq mm (kW)				**0.1**	

Calculations

Energy loss in LT over head lines = 8.125 kW × 24 × 0.2 × 6 days Units = 234 Units
Energy loss in incomer cable = 0.3 kW × 24 × 0.2 × 6 days Units = 8 Units
Energy loss in outgoing cable = 0.1 kW × 24 × 0.2 × 6 days Units = 2 Units

Annexure 12: Feeder Energy Audit by DTC Meter Reading –Urban

DTC Direct Reading Programme of Ind. Est (Urban) S/S									
Sub division : E Sub Dn. Code: 4579									
Substation code: 274003 SubStation Name: Industrial Estate									
Sr. No	Feeder Code	DTC Code	DTC NAME	DTC RATING	MF	Initial Reading	Final Reading	Diff. (FR-IR)	Energy
				kVA					kWH
Feeder Name : Ramwadi , Feeder code: 201									
1	201	4579284	AMAR HOUS.	200	3	51333	51599	266	798
2	201	4579067	MOTIBAG	200	3	221500.16	223970	2469.84	7409.52
3	201	4579045	KADADI NAGAR-2	200	3	101974.66	103992	2017.34	6052.02
4	201	4579044	KADADI NAGAR-1	200	3	286150.2	288717	2566.8	7700.4
5	201	4579011	CENTROL ETISE	100	3	22350	23200	850	2550
6	201	4579066	MANJUSHA	200	3	179407	180382	975	2925
7	201	4579170	REVANSIDDHESHWAR	200	3	303768.7	304396	627.3	1881.9
8	201	4579140	GEETA APT.	200	3	22860	23182	322	966
9	201	4579262	ADD KADADI NAGAR 1	200	3	329770	330891	1121	3363
10	201	4579258	JAMB MUNI	200	3	59005	60531	1526	4578
11	201	4579255	ADD MOHITE NAGAR	200	3	223424	225253	1829	5487
12	201	4579228	SMRUTI PRAKASH TOWER	200	2	58479	60117.5	1638.5	3277
13	201	4579224	DIST. JUDE	200	2	37948.4	38168.4	220	440
14	201	4579222	KAIKASHAN APT.	100	2	948	1039	91	182
15	201	4579221	NAVODAY TERRACE	100	2	118649.6	119166.2	516.6	1033.2
16	201	4579308	Torna Rajgad	100	2	23158	23510	352	704
17	201	4579082	NILAYAM APT.	100	2	21938	23183	1245	2490
18	201	4579081	NALANDA	200	5	436637.8	438132	1494.2	7471
19	201	4579069	MOHITE NAGAR	200	3	224571.4	225900	1328.6	3985.8
20	201	4579068	MORYA	200	3	553899.2	555697	1797.8	5393.4
21	201	4579207	RAJESH KUMAR NAGAR		3	112055.41	113059.4	1004.01	3012.03
22	201	4579204	NAVODAY PARK	100	2	86037.2	86395	357.8	715.6
23	201	4579203	SUDEEP COMPLEX	200	2	122890.4	123428	537.6	1075.2
24	201	4579194	SANJITA APT.	100	2	110113	110949	836	1672
25	201	4579179	GAJWADAN	200	2	214716.2	215726	1009.8	2019.6
26	201	4579131	VIKAS NAGAR 2	200	3	166973.6	167767	793.4	2380.2
27	201	4579130	VIKAS NAGAR- 1	200	6	214078.4	214972	893.6	5361.6
28	201	4579124	TELEPHONE COMPLET	200	6	32867.4	33006.2	138.8	832.8
29	201	4579105	SONI	200	3	387977.4	388872	894.6	2683.8
30	201	4579100	RAHUL NEHA	200	3	179597.6	180545	947.4	2842.2

31	201	4579327	Mohite Nagar II	200	3	199798	200992	1194	3582
32	201	4579335	Vishwa Karma	100	2	939	1120	181	362
33	201	##########	ESI HOSPITAL(HT)		1	181672	186278	4606	4606
34	201	##########	BSNL(HT)		1	825748	828282	2534	2534
Feeder Name : Polytechnic , Feeder code: 203									
35	203	4579280	RAJARATNA NAGAR	200	3	263814	265437	1623	4869
36	203	4579283	VEET BHATTI	100	3	105331	106875	1544	4632
37	203	4579281	AMAR KAMAGAR	200	3	233915	235084	1169	3507
38	203	4579286	HUCCHESHWAR NAGAR	200	3	353019	355095	2076	6228
39	203	4579288	NAI JINDGI	200	3	564677	567770	3093	9279
40	203	4579289	SURABHI (P.A.)	200	3	324652	326696	2044	6132
41	203	4579292	GATTU KARKHANA (S.A.	200	3	179433	180840	1407	4221
42	203	4579005	BOLLI	200	3	346375.6	350101	3725.4	11176.2
43	203	4579065	MUKTA	200	3	617787.4	618700	912.6	2737.8
44	203	4579064	MADHAV NAGAR 2	200	3	290752.8	291664	911.2	2733.6
45	203	4579063	MADHAV NAGAR 1	200	3	667703.2	670261	2557.8	7673.4
46	203	4579205	MARKANDE NAGAR-2	200	2	873488.8	875940	2451.2	4902.4
47	203	4579191	VENU GOPAL	200	4	383972.8	385851	1878.2	7512.8
48	203	4579189	THOBADE 2	200	3	390097	391690	1593	4779
49	203	4579182	MALI NAGAR	200	3	537959	539190	1231	3693
50	203	4579175	SHOBADEVI	200	3	746823	751348	4525	13575
51	203	4579155	SHANTI NAGAR	200	3	458794.6	459544.8	750.2	2250.6
52	203	4579143	LAXMI NARAYAN	200	3	293578.3	299622	6043.7	18131.1
53	203	4579266	ADAM	200	3	148151	149967	1816	5448
54	203	4579265	KAYAMA	200	3	264319	265985	1666	4998
55	203	4579019	DUSSA	200	4	316869	318124	1255	5020
56	203	4579062	MARKANDEYA	400	3	728507.4	730671	2163.6	6490.8
57	203	4579060	LOMBOLE	300	3	388393.9	390285	1891.1	5673.3
58	203	4579127	THOBADE		3	270183.22	271500	1316.78	3950.34
59	203	4579121	SWAGAT NAGAR	200	3	1135124.2	1139313	4188.8	12566.4
60	203	4579120	SHIVGANGA(KATTA)	200	3	405579	409963	4384	13152
61	203	4579104	SARGAM	200	5	395883.9	397294	1410.1	7050.5
62	203	4579098	PRIYA DARSINI		3	1079470	1083255	3785	11355
63	203	4579089	SHRI RAM	200	3	358086	361605	3519	10557
64	203	4579088	AMBABAI(N.N)	200	3	544449.2	547726	3276.8	9830.4
65	203	4579264	SARALA	200	3	261772	263297	1525	4575
66	203	4579254	PASKANTI	200	3	112093	114164	2071	6213

67	203	4579245	PARSI VIHIR	200	3	578381	581599	3218	9654
68	203	4579244	DHASARI	200	6	178249	179177	928	5568
69	203	4579230	Basaveshwar Nagar	100	2	1655	3020	1365	2730
70	203	4579312	YAMUL	200	2	216806.88	219806	2999.12	5998.24
71	203	4579311	KAGJI	200	2	170044	172308	2264	4528
72	203	4579328	Vinayak Nagar	200	3	779161	782459	3298	9894
Feeder Name : PRESS , Feeder code: 202									
73	202	4579279	TARUN BHARAT	200	3	151763.6	152790	1026.4	3079.2
74	202	4579109	SONI	200	5	15344.34	15654	309.66	1548.3
75	202	4579055	LAXMI FOUNDRY	200	3	183820.2	184384	563.8	1691.4
76	202	4579015	DEEPSK ENGINEERING	200	3	126931	127304	373	1119
77	202	4579013	CANCER HOSPITAL	200	6	141798.8	142499	700.2	4201.2
78	202	4579008	BALDAWA	300	5	59206	60386	1180	5900
79	202	4579110	SANCHAR PRESS	200	3	142428	142799	371	1113
80	202	4579092	LOKMAT (OM IND)	200	3	195862	196884	1022	3066
81	202	4579071	MULTTANI	63	2	82060.4	82715.6	655.2	1310.4
82	202	########	SAIBABA(HT)		5	2420509	2425403	4894	24470
83	202	########	LAXMI OIL PUMP(HT)		1	1068199	1074590	6391	6391
Feeder Name : Ind.Estate2 , Feeder code: 206									
84	206	4579295	ADD KAMDA(L.H.P)	200	3	110833	113799	2966	8898
85	206	4579223	NILKANT RESID.	200	3	175058.46	176465	1406.54	4219.62
86	206	4579156	SUPER (EVER GREEN)	100	6	44315.6	44608	292.4	1754.4
87	206	4579190	BHAGYADAY	200	5	311421.8	312401	979.2	4896
88	206	4579212	KILLEDAR COMPLEX	100	4	21972.2	22066	93.8	375.2
89	206	4579083	NARANR	100	3	21369.8	22852	1482.2	4446.6
90	206	4579047	KOUSTUB	200	3	120349	122715	2366	7098
91	206	4579046	KAMDA	200	5	33502	34056	554	2770
92	206	4579038	IND ESTATE	63	2	9986	10181	195	390
93	206	4579012	CHINTAMANI APP	100	4	72523.4	72885	361.6	1446.4
94	206	4579007	VRUNDAVAN APT	200	2	145043	145617	574	1148
95	206	4579056	GAJANAN	200	3	20688.5	21121	432.5	1297.5
96	206	4579125	TRADE WINGS	200	3	49383	50367	984	2952
97	206	4579111	SHEKHANI	200	3	35098	35729	631	1893
98	206	4579084	NAVJEEWAN	200	3	7597.2	8939	1341.8	4025.4
99	206	4579196	NILKANTH ARCHADE	200	4	45956	46243	287	1148
100	206	4579178	HAYAT RUBBER	100	3	577354.6	579079	1724.4	5173.2
101	206	4579169	S.M.RUBBERQ	200	2	447847.2	449420	1572.8	3145.6
102	206	4579277	KAZI SAW MILL	200	3	44014.33	44537	522.67	1568.01
103	206	4579214	GANGAJI	200	3	161878.5	162481	602.5	1807.5
104	206	4579332	Lokhandwala Vihar	200	3	3282	3561	279	837

Feeder Name : Medical ,			**Feeder code: 204**						
105	204	4579302	Renuka devi	200	2	23550	23753	203	406
106	204	4579039	JAWAHAR NGAR	200	3	4567.2	6204.6	1637.4	4912.2
107	204	4579031	HUDCO NO2	200	5	51430	52827.4	1397.4	6987
108	204	4579030	HUDCO 1	200	3	720519.6	722499	1979.4	5938.2
109	204	4579004	B&C COLONY	200	2	141358.7	142167.4	808.7	1617.4
110	204	4579129	UJANI COLONY	200	3	226733.6	228279	1545.4	4636.2
111	204	4579103	SAMRAT ASHOK	200	3	623099.86	623837	737.14	2211.42
112	204	4579091	OLD T.V.CENTRE	200	3	170737.2	171695	957.8	2873.4
113	204	4579080	NEW T.V.CENTRE	200	3	228957	230647	1690	5070
114	204	4579192	UJSNI SERAT NAGAR	200	3	41446.8	41650	203.2	609.6
115	204	4579043	KUMTHA NAKA	200	5	629442.4	630950	1507.6	7538
116	204	4579176	SURVASE NAGAR	200	2	371115	375096	3981	7962
117	204	4579142	ANTROLIKAR NAGAR-1	200	3	114030	115521	1491	4473
118	204	4579139	GURUNANAK 2	200	3	673243.4	675719	2475.6	7426.8
119	204	4579276	CHAMDA	200	3	109678	111351	1673	5019
120	204	4579270	NEW KURBAN HUSEN	200	3	615999	618546	2547	7641
121	204	4579260	ANTROLIKAR NAGAR-1	200	3	342356	344694	2338	7014
122	204	4579218	KRIDA SANKUL	200	2	55741.8	57299.2	1557.4	3114.8
123	204	4579243	LEPRACY	200	3	102504	104929	2425	7275
124	204	4579229	SAI VIHAR	100	2	115548.8	116149	600.2	1200.4
125	204	4579322	PRIMEIR FILTER	200	2	10109	10590	481	962
126	204	4579336	UNITED ARCADE	200	3	476.5	501	24.5	73.5
Feeder Name : Ind Est 2 ,			**Feeder code: 207**						
127	207	4579285	SURWASE MITRA NAGAR	100	3	35599	35890	291	873
128	207	4579006	BHARAT LOHAR	200	3	648037.9	649118	1080.1	3240.3
129	207	4579001	ASARA	200	6	132346.2	132886	539.8	3238.8
130	207	457905	LOKMANYA NAGAR	200	3	469850	472713	2863	8589

		7							
131	207	4579119	NATIONAL(SHIVGANGA		3	820175	822248	2073	6219
132	207	4579108	SAGAR GAS	200	3	289497.8	291229	1731.2	5193.6
133	207	4579107	SURWASE APT	200	3	359616.7	360981	1364.3	4092.9
134	207	4579106	SHRI	200	3	7192	9758	2566	7698
135	207	4579070	METRO	200	3	137381.5	137711	329.5	988.5
136	207	4579206	DEEP JOYTI	100	2	143084.6	144025	940.4	1880.8
137	207	4579199	N.G.MILL SOCIETE	100	2	131044	132208	1164	2328
138	207	4579198	MANTRI CHA.ESTATE	100	6	112377	112959	582	3492
139	207	4579197	mantri cha.vihar-2	200	3	50495	50767	272	816
140	207	4579185	VARUN APT	100	2	145138.6	145684	545.4	1090.8
141	207	4579172	ABHIYANTA NAGAR	200	3	337536	339530	1994	5982
142	207	4579148	BRAHAMADEO NAGAR	200	3	820175	822317	2142	6426
143	207	4579271	MANTRI CH.VIHAR -2	200	3	114597	115364	767	2301
144	207	4579257	RELIANCE INFO COM	100	3	116353	116997	644	1932
145	207	4579253	ANANAD NAGAR-1	200	3	215745.6	216978	1232.4	3697.2
146	207	4579252	MAHATMA PHULE NAGAR	200	3	97894	100046	2152	6456
147	207	4579251	ADD ASARA	200	3	221200	224378	3178	9534
148	207	4579250	ADD CHINTAMANI	200	3	253319.2	256626	3306.8	9920.4
149	207	4579209	IDEA CELLULR	100	4	48800.6	49126	325.4	1301.6
150	207	4579309	SAI APP.	100	2	17716.83	21828.81	4111.98	8223.96
151	207	4579313	VEVAKANAD ADD METRO	200	2	22017	22873	856	1712
152	207	4579216	SUNDER COMPLEX	100	2	25432.83	25651	218.17	436.34
Feeder Name : Mitragotri , Feeder code: 209									
153	209	4579290	SIRAT NAGAR	200	3	43538	44456	918	2754
154	209	4579193	ANTROLIKAR NAGAR-2	200	3	4726.2	6460	1733.8	5201.4
155	209	4579061	MUDGUNDI	200	3	228022.6	228818	795.4	2386.2
156	209	457902	GURUNANAK NAGAR-1	200	5	153806.4	154613	807.3	4036.5

		2					.7		
157	209	4579023	GENTAL	200	3	425562.4	427874.6	2312.2	6936.6
158	209	4579014	DHAYFULE	200	3	390256.8	391125.2	868.4	2605.2
159	209	4579079	N.C.C	200	5	609780	612076	2296	11480
160	209	4579188	LOKSEVA	400	3	275069.4	276714	1644.6	4933.8
161	209	4579261	ANTROLIKAR NAGAR-3	200	3	8112.9	9926.3	1813.4	5440.2
162	209	4579310	POBHTI	200	2	371233	374417	3184	6368
163	209	###### #####	MEDICAL COLLAGE(HT)		1	177942	182458.4	4516.4	4516.4
									740112.50

Annexure 13: Feeder Energy Audit by DTC Meter Reading –Rural

Distribution Transformer (DT) Reading Format, Solapur Rural Divisions	
Sub division : Barshi (U)	Sub Dn. Code: 6319
Substation code: 274116	SubStation Name: 33/11 kV PPR
Feeder Name : Darshan Mandap	Feeder code: 201
Initial Reading(kWh)= 719980 ;Date :02.10.08	Final Readind(kWh)=879530 ; Date : 08.10.08

Sr No	FED	DTC_COD	DTC_NAME	DTC_ RATING kVA	METER NO	MF	Initial Reading	Final Reading	Diff. (FR-IR)	Energy kWh
1	201	4099036	ANIL NAGAT	200	3121318	2	675889	677790	1901	3802
2	201	4099037	COTTEGE HOSPITAL	100	3121344	3	401541	402905	1364	4092
3	201	4099038	AMBABAI	200	MSU 07581	3	495978	497834	1856	5568
4	201	4099039	KHADI GRAMODYOG	100	3121294	2	401060	402915	1855	3710
5	201	4099045	TANPURE	200	3121326	3	826367	828796	2429	7287
6	201	4099011	GAJANAN MAHARAJ	200	3111882	3	58479	60367	1888	5664
7	201	4099012	TANGA STAND	200	3121296	3	670780	672980	2200	6600
8	201	4099013	UTPAT GALLI	200	2277519	3	321646	323699	2053	6159
9	201	4099019	URBAN BANK	200	3121369	3	783076	785708	2632	7896
10	201	4099023	EXCISE	100	1112438	3	24132	24955	823	2469
11	201	4099024	GHANTE	200	3121283	2	637591	639535	1944	3888
12	201	4099025	POST OFFICE	100	3121343	3	76089	76908	819	2457
13	201	4099026	DIVISION OFFICE	200	3121324	3	593494	595504	2010	6030
14	201	4099027	MAHAVIR NAGAR	200	3121295	3	441600	443179	1579	4737
15	201	4099028	DOORDARSHAN	25	109492	1	44110	44371	261	261
pp	201	4099029	STATE BANK	200	3121370	3	526065	527804	1739	5217
17	201	4099030	MAHARASHTRA OIL MIL	200	3121371	3	657897	659712	1815	5445
18	201	4099031	KADABE GALLI	200	3121284	3	414685	416253	1568	4704
19	201	4099032	BHOSALE	200	3121340	3	577474	579444	1970	5910
20	201	4099033	VYAPARI COMMITEE	100	3121293	3	389256	390842	1586	4758
21	201	4099034	WAGHULE	200	3121320	3	560180	562166	1986	5958
22	201	4099035	KAIKADI	200	3121316	2	########	#########	3300	6600
23	201	4099092	MAHAJAN	100	201187	3	516313	518452	2139	6417
24	201	4099093	LAKHUBAI	200	MSE 10871	2	58479	62080.8	3601.8	7203.6
25	201	4099094	SONAR MATH	100	201256	2	444788	446881	2093	4186
26	201	4099095	GANGEKAR	100	201144	2	392211	394568	2357	4714
27	201	4099108	TILAK SMARAK	200	201226	3	140147	140640	493	1479
28	201	4099109	BHADULE	100	201143	3	378499	380384	1885	5655
29	201	4099111	BHOSALE ADD	100	201340	2	405353	407384	2031	4062
30	201	4099115	DAMODAR PROPERTIES	100	-	1	2813	2831	18	18
31	201	19051370	GAJANAN MAHARAJ (HT)	100	1983667	1	880660	885461	4801	4801

32	201	3.37E+11	COTTEGE HOSPITAL (HT)	63	6599682	2	36311	36922	611	1222
33	201	3.37E+11	BSNL (HT)	100	6599740	2	198974	201515	2541	5082
			Total Energy measured at DT secondary							154052
			Units measured at 11kV Incomer							159550
			% Loss							3.45%

Distribution Transformer (DT) Reading Format, Solapur Urban Division	
Sub division : Barshi (U)	**Sub Dn. Code: 6319**
Substation code: 274116	**SubStation Name: 33/11 kV PPR**
Feeder Name : Ganesh Nagar	**Feeder code: 202**
Initial Reading(kWh)= 2172.7 ;Date :02.10.08	**Final Readind(kWh)=2339.8 ; Date : 08.10.08**

Sr No	FED	DTC_COD	DTC_NAME	DTC_ RATING kVA	METER NO	MF	Initial Reading	Final Reading	Diff. (FR-IR)	Energy
1	202	4099040	RAILWAY	200	3121291	3	338663	340213	1550	4650
2	202	4099041	GANESH NAGAR	200	3121323	3	440880	442574	1694	5082
3	202	4099042	GUPTA	100	3121365	2	502187	504593	2406	4812
4	202	4099043	MALI WASTI	100	-	2	762058	764907	2849	5698
5	202	4099044	WADAR GALLI	200	3121342	2	1E+06	1025537	4357	8714
6	202	4099067	SAMARTH	100	3121345	2	841722	845194	3472	6944
7	202	4099068	TATHE	100	3121354	2	546526	549263	2737	5474
8	202	4099069	BHAGAT	100	3121357	2	770734	774113	3379	6758
9	202	4099070	KARVE	100	3121355	2	339065	340991	1926	3852
10	202	4099071	YASHWANT NAGAR	100	3121341	2	414082	415988	1906.2	3812.35
11	202	4099072	REST HOUSE	200	3121329	3	385169	386921	1752	5256
12	202	4099073	UJANI	200	3121307	3	630523	632776	2253	6759
13	202	4099074	MANISHA NAGAR	315	3121319	5	355663	357198	1535	7675
14	202	4099075	KARAD NAKA	200	3121312	3	761901	764741	2840	8520
15	202	4099076	TAHASIL	200	3121327	3	647133	649638	2505	7515
16	202	4099077	POLICE LINE	200	3121366	2	105952	107951	1999	3998
17	202	4099078	DATTA NAGAR	315	3121356	5	208217	209059	842	4210
18	202	4099096	UMATE NAGAR	100	201220	2	452770	454946	2176	4352
19	202	4099097	GOKUL NAGAR	0.2	201213	3	559600	562858	3258	9774
20	202	4099098	UMA COLLEGE	200	201271	3	326184	328028	1844	5532
21	202	4099100	JIJAU NAGAR	100	201211	2	496218	498279	2061	4122

22	202	3.07E+11	RAILWAY HT CONSUMER	100	MSE 61396	1	510716	515319	4603	4603
23	202	4098846	SHOLAPUR RARAL DT NAGAR	100	201186	2	910485	915325	4840	9680
24	202	4098847	ANAND NAGAR RURAL DT	100	201250	2	984669	990626	5957	11914
25	202	4098848	PRATAP NAGAR RURAL DT	63	MSD 02880	2	106580	109138	2558	5116
26	202	4098845	RURAL DT GAIND	63	3121314	1	819238	821495	2257	2257
27	202	9981017	RURAL DT GAIND ADDITIONAL	100	4848317	1	2586	6860	4274	4274
			Total Energy measured at DT secondary							161353
			Units measured at 11kV Incomer							167100
			% Loss							3.44%

Distribution Transformer (DT) Reading Format, Solapur Urban Division	
Sub division : Barshi (U)	**Sub Dn. Code: 1384**
Substation code: 278003	**SubStation Name: 33/11 kV Barshi (U) S/S**
Feeder Name : 11kV Mill	**Feeder code: 206**
Initial Reading(kWh)= 48499.7 ;Date :09.10.08	**Final Readind(kWh)= 48573.5 ; Date : 11.10.08**

Sr No	FED	DTC_COD	DTC_NAME	DTC_ RATING kVA	METER NO	MF	Initial Reading	Final Reading	Diff. (FR-IR)	Energy
1	206	4090067	Srijee	200	201461	3	399959	400933	974	2922
2	206	4090059	Santosh	200	2363121	3	428273	428994	721	2163
3	206	4090039	Lohe	200	201245	3	381181	381904	723	2169
4	206	4090025	Industrial Estate 1	600	110329	5	65647	65923	276	1380
5	206	4090070	Somane Cold	100	201172	2	347197	347971	774	1548
6	206	4090031	Javedi Plot	300	201174	3	294502	294839	337	1011
	206	4090031	Javedi Plot	300	201246	3	369013	369463	450	1350
7	206	4090120	Laxmi Engineering	200	201413	2	B			3200
	206			200	211444	2	B			0
8	206	4090071	Sopal Group	63					0	200
9	206	4090029	Jamgaon Road	200	110290	2	1354	1994	640	1280
10	206	4090121	Petrol Pump	100	MSE 20060	2	325192	325929	737	1474
11	206	4090140	Railway Station	63	188703	2	005	315	310	620
12	206	4090004	Arangaon Road		3121253	2	425136	425695	559	1118
13	206	4090122	Mulge Wara	100	201400	2	422896	423443	547	1094
14	206	4090015	Dutt Nagar		201192	2	388249	388773	524	1048
15	206	4090104	Nade Plot No.2	63		2	334466	334790	324	648

16	206	4090044	Nade Plot No.2	100	201241	2	96063	96273	210	420
17	206	4090014	Kadam Wasti	200	2363152	2				2700
18	206	4090003	Amrai Nala	100	MSE 52804	2	409102	409778	676	1352
19	206	4090138	Monibhardrapur Product	63	3121351	2	170348	170820	472	944
20	206	4090134	Satakar	63	MSE 20055	2	1317	1317	0	0
21	206	4090094	Darshana Pulrex	100	110085	3	176175	176310	135	405
22	206	4090105	Wahkarba Kutti	100		2	592812	593780	968	1936
23	206	4090106	Megdeche	63	201341	2	300104	300623	519	1038
24	206	4090052	Punmiya 1	315	3121275	3			0	800
25	206	4093053	Punmiya 2	200	MSE 20077	3	461518	462003	485	1455
26	206	4090060	Sholapur Road	315	201249	3	791621	792552	931	2793
27	206	4090038	Landi Group	100	3121334	2	159661	160217	556	1112
28	206	4090030	Pardi Camp	200		3	301590	301968	378	1134
29	206	4090089	Sawada	100	06599789	2	201322	201903	581	1162
30	206		Gramin	100	06599757	2			0	800
31	206	#########	Barsi Textile Mill			20	302447	303602	1155	23100
32	206	#########	Vep Industry			5	414615	415785	1170	5850
33	206	#########	Market Yard						0	35
34	206	4090132	Bhagwat Petrol Pump			2	254613	254989	376	752
			Total Energy measured at DT secondary							71013
			Units measured at 11kV Incomer							73800
			% Loss							3.78%

Distribution Transformer (DT) Reading Format, Solapur Urban Division				
Sub division : Barshi (U)	**Sub Dn. Code: 1384**			
Substation code: 278003	**SubStation Name: 33/11 kV Barshi (U) S/S**			
Feeder Name : 11kV Industrial Feeder	**Feeder code: 205**			
Initial Reading(kWh)= 8745.31 ;Date :09.10.08	**Final Reading(kWh)= 8765.49 ; Date : 11.10.08**			

Sr. No	FED	DTC CODe	DTC_NAME	DTC_ RATING kVA	METER NO	MF	Initial Reading	Final Reading	Diff. (FR-IR) kWh	Energy kWh

1	205	4090116	Pankaj Nagar	100	201417	2	504986	505273	287	574
2	205	4090072	Spectram	200	3121271	3	98041	98685	644	1932
3	205	4090036	KMI Plastic	200	3121273	3	710209	710976	767	2301
4	205	4090062	Shanti Oil Mil	315	110337	3	4286	5225	939	2817
	205	4090062	Shanti Oil Mil	315	201171	3	237859	238141	282	846
5	205	4090065	Shiv Ganesh	315	110336	5	53419	53608	189	945
6	205	4090117	Aadarsh Engg	200	MSE20059	2	235369	235603	234	468
7	205	4090054	Royal Plastic	200	3121267	3	141262	141493	231	693
8	205	4090058	Sameer Industry	200	201460	3	212840	213176	336	1008
9	205	4090028	Jala Ram	315	3121278	5	469293	469766	473	2365
10	205	4090005	Archana	315	110315	5				1200
	205	4090005	Archana	315	110324	5	51236	51534	298	1490
11	205	4090016	Disha	200	3121268	3	594568	594978	410	1230
12	205	4090002	Amar	200	3121266	3	266591	266780	189	567
13	205	4090023	High Power	315	3121269	3	188846	189142	296	888
14	205	4090111	Bodi Kharkhara/Donikar	100	201285	2	263252	263504	252	504
			Total Energy measured at DT secondary							19828
			Units measured at 11kV Incomer							20180
			% Loss							1.74%

Annexure 14: 33kV Indirect Loss Report for Urban Network

Component ID	Type	% Voltage Drop	kW Loss	kVAr Loss
Line2	33 kV Line	0.05	0.709	0
Line3	33 kV Line	0.27	19.228	0
Line4	33 kV Line	0.05	0.611	0
Line6	33 kV Line	0.27	13.741	0
Line7	33 kV Line	0.23	18.642	0
Line9	33 kV Line	0.23	18.642	0
Line11	33 kV Line	0.18	10.122	0
Line12	33 kV Line	0.18	16.541	0
Line14	33 kV Line	0.05	6.253	0
Line15	33 kV Line	0.14	6.586	0
Line17	33 kV Line	0.09	4.862	0
Line19	33 kV Line	0.09	4.862	0
Line21	33 kV Line	0	0.009	0
Line22	33 kV Line	0.09	2.497	0
Line24	33 kV Line	0.05	1.668	0
T1	33 / 11 kV Transformer	2.66	14.653	227
T5	33 / 11 kV Transformer	2.66	14.653	227
T10	33 / 11 kV Transformer	2.3	8.106	98.406
T15	33 / 11 kV Transformer	2.57	13.766	213
T16	33 / 11 kV Transformer	2.57	13.766	213
T19	33 / 11 kV Transformer	1.44	4.385	67.97
T20	33 / 11 kV Transformer	1.44	4.385	67.97
T23	33 / 11 kV Transformer	1.41	4.227	65.52
T24	33 / 11 kV Transformer	1.41	4.227	65.52
T35	33 / 11 kV Transformer	2.1	9.269	144
T37	33 / 11 kV Transformer	4.84	12.018	186
T38	33 / 11 kV Transformer	2.23	10.369	161
T41	33 / 11 kV Transformer	0.73	1.162	18.008
T42	33 / 11 kV Transformer	0.73	1.162	18.008
		kW	**MU**	**%**
	33 kV Line Loss in kW	**125.0**	**0.437**	**0.12%**
	33 kV Transformation loss	**116.1**	**0.406**	**0.11%**
	Total 33 kV network loss	**241.1**	**0.843**	**0.23%**

Annexure 15: 11kV Indirect Loss Report of Urban Network

BU	Substation	S/Stn	Feeder No	Feeder name	Max load	Load at 2100 Hrs	PF	No of TF	Transf. Loss (kW)	Line Loss (kW)	Total Loss (kW)	Annual LLF	Annual T/F loss (MU)	Annual Line loss (MU)	Annual loss in MU
4086	Swich. Stn	272106	201	11 KV Local Navi Ves	19	14	0.85	2	0.54	0.56	1.1	0.352	0.002	0.002	0.003
			202	11 KV Shubhary	134	109	0.85	24	54.33	26.11	80.44	0.246	0.117	0.056	0.173
			203	11 KV Choupad	62	55	0.85	12	5.58	3.22	8.80	0.317	0.015	0.009	0.024
	132/11 kV Degoan	277002	202	11 KV SHP II	130	125	0.90	45	16.43	32.44	48.87	0.275	0.040	0.078	0.118
			205	11 KV Navi Ves	190	170	0.90	27	14.25	20.57	34.83	0.345	0.043	0.062	0.105
			206	11 KV SHP I	140	110	0.90	28	11.50	23.40	34.91	0.399	0.040	0.082	0.122
			208	11 KV Mill	90	80	0.90	4	10.91	0.04	10.95	0.718	0.069	0.000	0.069
4087	33/11 kV Water Work	274008	201	11KV WATER WORK	114	103	0.90	29	5.68	10.81	16.48	0.394	0.020	0.037	0.057
			202	11KV D.A.V. FEEDER	55	47	0.90	11	4.42	1.63	6.05	0.289	0.011	0.004	0.015
			203	11KV BHAWANI	62	52	0.90	12	4.82	1.87	6.69	0.342	0.014	0.006	0.020
			204	11KV SAMACHAR	150	112	0.90	35	7.18	65.32	72.50	0.278	0.017	0.159	0.176
			205	11 KV JODBHAVI	72	58	0.90	13	6.54	6.08	12.62	0.343	0.020	0.018	0.038
			206	11KV SAMART	169	134	0.90	39	13.19	34.04	47.24	0.350	0.040	0.104	0.145
	33/11 kV Civil	274061	201	11 KV RAMLAL	105	95	0.90	13	6.08	8.19	14.26	0.321	0.017	0.023	0.040
			202	11 KV OLYMPIC	95	85	0.90	11	9.51	6.57	16.09	0.382	0.032	0.022	0.054
			203	11 KV JAIL ROAD	85	75	0.99	14	5.79	6.85	12.64	0.314	0.016	0.019	0.035
			204	11 KV BAPUJI NAGAR	50	40	0.90	10	4.24	1.29	5.53	0.280	0.010	0.003	0.014
			205	11 KV JAGDAMBA	115	100	0.90	19	8.63	9.15	17.78	0.302	0.023	0.024	0.047

			206	11 KV DAK BANGLA	135	125	0.90	29	12.44	27.71	40.15	0.524	0.057	0.127	0.184
	Aditya Nagar	274062	201	11 KV LIMAYEWADI	75	70	0.90	30	79.75	108.50	188.245	0.304	0.213	0.289	0.502
			202	11 KV MODI	70	5	0.90	34	27.63	68.04	95.66	0.311	0.075	0.186	0.261
			203	11 KV MAHALAXMI	60	60	0.99	18	7.50	10.72	18.22	0.383	0.025	0.036	0.061
4089	33/ 11 kV MIDC	274009	201	11 KV M I D C NO 3	72	19	0.85	16	0.5	0.27	0.77	0.335	0.001	0.001	0.002
			202	11 KV PATAN BAG	106	50	0.85	25	2.84	1.55	4.39	0.411	0.010	0.006	0.016
			203	11 KV M I D C NO 4	64	22	0.85	16	0.56	0.32	0.88	0.329	0.002	0.001	0.003
			204	11 KV M I D C NO 5	118	44	0.85	33	1.33	4.83	6.15	0.369	0.004	0.016	0.020
			205	11 KV ASHOK CHOWK	123	63	0.85	24	3.20	3.69	6.89	0.361	0.010	0.012	0.022
			206	11 KV VINKAR	120	82	0.85	10	11.35	2.66	14.01	0.538	0.053	0.013	0.066
	33/11 kV BG	274045	201	BIDIGHRKUL	100	100	0.85	29	13.75	4.84	18.59	0.387	0.047	0.016	0.063
			203	GANDHINAGAR	120	50	0.85	27	1.62	2.64	4.26	0.273	0.004	0.006	0.010
			204	AGRO	50	50	0.85	24	2.24	2.09	4.33	0.558	0.011	0.010	0.021
			205	MULEGAON	170	160	0.85	24	61.78	31.45	93.225	0.565	0.306	0.156	0.462
			207	11 KV GADGI NAGAR	30	30	0.85	13	4.44	1.05	5.49	0.361	0.014	0.003	0.017
	132/11 kV MIDC	277012	202	MIDC NO 1	80	40	0.85	9	5.16	1.73	6.885	0.393	0.018	0.006	0.024
			203	GANDHINAGAR	20	20	0.85	8	1.05	0.22	1.27	0.690	0.006	0.001	0.008
			204	POLYTECHNIC	140	100	0.85	12	14.75	5.42	20.17	0.458	0.059	0.022	0.081
			207	MIDC NO 2	120	60	0.85	17	6.95	2.93	9.878	0.473	0.029	0.012	0.041
			209	SIDDESHAWAR	140	120	0.85	17	10.07	5.74	15.81	0.683	0.060	0.034	0.095
4579	33/11 kV IE	274003	201	RAMWADI	76	72	0.90	36	4.90	3.06	7.95	0.339	0.015	0.009	0.024
			202	press	30	22	0.90	9	1.14	0.07	1.22	0.578	0.006	0.000	0.006

			203	polytenic	125	125	0.90	18	81.273	81.67	162.942	0.431	0.307	0.308	0.615
			204	MEDICAL	85	85	0.90	18	10.65	5.43	16.08	0.373	0.035	0.018	0.052
			206	IND-ESTATE-2	20	16	0.90	16	7.086	3.63	10.718	0.623	0.039	0.020	0.058
			207	IND-ESTAET-1	65	65	0.90	29	0.02	0.29	0.316	0.385	0.000	0.001	0.001
			209	MITRGOTRI	72	72	0.90	26	56.26	72.34	128.60	0.372	0.183	0.236	0.419
	33/11 kV Jule SPR	274068	201	Mantrichandak	130	110	0.90	48	8.427	18.17	26.595	0.329	0.024	0.052	0.077
			202	VIMANTAL	100	80	0.90	10	18.79	10.35	29.14	0.285	0.047	0.026	0.073
			203	SHINDU VIHAR	100	90	0.90	34	11.30	5.76	17.05	0.348	0.034	0.018	0.052
			204	SHIVSHAI	60	60	0.90	10	4.47	0.02	4.48	0.419	0.016	0.000	0.016
			205	KUMTHA	45	35	0.90	15	3.29	4.53	7.82	0.542	0.016	0.022	0.037
			206	SANTOSH NAGAR	70	70	0.90	12	9.96	6.74	16.69	0.264	0.023	0.016	0.039
	33/11 kV Paper Pl.	274122	201	SHANTI NAGAR	3	2	1.00	1	0.13	0.00	0.13	0.509	0.001	0.000	0.001
			202	SHANKAR NAGAR	40	39	1.00	2	3.386	1.45	4.835	0.321	0.010	0.004	0.014
			203	SIDDHESHWAR	180	165	1.00	4	18.97	25.18	44.144	0.485	0.081	0.107	0.187
				11kV Loss				**1051**	**698.556**	**783.2**	**1481.73**		**2.39**	**2.50**	**4.88**
				%Loss at 11kV									**0.65%**	**0.68%**	**1.33%**