

8 (a) : NOTE ON YEARWISE SAVINGS :

The Energy Conservation measures were studied for the building & measures to be implemented were categorised in following 6 groups.

1. High Potential of Energy Conservation with No Investment.
2. ----- do ----- with Low Investment.
3. ----- do ----- with High Investment.
4. Low Potential of Energy Conservation with No Investment.
5. ----- do ----- with Low Investment.
6. ----- do ----- with High Investment.

The Department started implementing Energy Conservation Act 2001 immediately after its enforcement & maximum gain was achieved in the Year October 02-Sept.03. The projects implemented initially were of the nature of category no. 1 & 4 as given above (no expenditure or very less expenditure), hence maximum benefit is seen to be achieved in that year & ratio of 'Savings To Investment' is very high.

In the Second Year projects of the nature of Sr.No. 2 & 5 (involving lesser investment) were taken in hand. Therefore, 'Savings To Investment' ratio for the Second Year is lower than the First Year.

In the third year (04-05) projects requiring more investment were adopted & thus Pay Back period is more with 'Savings To Investment' ratio further declining.

The Projects which can save much energy, but requires large investment (Sr.No.3 & 6) above will be adopted in the coming year in stages. The Pay Back period will be slightly higher than the previous year. But these will be implemented keeping in view the ultimate goal of Energy Conservation.

It is seen that with the completion of No investment phase, other phases of Energy Conservation depends on Money Investment. Hence Energy Saving is directly proportional to Investment which ultimately depends on availability of funds from the User Department & accordingly saving will vary.

8 (b) WRITE-UP FOR THE PROJECTS FOR THE YEAR OCT.04 – SEPT.05

I. WATER HEATERS OFF SEASON CHANGE OF THERMOSTAT SETTING:

Background: Water Heating load is the major part of the total connected load of the MLA Hostel. Each suit comprises of 35 Ltr. capacity Water Heaters of 2 KW load each. Thus total W. H. Load is = 774 KW. If max. water heating temperature is reduced slightly during off-peak load period it will not affect the requirement of the occupants.

Observation : Previously the Water Heaters were being operated at 70 degrees C. This setting was kept constant during the peak load period i. e. during the "Winter Assembly Session", being held every year at Nagpur, during which rapid water heating is required due to high occupancy. During Off-Peak period this rate of water heating is not required , hence it was reseted to 50 deg.C. for the remaining 11 months.This operation was done by the departmental field staff requiring no investment.

Technical & Financial Analysis : Due to resetting of thermostat during off-peak load period from 70 deg. to 50 deg. saved 20 deg. Due to this saving in 20 deg., expected saving in units/water heater is nearly = 0.813 Units.Considering 20% occupancy for Off-Peak 11 months, total Annual Saving = $0.813 \times 0.20 \times 387 \times 30$ days x 11 months = **20761 Units**. Saving in rupees = $20761 \times \text{Rs.}3.90/\text{unit} = \text{Rs.}80968/-$

Impact : Thus with only operational changes there is an annual saving energy of 20761 units without affecting the normal operation of the building & without any investment.

II. USE OF M.D. CONTROLLER FOR WATER HEATERS:

Background: Water Heating load is the major part of the total connected load of the building, which is = 774 KW. The basic idea was to reduce this simultaneous demand by diversifying the heater load to lower the M.D.

Observation : If all of these Water Heaters are operated simultaneously the M.D. is shooted up by 774 KW. which results in loading the system to maximum extent, thus increasing the losses & thereby the units besides high M.D. charges which are charged 75% of the max.M.D. in a year , for all the remaining 11 months. Thus it was observed that by diversifying the heater load units consumption as well as max.M.D.charges in bill can be reduced.

Technical & Financial Analysis : Water Heaters are grouped in 3 phases. Water Heaters on every phase are made off in rotation during every 10 minutes cycle, thus reducing the $1/3^{\text{rd}}$ of the total simultaneous M.D.by $774/3 = 258 \text{ KVA}$ & the corresponding losses due to reduction in current which is reflected in Energy Bill also.

Impact : Reduction in $1/3^{\text{rd}}$ of the total MD reduced the M.D. charges & also reduction in units consumed to some extent due to reduction in losses. At present since the M.D. is being charged at 75% of the Max. M.D. occuring during Peak load period, for all the remaining 11 months, hence until the arrangement is not made to reduce the Max. M.D. during the peak load period the saving in M.D. charges will not be reflected in the Energy Bills.

III. USE OF TIMERS TO REDUCE CONSUMPTION BY 2 HOURS / DAY FOR 52 NOs STREET LIGHTS:

Background: Normal Working Hours of the Area Lighting are 12 hours. Except for 3 months of the Winter Session (i.e. November December & January) 12 hours working of Street Lights is not required.

Observation : On the above background normal working of the Street Lights were reduced average 2 hours per day for the remaining 9 months of the year, which results in considerable saving in Energy. For this, 3 numbers of timers were installed.

Technical & Financial Analysis : Total load of Street Lights = 7.9 KW. Two hours reduction in burning hours by timers will save $7.9 \times 0.16 \times 12 \text{ hrs} \times 30 \text{ days} \times 9 \text{ months} = 4266 \text{ Units per year}$.

The cost of savings in Rupees will be $4266 \times \text{Rs. } 3.90 = \text{Rs. } 0.17 \text{ Lakhs}$. Investment is only 3 No.s of Timers, costing around Rs.

Impact : Effective monitoring of S.L.Operation with the help of Timers saved approximately 4266 Units per year.

IV. USE OF D.P.S.D. TO 25 NO.s STREET LIGHT FITTINGS :

Background: Normally the required illumination level of S.L.is kept constant throughout the working hours. This illumination level is not required during "off peak" working hours. Thus, if illumination level is reduced say after 12.00 night up to 5.00 a.m. during which public movement is very rare, much energy can be saved.

Observation : D.P.S.D.is the dynamic Power Saving Device which are fitted with the 25 No.s of 150 Watt. H.P.S.V. S.L.Fitting, which reduced the illumination level during Off peak working hours to a minimum required value, which is operated after a set time (12.00 Night) without affecting the Illumination level during peak working hours.

Technical & Financial Analysis : Reduction in Energy level to the minimum required value during off peak working hours saves about 30% of the Power. The saving will be $= 0.30 \times 3.75 \text{ KW} \times 11\text{Hrs.} \times 365\text{days} = 4516 \text{ units / year}$, say 4500 units (Avg. working 11 hours are taken considering 12 Hrs. normal operation for 3 months & 10 Hrs. operation for remaining 9 months of the year). Financial investment is cost of the DPSD fitting $= \text{Rs.} 4305 \times 25 \text{ Nos.} = \text{Rs.} 107625/-$. Saving due to units $= 4500 \text{ units} \times \text{Rs.} 3.90 = \text{Rs. } 17550/- \text{ per Year}$. Pay back period $= 107625 / 17550 = 6 \text{ Years}$.

Impact : Reduction of Illumination level during off-peak period of the day results in reduction in energy bill without affecting normal working.

V. REPLACEMENT OF 10 NO.s 160 W BLENDED M.V. LAMP STREET LIGHT FITTINGS BY 30W CFL FITTINGS:

Background: There are 10 Nos.160W blended M.V.lamp fittings at specific locations for area lighting. 30W CFL fitting would serve the same requirement without affecting the required illumination level.

Observation : All the 160W blended M.V.lamp fittings were replaced by 30W CFL fittings & it was observed that required illumination level could be met by the new fitting.

Technical & Financial Analysis: Installation of 30W CFL fitting saved the energy consumption. The saving will be =

$$\frac{(160 - 30) \times 10 \times 11\text{Hrs} \times 365\text{days}}{1000} = 5219.5 = \text{Say } 5200 \text{ Units}$$

Saving in Rs. $= 5200 \times \text{Rs.} 3.90 = \text{Rs.} 20280/-$

Cost of installation of 30W CFL fittings $= \text{Rs.} 690 \times 10 \text{ Nos} = \text{Rs.} 6900 /-$

Pay-back period $= 6900/20280 = 0.33 \text{ Years}$.

Impact : Use of 30W CFL helps in reduction in energy bill without affecting normal working.

VI. PROVIDING SEPERATE METERING TO 44 NOs CLASS-III RESI. QUARTERS & CLASS-IV SERVENTS QUARTERS:

Background: There are 12 Nos.class-III quarters & 32 Nos.class-IV quarters having connected load of 18KW & 32KW respectively. Supply to these quarters was unmetered which lead to uncontrolled use of energy by the occupants thereby leading to consumption of energy much more than the requirement. Hence it had been decided to provide separate meters to each occupant through separate MSEB service connection., which will save 50 KW of the bldg. Besides occupants will also use energy precisely, being charged directly to them, which ultimately will lead to energy conservation.

Observation : Providing separate metering to individual quarters reduced the consumption of the premises thereby saving units and also the M.D.by 25KW(considering 50% diversity).

Technical & Financial Analysis:

(a) Providing separate metering is not contributed to Conservation of Energy directly. But due to reduction in 50 KW load saved the MD charges & also due to reduction of load on the system supply of the building, system losses are reduced which resulted in saving in some quantum of units. For this entry form saving in Units due to these losses only are considered.

(b) Considering average 100 units energy consumption by each occupant, reduction in units consumption per month =

$$44 \text{ Qtrs.} \times 100\text{units} = 4400 \text{ Units/ month} = 52800 \text{ units/ Year}$$

$$\text{Saving in Rupees} = 52800 \times \text{Rs.} 3.90 = \text{Rs.} 2.06 \text{ Lakhs / Yr.}$$

(c) Considering 50% diversity factor, reduction in M.D. for 50KW load $= 25\text{KW}$

$$\text{Saving in Rupees} = 25\text{KVA} \times 12\text{M} \times \text{Rs.} 330/- = \text{Rs.} 1.00 \text{ Lakh.}$$

Total saving achieved $= \text{Rs.} 2.06 + \text{Rs.} 1.00 = 3.06 \text{ Lakh.}$

Investment for 44 Nos. Qtrs. for providing separate metering $= \text{Rs.} 3.50\text{Lakh}$

The pay-back period will be $3.5/3.06 = 1.14\text{Years} = \text{nearly } 14 \text{ Months}$

Impact : Providing separate metering to individual quarters reduced the consumption of the premises by nearly 52800 units/ year and also saving in Units due to losses. & also the M.D. by at least 25KW. Also providing separate meters brought awareness among the occupants to use the energy precisely, as the bill is being directly charged to them which ultimately helped in achieving awareness about energy conservation.

(9) (i) GENERAL DESCRIPTION OF THE BUILDING :

MLA Hostel is the VIP type of the building. It's basic purpose is to provide residential arrangement of the Members of Maharashtra Legislative Assembly & Maharashtra Legislative Council during Winter Assembly Session of Govt. of Maharashtra held every year at Nagpur. The building is situated in Civil Lines area & is about 1 Km from House of Assembly. It consists of 3 wings (Buildings). The first 2 wings are of Five storeys (G + 4). The first wing consists of **132 Nos. of Suits**. The 2nd wing consists of total **183 Suits**. The 3rd wing is of Three storeys (G + 2), consisting of **71 Suits**. Thus in all there are **386 Nos. Suits** in the premises.

(ii) ENERGY CONSUMPTION :

Major Electrical load of the building consists of water heating (**774Kw**). Other loads include room lighting (Fluo.Fitting), Water Pumps, Street/Area lighting., passage lighting etc. The total energy consumption for the last three years is shown in the following tables year-wise.

ENERGY CONSUMPTION OF MLA HOSTEL, NAGPUR**PERIOD : OCT.2002 - SEPT.2003**

| Sr. No. | Month | Connected Load | Contract Demand (KVA) | Maximum Demand (KVA) | Power factor | Units (Kwh) | Amt. Of Bill (Rupees) |
|---------|----------------|----------------|-----------------------|----------------------|--------------|---------------|-----------------------|
| 1 | Oct-02 | 300 | 300 | 448 | 0.90 | 47055 | 307695 |
| 2 | Nov-02 | 300 | 300 | 448 | 0.90 | 38160 | 276526 |
| 3 | Dec-02 | 300 | 300 | 597 | 0.90 | 91790 | 554684 |
| 4 | Jan-03 | 300 | 300 | 576 | 0.90 | 75355 | 391479 |
| 5 | Feb-03 | 300 | 300 | 432 | 0.96 | 51696 | 316341 |
| 6 | Mar-03 | 300 | 300 | 432 | 0.92 | 38105 | 271209 |
| 7 | Apr-03 | 300 | 300 | 432 | 0.92 | 34185 | 247838 |
| 8 | May-03 | 300 | 300 | 432 | 1.00 | 37230 | 269812 |
| 9 | Jun-03 | 300 | 300 | 432 | 1.00 | 34355 | 259885 |
| 10 | Jul-03 | 300 | 300 | 432 | 0.95 | 34355 | 259805 |
| 11 | Aug-03 | 300 | 300 | 432 | 1.00 | 44645 | 295080 |
| 12 | Sep-03 | 300 | 300 | 432 | 1.00 | 43025 | 289041 |
| | TOTAL : | | | 5525 | 0.95 | 569956 | 3739395 |

(A) M.D. Charges :

Rate : Rs.330/- per KVA

- Total M.D.Utilised for 12 months =
(448 x 2M) + 597 + 576 + 432 x 8M = **5525** KVA
- Total M.D. Charges for 12 months =
Total M.D.(KVA x Rate) = 5525 x Rs.330/- = **1823250** Rs.
- Total Amount of Bill in the Year = **3739395** Rs.
- Actual Bill as per Units Consumption = (Total Bill - Total MD Charges)
= **1916145** Rs.
- Total Units Consumed in the Year = **569956** Units(Kwh)
- Average Rate per Unit for the Year = **3.54** Rs.
Say Rs. 3.36 Per Unit
- Average Poer Factor during the Year = **0.95**

(B) Saving in Energy Consumption :

(i) Energy Saved as compared to previous year = (826641 - 569956) = **256685 Units**.
There is actual Saving in Bill which is = Rs.(4950974 - 3839395) = **Rs.12,11,579**

ENERGY CONSUMPTION OF MLA HOSTEL, NAGPUR**PERIOD : OCT. 2003 - SEPT.2004**

| Sr. No. | Month | Connected Load | Contract Demand (KVA) | Maximum Demand (KVA) | Power factor | Units (Kwh) | Amt. Of Bill (Rupees) |
|---------|--------|----------------|-----------------------|----------------------|--------------|-------------|-----------------------|
| 1 | Oct-03 | 300 | 300 | 432 | 1.00 | 45640 | 300637 |
| 2 | Nov-03 | 300 | 300 | 432 | 1.00 | 29380 | 244779 |
| 3 | Dec-03 | 300 | 300 | 432 | 0.95 | 56005 | 342115 |
| 4 | Jan-04 | 300 | 300 | 604 | 0.95 | 56005 | 342116 |
| 5 | Feb-04 | 300 | 300 | 453 | 0.96 | 58270 | 351755 |
| 6 | Mar-04 | 300 | 300 | 453 | 0.98 | 41475 | 291682 |
| 7 | Apr-04 | 300 | 300 | 453 | 0.99 | 34185 | 253386 |
| 8 | May-04 | 300 | 300 | 453 | 0.94 | 41800 | 301342 |

| | | | | | | | |
|----|----------------|-----|-----|-------------|-------------|---------------|----------------|
| 9 | Jun-04 | 300 | 300 | 453 | 0.89 | 44485 | 294457 |
| 10 | Jul-04 | 300 | 300 | 453 | 0.96 | 45815 | 301716 |
| 11 | Aug-04 | 300 | 300 | 453 | 0.98 | 46175 | 302774 |
| 12 | Sep-04 | 300 | 300 | 453 | 0.99 | 41110 | 279899 |
| | TOTAL : | | | 5524 | 0.97 | 540345 | 3606658 |

(A) M.D. Charges : Rate : Rs.330/- per KVA

- Total M.D.Utilised for 12 months =
(432 x 3M) + 604 + 453 x 8M = **5524 KVA**
- Total M.D. Charges for 12 months =
Total M.D.(KVA x Rate) = 5525 x Rs.330/- = **1822920 Rs.**
- Total Amount of Bill in the Year = **3606658 Rs.**
- Actual Bill as per Units Consumption = (Total Bill - Total MD Charges)
= **1783738 Rs.**
- Total Units Consumed in the Year = **540345 Units(Kwh)**
- Average Rate per Unit for the Year = **3.30 Rs.**
Say Rs. 3.30 Per Unit
- Average Poer Factor during the Year = **0.97**

(B) Saving in Energy Consumption :

(i) Nos. of Energy Saved as comared to previous year = (569956 - 540345) = **29611 Units.**
There is actual Saving in Bill which is = Rs.(3739395 - 3606658) = Rs.1,32,737/-

ENERGY CONSUMPTION OF MLA HOSTEL, NAGPUR
PERIOD : OCT.2004 - SEPT.2005

| Sr. No. | Month | Connected Load | Contract Demand (KVA) | Maximum Demand (KVA) | Power factor | Units (Kwh) | Amt. Of Bill (Rupees) |
|---------|----------------|----------------|-----------------------|----------------------|--------------|---------------|-----------------------|
| 1 | Oct-04 | 300 | 300 | 453 | 1.00 | 44765 | 306870 |
| 2 | Nov-04 | 300 | 300 | 453 | 1.00 | 30535 | 378153 |
| 3 | Dec-04 | 300 | 300 | 643 | 0.99 | 95015 | 560100 |
| 4 | Jan-05 | 300 | 300 | 482 | 0.98 | 49420 | 322528 |
| 5 | Feb-05 | 300 | 300 | 482 | 0.99 | 55160 | 358252 |
| 6 | Mar-05 | 300 | 300 | 482 | 1.00 | 39250 | 289838 |
| 7 | Apr-05 | 300 | 300 | 482 | 1.00 | 26144 | 257941 |
| 8 | May-05 | 300 | 300 | 482 | 1.00 | 36295 | 281207 |
| 9 | Jun-05 | 300 | 300 | 482 | 1.00 | 25805 | 251332 |
| 10 | Jul-05 | 300 | 300 | 482 | 1.00 | 31390 | 278559 |
| 11 | Aug-05 | 300 | 300 | 482 | 1.00 | 38845 | 304410 |
| 12 | Sep-05 | 300 | 300 | 482 | 1.00 | 26690 | 262077 |
| | TOTAL : | | | 5887 | 1.00 | 499314 | 3851267 |

(A) M.D. Charges : Rate : Rs.330/- per KVA

- Total M.D.Utilised for 12 months =
(453 x 2M) + 643 + 482 x 9M = **5887 KVA**
- Total M.D. Charges for 12 months =
Total M.D.(KVA x Rate) = 5887 x Rs.330/- = **1942710 Rs.**
- Total Amount of Bill in the Year = **3851267 Rs.**
- Actual Bill as per Units Consumption = (Total Bill - Total MD Charges)
= **1908557 Rs.**
- Total Units Consumed in the Year = **499314 Units(Kwh)**
- Average Rate per Unit for the Year = **3.82 Rs.**
Say Rs. 3.82 Per Unit
- Average Poer Factor during the Year = **1.00**

Saving in Energy Consumption : Energy saved as compared as compared to previous year =
(540345 – 499314) Units = 41031 Units.

Actual saving in Amount is not seen due to rise in tariff & fuel charges. Still there is the net saving in Energy of 41031 Units which is equivalent to 41031 x Rs. 3.90 (Avg.) = Rs.1.60Lakhs.

★ **Colour presentation is attached herewith separately.**

(9) (iii) Energy Conservation Achievements (Oct.04-Sept-05):

I. WATER HEATERS OFF SEASON CHANGE OF THERMOSTAT SETTING:

Water Heating load is the major part of the total connected load of the MLA Hostel. Each suit comprises of 35 Ltr. capacity Water Heaters of 2 KW load each. Total W. H. Load is = 774 KW. Previously the Water Heaters were being operated at 70 degrees C. This setting was kept constant during the peak load period i. e. during the "Winter Assembly Session", being held every year at Nagpur, during which rapid water heating is required due to high occupancy. During Off-Peak period this rate of water heating is not required, hence it was reseted to 50 deg.C. for the remaining 11 months. Due to this saving in 20 deg., expected saving in units/water heater is nearly = 0.813 Units. Considering 20% occupancy for Off-Peak 11 months, total Annual Saving = $0.813 \times 0.20 \times 387 \times 30 \text{ days} \times 11 \text{ months} = 20761 \text{ Units}$ without affecting the normal operation of the building & without any investment.

II. USE OF M.D. CONTROLLER FOR WATER HEATERS:

Water Heating load is the major part of the total connected load of the building, which is = 774 KW. The basic idea was to reduce this simultaneous demand by diversifying the heater load to lower the M.D. The M.D. charges which are charged 75% of the max. M.D. in a year, for all the remaining 11 months. Water Heaters are grouped in 3 phases. Water Heaters on every phase are made off in rotation during every 10 minutes cycle by the M.D. Controller, thus reducing the $\frac{1}{3}^{\text{rd}}$ of the total simultaneous M.D. by $\frac{774}{3} = 258 \text{ KVA}$ & the corresponding losses due to reduction in current which also reduced units consumed to some extent. At present since the M.D. is being charged at 75% of the Max. M.D. occurring during Peak load period, for all the remaining 11 months. Suitable methodology is being worked out to reduce the Max. M.D. during the peak load period. Till that the saving in M.D. charges will not be reflected in the Energy Bills.

III. USE OF TIMERS TO REDUCE CONSUMPTION BY 2 HOURS / DAY FOR 52 NOS STREET LIGHTS:

Initially normal working hours of the Area Lighting were 12 hours. Except for 3 months of the Winter Session (i.e. November, December & January) 12 hours working of Street Lights is not required. On this background normal working hours of the Street Lights were reduced average 2 hours per day for the remaining 9 months of the year, to reduce the energy consumption. For this, 3 numbers of timers were installed. Total load of Street Lights = 7.9 KW. Two hours reduction in burning hours by timers saved @ $7.9 \times 0.16 \times 12 \text{ hrs} \times 30 \text{ days} \times 9 \text{ months} = 4266 \text{ Units}$ per year, which saved Rs. @ .0.17 Lakhs. Investment is only of 3 Nos. of Timers, costing around Rs. 0.10 Lakhs.

IV. USE OF D.P.S.D. TO 25 NO.s STREET LIGHT FITTINGS :

Previously the required illumination level of S.L. was constant throughout the working hours. This illumination level is not required during "Off Peak" working hours. Thus, illumination level was reduced after 12.00 night up to 5.00 a.m. during which public movement is very rare, to save the energy, with the help of D.P.S.D., which is the Dynamic Power Saving Device which fitted with the 25 No.s of 150 Watt. H.P.S.V. S.L.Fitting, to a minimum required value, which is operated after a set time (12.00 night) without affecting the Illumination level during peak working hours. Reduction in illumination level to the minimum required value during off peak working hours saves about 30% of the Power. The saving will be = $0.30 \times 3.75 \text{ KW} \times 11 \text{ Hrs.} \times 365 \text{ days} = 4516 \text{ units / year}$, say 4500 units (Avg. working 11 hours are taken considering 12 Hrs. normal operation for 3 months & 10 Hrs. operation for remaining 9 months of the year). Financial investment is cost of the DPSD fitting = $\text{Rs.}4305 \times 25 \text{ Nos.} = \text{Rs.}107625/-$. Saving due to units = $4500 \text{ units} \times \text{Rs.}3.90 = \text{Rs.}17550/-$ per Year.

V. REPLACEMENT OF 10 NO.s 160 W BLENDED M.V. LAMP STREET LIGHT FITTINGS BY 30W CFL FITTINGS:

There were 10 Nos. 160W blended M.V. lamps fittings erected at specific locations for area lighting. Replacement of these 160W blended lamps by 30W CFL fitting would not affect the required illumination level. Hence all the 160W blended M.V. lamp fittings were replaced by 30W CFL fittings & it was observed that required illumination level was met by the new fitting. The installation of 30W CFL fitting saved the energy consumption to a value =

$$\frac{(160 - 30)W \times 10 \text{ Nos.} \times 11 \text{ Hrs} \times 365 \text{ days}}{1000} = 5219.5 = \text{Say } 5200 \text{ Units}$$

Saving in Rs. = $5200 \times \text{Rs.}3.90 = \text{Rs. } 20280/-$. Cost of installation of 10 Nos., 30W CFL fittings is = $10 \text{ Nos.} \times \text{Rs.}690/- = \text{Rs.}6900/-$

VI. PROVIDING SEPERATE METERING TO 44 NOS CLASS-III RESI. QUARTERS & CLASS-IV SERVENTS QUARTERS:

There are 12 Nos. class-III quarters & 32 Nos. class-IV quarters having connected load of 18KW & 32KW respectively. Supply to these quarters was un-metered which led to uncontrolled use of energy by the occupants thereby leading to consumption of energy much more than the requirement. Hence separate meters to each occupant through separate MSEB service connection were provided, which saved 50 KW of the bldg. and also reduced the M.D. by 25KW (Considering 50% Diversity).

(a) Providing separate metering is not contributed to Conservation of Energy directly. But due to reduction in 50 KW load saved the MD charges & also due to reduction of load on the system supply of the building, system losses are reduced which resulted in saving in some quantum of units. For this entry form saving in

Units due to these losses only are considered.

(b) Considering average 100 units energy consumption by each occupant, reduction in units consumption per month = $44 \text{ Qtrs.} \times 100 \text{ units} = 4400 \text{ Units/ month} = 52800 \text{ units/ Year}$

Saving in Rupees = $52800 \times \text{Rs.}3.90 = \text{Rs.}2.06 \text{ Lakhs / Yr.}$

(c) Considering 50% diversity factor, reduction in M.D. for 50KW load = **25KW**

Saving in Rupees = 25KVA x 12M x Rs.330/- = **Rs.1.00 Lakh.**

Total saving achieved = Rs.2.06 + Rs.1.00 = **3.06 Lakh.**

Investment for 44 Nos. Qtrs. for providing separate metering = **Rs.3.50Lakh**

Also providing separate meters brought awareness among the occupants to use the energy precisely, as the bill is being directly charged to them which ultimately helped in achieving awareness about energy conservation.