



**SRI LAKSHMI NARAYANA**  
**INSTITUTE OF MEDICAL SCIENCES**  
(RECOGNIZED BY MEDICAL COUNCIL OF INDIA & AFFILIATED BY BHARATH UNIVERSITY)

## **ENERGY AUDIT**

### **ENERGY AUDIT 2022**

This Audit has been conducted by a Committee constituted by the Experts & Scientists from different reputed Institutes. The Committee developed a questionnaire for audit based on the regulatory & statutory requirements of Central as well State. The basic data was gathered & compiled, which the committee analyzed. By and large, the audit reveals a healthy environment inside SLIMS campus. The committee has suggested short term as well as long-term suggestions for improved environmental conditions about energy efficiency to a higher levels and authorities and all stakeholders of the University conforms that they will give due attention and utilize opportunities for identified improvements. Energy Audit is a process of systematic, documented, periodic and objective evaluation of components of Energy sources with the aim of safeguarding the environment and natural resources in its operations. It aims to analyse environments within and outside of the concerned area, which will have an impact on the eco-friendly atmosphere. Energy audit is a valuable means for a university to determine how and where they are using the most energy or other resources; the university can then consider how to implement changes and make savings. It can create to resources consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Energy save impact on their area of work. This includes all emissions to air; land and water; legal constraints; the effects on the neighboring community; landscape and ecology; the public's

Constraints; the effects on the neighboring community; landscape and ecology; the public's perception of the operating company in the local area. SLIMS seeks to become a centre of excellence by providing its students a comprehensive education with special emphasis on responsible citizenship, secular outlook, moral values and abiding faith in Environmental ethics expressed in active concern for others. On analyzing the average power consumption graph in The Slims campus, it was noted that a minimum of 25 KW power is consumed daily. There are days, on which average consumption exceeds 30 KW. Thus, it was very essential to reduce the power consumption, which we obtain from the conventional form with renewable energy resources. Solar energy was adopted as an alternate way for reducing the maximum power consumption from the powerhouses.



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### **ENERGY AUDIT 2021**

Hospital buildings are large energy consumers in many countries. In order to evaluate energy saving possibilities in such facilities an energy audit was conducted in a typical Hospital campus. The audit objective was to provide background for similar applications in all Hospital facilities. The ever-increasing energy costs and environmental concerns make paramount the rational use of energy and the energy conservation acts. Attention must be paid both in the industry and the building sectors. The last has attracted considerable interest in large scale, country wide, and in small scale, for example residential, commercial and hospital buildings. The audit implementation mode and recommendations may serve as a guide for audits in Hospital campuses country-wise and/or to form a basis for estimations of energy saving investment possibilities in the Hospital sector.

### **NEED FOR ENERGY AUDIT:**

In any building, the three top operating expenses are often found to be energy (both electrical and thermal), labour and materials. If one were to relate to the manageability of the cost or potential cost savings in each of the above components, energy would invariably emerge as a top ranker, and thus energy management function constitutes a strategic area for cost reduction. Energy Audit will help to understand more about the ways energy and fuel are used in any building, and help in identifying the areas where waste can occur and where scope for improvement exists. The Energy Audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programs

Which are vital for production and utility activities. Such an audit programme will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a “Bench-mark” (Reference point) for managing energy in the building and also provides the basis for planning a more effective use of energy throughout the Campus.

## **OBJECTIVE OF ENERGY AUDIT IN THIS HOSPITAL BUILDING:**

### **The Objectives of the study are to:**

- Develop a suitable tool for energy audit for SLIMS
- Review the energy related activities in SLIMS
- Measurement and quantification of energy consumption by all utility areas at SLIMS
- Identify areas of energy wastage at SLIMS
- Establishing of energy balance
- Identification of energy improvements opportunities

- Development of energy management's proposals
- Preparation of standard operating practices for efficient use of energy at SLIMS
- Create energy conservation awareness among the end users.

### **Actions adopted in this audit:**

- Visual inspection and data collection
- Observations on the general condition of the facility and equipment and quantification
- Identification / verification of energy consumption and other parameters by
  - Measurements
  - Detailed calculations, analyses and assumptions
  - Validation
  - Potential energy saving opportunities
  - Implementation

### **Field work:**

- The mechanical and electrical systems are examined in order to verify that their implementation, operation and use correspond to that designed.

- The most essential factors affecting energy use, the present operating situation and the most important savings potential are investigated.

- The staff and occupants at the site are guided on matters related to energy use.
- The most obvious operational energy saving measures is carried out immediately
- Data collection forms are a helpful reminder while checking and writing results.

### **Detailed Reporting:**

- Includes a comprehensive description of the Hospital Building
- The number of lights, fans, computers and air conditioners, their type and their hours of usage were noted down. The power consuming equipment in the laboratory were identified and listed.
- Details of the equipment like name of the equipment, hours of usage per day were collected and recorded.
- Data regarding the type of lights, fans, computers, and air conditioners, their numbers and hours of usage per day and their location were collected and listed out.
- Introduces all profitable energy saving measures in detail, including some comments on implementation, saving calculations, cost estimates
- Ranks the saving measures according to e.g. simple payback time

## Analysis of Data:

On analyzing the average power consumption graph in The Slims campus, it was noted that a minimum of 25 KW power is consumed daily. There are days, on which average consumption exceeds 30 KW. Thus, it was very essential to reduce the power consumption, which we obtain from the conventional form with renewable energy resources. Solar energy was adopted as an alternate way for reducing the maximum power consumption from the powerhouses.

ENERGY AUDIT SEQUENCE

| SNO | DESCRIPTION OF AREA               | POSSIBLE SAVING       | SAVING KWH   | COST SAVING<br>PER MONTH |
|-----|-----------------------------------|-----------------------|--------------|--------------------------|
| 1   | TRANSFORMER IN COMING LOAD FACTOR | 76%                   | NOT POSSIBLE | 0                        |
| 2   | INDUCTION MOTOR LOAD / EE MOTORS  | NOT APPLICABLE        |              | 0                        |
| 3   | HEATERS LOAD                      | BY SOLAR WATER HEATER | 9600 KWH     | 57600                    |
| 4   | CABLE DISRTIBUTION                | NOT APPLICABLE        |              |                          |
| 5   | POWER FACTOR IMPROVEMENT          | 0.93 - 0.99           | 40           | 6300                     |
| 8   | COMPRESSED AIR                    | NOT APPLICABLE        |              | 0                        |
| 9   | COMPRESSED AIR SYSTEM             | NOT APPLICABLE        |              | 0                        |
| 10  | HVAC AND Refrigeration system     |                       | 50 KWH       | 7875                     |
| 11  | Centrifugal Pump application      | NOT APPLICABLE        |              |                          |
| 12  | FAN AND BLOWERS                   | NOT APPLICABLE        |              |                          |
| 13  | VFD APPLICATION                   | NOT APPLICABLE        |              |                          |
| 14  | LIGHTING SYSTEM BY LED BULBS      | 150                   | 6000         | 31500                    |
| 15  | DG SET PERFORMANCE                | 2 NOS                 | NOT POSSIBLE | 103275                   |
|     | TOTAL COST SAVING APROXIMATELY RS |                       |              |                          |

*V. Thirunavukarasu*  
**V. THIRUNAVUKARASU, B.E., MBA,**  
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### **Advantages of Energy Audit:**

- To develop to more efficient resource management.
- To provide basis for improved sustainability.
- To create a GHG free campus.
- Recognize the cost saving methods through Energy minimizing and Managing.
- Energy auditing should become a valuable tool in the management and monitoring of environmental and sustainable development.

### **CAMPUS SURVEY:**

Energy audit forms part of a resource management process. Although they are individual events, the real value of energy audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy, pollution and also economic efficiency. All these indicators are assessed in process of Energy Auditing of educational institute“. Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute’s energy and integrate environmental considerations into all contracts and services considered to have significant environmental impacts.

The Audit covered the following major areas:

1. Sources of Energy
2. Consumption of Energy
3. Cost of Energy
4. Energy Efficiency and Energy Management



| MONTHLY POWER CONSUMPTION FY-20-21 |        |        |      |       |
|------------------------------------|--------|--------|------|-------|
| MONTH                              | KWH    | KVAH   | P.F  | M.D   |
| Apr-20                             | 216300 | 228600 | 0.95 | 536   |
| May-20                             | 247500 | 220744 | 0.95 | 572.6 |
| Jun-20                             | 220044 | 220838 | 0.94 | 516.4 |
| Jul-20                             | 230030 | 236300 | 0.93 | 528.6 |
| Aug-20                             | 194380 | 212520 | 0.91 | 505.6 |
| Sep-20                             | 193680 | 210240 | 0.92 | 475.8 |
| Oct-20                             |        |        |      |       |
| Nov-20                             |        |        |      |       |
| Dec-20                             |        |        |      |       |
| Jan-21                             |        |        |      |       |
| Feb-21                             |        |        |      |       |
| Mar-21                             |        |        |      |       |
| AVERAGE                            | 216410 | 221589 | 0.93 | 582.4 |

  
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### **ENERGY AUDIT 2020**

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for ecosocial aspect.

Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipment's, using high efficiency equipment and change of habits which causes enormous wastages of energy.

By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to being self-sufficient in electricity requirement. In the present study, college electricity audit has been done. In this study considered practical laboratory, instrument, Fans, air conditioners, Computers etc are considered in this study. We have studied total budget of the college, total economic investment of college on the electricity and total generation electricity from the solar wind hybrid electricity generation unit. Also, we have studied total saving of electricity and money from solar wind generation and requirement of solar energy. Also, it is studied that exact

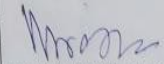
contribution of bulb, fans, computer, instruments etc in the total requirement of electricity. We studied all these mentioned things by collecting exactly data form survey.

**Analysis:**

On analyzing the average power consumption graph in The Slims campus, it was noted that a minimum of 25 KW power is consumed daily. There are days, on which average consumption exceeds 30 KW. Thus, it was very essential to reduce the power consumption, which we obtain from the conventional form with renewable energy resources. Solar energy was adopted as an alternate way for reducing the maximum power consumption from the powerhouses.

**ENERGY AUDIT SEQUENCE**

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|--|-----------------------------------|-----------------------|--------------|--------------------------|
| 1  | TRANSFORMER IN COMING LOAD FACTOR | 76%                   | NOT POSSIBLE | 0                        |
| 2  | INDUCTION MOTOR LOAD / EE MOTORS  | NOT APPLICABLE        |              | 0                        |
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| <b>TOTAL COST SAVING APROXIMATELY RS</b> |                                   |                       |              |                          |

  
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## Average KWH/MD/PF

- Transformer capacity = 630KVA
- Sectioned KVA Demand = 500KVA
- Recorded Demand Average = 475 KVA
- Recorded KWH Average = 182331
- Recorded PF Average = 0.93 Lag

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## Component of Electricity Billing

1. Energy charges RS -5.25/ KWH
2. Max Demand Charges RS- 250 / KVA
3. Sales TAX 5% on energy charges
4. Surcharges 2.64 on energy + MD charges
5. Meter rent RS - 500 / month

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**ENERGY SAVING ACTIVITY YEAR-2020-21**

| S.NO | TYPE OF LIGHT FITTINGS            | AREA          | QTY | KW LOAD         |
|------|-----------------------------------|---------------|-----|-----------------|
| 1    | LED LIGHT                         | STREET LIGHT  |     |                 |
|      |                                   | POOL LIGHT    | 120 | 2.2             |
| 2    | LED TUBE                          | BLOCKC        |     |                 |
|      |                                   | AND BACK AREA | 120 | 5.2             |
|      | MOTOR LOAD(PUMPS)                 | BLOCK ABCD    | 4   | 20              |
| 3    | AUTO WATER TANK LEVEL             |               |     |                 |
|      | CONTROLLER PROVIDED               |               |     |                 |
|      | <b>SAVING</b>                     |               |     | <b>27.4 KW</b>  |
|      | <b>ENERGY SAVING FOR THE YEAR</b> |               |     | <b>78912KWH</b> |

  
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**Recommendation:**

Replace all CFL Tube light using LED Bulb, to save more power.

Replace CRT monitor using LED or LCD monitor.

**Summary of Energy Auditing:**

The communication process for awareness in relation to energy conservation is found inadequate.

Assessment of electrical load calculation is yet to be done by the university.

Monthly use of electricity in the university is very high.

Objectives for reducing energy, water and fuel consumption are meager.

There are fans and Tube light of older generation and non-energy efficient which can be phase out by replacing with new energy efficient fans and tubes.

Regular monitoring of equipment and immediate rectification of any problems.

**Follow Up Action and Plans:**

Energy Audits are exercises which generate considerable quantities of valuable management information.

The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organization and that action plans and implementation programs result from the findings.

Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organizational priorities and the passing of time.

## **Conclusion and Recommendations:**

The green and environmental audit assists in the process of testing performance in the environmental arena and is fast becoming an indispensable aid to decision making in a university. The energy audit reports assist in the process of attaining an ecofriendly approach to the sustainable development of the university. Hope that the results presented in the energy auditing report will serve as a guide for educating the university community on the existing environment related practices and resource usage at the university as well as spawn new activities and innovative practices. A few recommendations are added to curb the menace of waste management using ecofriendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus sustainable environment and community development. It has been shown frequently that the practical suggestions, alternatives, and observations that have resulted from audits have added positive value to the audited organization. An outside view, perspective and opinion often helps staff who have been too close to problems or methods to see the value of alternative approaches. An energy audit report is a very powerful and valuable communications tool to use when working with various stakeholders who need to be convinced that things are running smoothly and systems and procedures are coping with natural changes and modifications that occur.

## **General Recommendations:**

All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like lights, fans, computers and projectors.

Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So, that all stakeholders are encouraged to save the electricity.

Most of the time, all the tube lights in a class room are kept on, even though, there is sufficient light level near the window opening.

In such cases, the light row near the window may be kept off.

All projectors to be kept OFF or in idle mode if there will be no presentation slides.

All computers to have power saving settings to turn off monitors and hard discs, say after 10 minutes/30 minutes.

The Power Factor to reduce the utility power bill.

Most utility bills are influenced by KVAR usage.

A good Power Factor provides a better voltage.

Reducing the pressure on electrical distribution network.

Reducing cable heating, cable over loading and cable losses.

Reducing over loadings of control gears and switch-gears etc





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Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also it can be said as “the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems”. The energy audit is key to a systematic approach for decision making in the area of energy management. It attempts to balance the total energy inputs with its use, and serve to identify all the energy streams in a facility.

By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to being self-sufficient in electricity requirement. In the present study, college electricity audit has been done. In this study considered practical laboratory, instrument, Fans, air conditioners, Computers etc are considered in this study. We have studied total budget of the college, total economic investment of college on the electricity and total generation electricity from the solar wind hybrid electricity generation unit. Also, we have studied total saving of electricity and money from solar wind generation and requirement of solar energy. Also, it is studied that exact contribution of bulb, fans, computer, instruments etc in the total requirement of electricity. We studied all these mentioned thinks by collecting exactly data form survey.

#### **OBJECTIVES:**

##### **Primary: --**

- 1) The first objective is to acquire and analyze data and finding the necessary consumption pattern of these facilities.
- 2) The second objective will be to calculate the wastage pattern based on the results of the first objective.
- 3) The final objective is to find and implement solutions that are acceptable and feasible.

**Secondary: -**

- 1) This would be our first exposure to this field hence experience gain would be vital.
- 2) This project will precede many follow up projects and hence helps to gain technical and management exposure required for future energy projects.
- 3) It is sure to help create a repertoire of vital contacts hence will develop interaction with alumni, faculty and students.

**NEED FOR ENERGY AUDIT:**

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SATHVIK SOLAR

INVOICE

ORIGINAL FOR BUYER

SATHVIK SOLAR



Regd. office :  
Old No.18, New No.39, South Usman Road,  
T.Nagar, Chennai - 600 017 , Tamil Nadu.  
Email Id: sathviksolar@gmail.com  
PH:044-22425838, Mobile: 08939406424

To  
Sree Lakshmi Narayana Institute of Medical Sciences  
Osudu, Agaram Village, Villianur-Gommune  
Kudupakkam Post, Puducherry - 605 502

Invoice No: SS/02 Date: 05.03.2016  
D.C. No: 02 Date: 30.01.2016  
P.O.No. Verbal  
Lorry No.  
TIN No : 33096288358

| Description of Goods  | Quantity | Rate             |    | Amount           |           |
|---|----------|------------------|----|------------------|-----------|
|   |          |                  |    |                  |           |
| 8000 Litres per day Solar water heater system<br>(ETC - INSTITUTION 500 x 16 units) | 1        | 1,142,857        | 00 | 1,142,857        | 00        |
|   |          | <b>Sub-Total</b> |    | 1,142,857        | 00        |
|   |          | CST-5%           |    | 57,143           | 00        |
|   |          | <b>Total</b>     |    | <b>1,200,000</b> | <b>00</b> |

Total Value in words:- Twelve Lakhs Rupees only

Certified that the Particulars given above are true and correct and the amount indicated represents the price actually charged and that there is no flow of additional consideration directly or indirectly from the buyer.

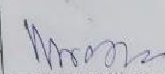
For SATHVIK SOLAR

*Dinesh B. E.*  
Authorised Signatory

E.&O.E.


### ENERGY AUDIT SEQUENCE

| SNO                               | DESCRIPTION OF AREA               | POSSIBLE SAVING       | SAVING KWH   | COST SAVING PER MONTH |
|-----------------------------------|-----------------------------------|-----------------------|--------------|-----------------------|
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### MONTHLY POWER CONSUMPTION FY-19-20

| MONTH   | KWH    | KVAH   | P.F  | M.D   |
|---------|--------|--------|------|-------|
| Apr-19  | 171760 | 177140 | 0.97 | 401   |
| May-19  | 173060 | 179900 | 0.96 | 401.6 |
| Jun-19  | 176300 | 184200 | 0.96 | 454   |
| Jul-19  | 196300 | 204200 | 0.96 | 461.2 |
| Aug-19  | 190020 | 200000 | 0.95 | 480   |
| Sep-19  | 193380 | 206560 | 0.94 | 505.4 |
| Oct-19  | 211420 | 227660 | 0.93 | 608.2 |
| Nov-19  | 167120 | 181260 | 0.92 | 531.2 |
| Dec-19  | 211413 | 227760 | 0.93 | 535.2 |
| Jan-20  | 167120 | 181255 | 0.92 | 511.2 |
| Feb-20  | 142052 | 151256 | 0.91 | 377.8 |
| Mar-20  | 136585 | 197722 | 0.95 | 475   |
| AVERAGE | 216410 | 221589 | 0.93 | 459.2 |

  
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OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM POST,  
PUDUCHERRY - 605 502.

Date: 16/11/2015

Ref: Quotation dated 15/11/2015

To,

SATHVIK SOLAR

New No: 39, Old No: 18, South Usman Road  
T Nagar, Chennai 600017  
TIN: 33096288358

Sub: Purchase order for 8000 Liters Per Day Solar water heater System  
(ETC - INSTITUTIONAL 500 x 16 units)

Dear Sir,

Here by consider this order as confirmation of Solar water heater system for capacity of  
8000 LPD (i.e 500 LPD X 16 Nos)

Total value of system is **Rs.12,000,00 (Twelve Lakhs rupees only).**

4 Solar water heater systems will be installed separately (2000 liters / day capacity each) 2 in boy's  
hostel and 2 in ladies hostel.

Terms and conditions:

1. Above price including VAT.
2. Transportation and Packing included.
3. Installation and commissioning
4. 1 Year Guarantee and 5 Years warranty
5. Inlet water tank under SLIMS scope of work

Payment terms:

- a. 60 % advance payment
- b. 25% payment towards supply of material
- c. 15 % towards installation and commissioning of the system

Thanking you

For Sri Lakshmi Narayana Institute of Medical Sciences

General Manager

Phone : Off :0413 - 2661978. Fax :0413 - 2661996. e-mail : slims\_h@yahoo.com

# ENERGY ADUIT REPORT

*for*

## **Sri Lakshmi Narayana Institute of Medical Sciences**

OSUDU, AGARAM VILLAGE, VILLIANUR COMMUNE, KUDAPAKKAM  
POST,

PUDUCHERRY – 605 502.

**FY: (2022 – 2023)**

*Audited by,*

**V. Thirunavukkarasu BE, MBA**

Certificate No.: 4056

Reg. No.: EA 6397

## **SRI GURU ENGINEERS**

Plot No.6, Elangoadigal Street, Santhi Nagar, Lawspet, Puducherry – 605 008.

Ph : 0413-2250895 / Cell : 9655828895



## ENERGY AUDIT SEQUENCE

| <b>SL. NO</b> | <b>DESCRIPTION OF AREA</b>           | <b>Remarks</b>    | <b>Page No.</b> |
|---------------|--------------------------------------|-------------------|-----------------|
| 1             | TRANSFORMER AND LOAD FACTOR          |                   | 2               |
| 2             | INDUCTION MOTOR LOAD / EE MOTOR      | NOT APPLICABLE    |                 |
| 3             | HEATER LOAD                          | NOT APPLICABLE    |                 |
| 4             | CABLE DISTRIBUTION                   | NOT APPLICABLE    |                 |
| 5             | POWER FACTOR IMPROVEMENT             |                   | 5               |
| 6             | HARMONICS STUDY                      | WITHIN THE LIMITS | 7               |
| 7             | AIR COMPRESSOR & DISTRIBUTION SYSTEM | NOT APPLICABLE    |                 |
| 8             | HVAC AND REFRIGERATION SYSTEM        |                   | 9               |
| 9             | CENTRIFUGAL PUMP APPLICATIONS        | NOT APPLICABLE    |                 |
| 10            | FAN AND BLOWERS                      | NOT APPLICABLE    |                 |
| 11            | VFD APPLICATION                      | NOT APPLICABLE    |                 |
| 12            | COOLING TOWER PERFORMANCE            | NOT APPLICABLE    |                 |
| 13            | LIGHTING SYSTEM                      |                   | 12              |
| 14            | DG SET PERFORMANCE                   |                   | 13              |
| 15            | SOLAR POWER                          |                   | 14              |
| 16            | RECOMMENDATIONS & COMMENTS           |                   | 15              |

# **TRANSFORMER AND LOAD FACTOR**

## **Transformer Efficiency**

|                               |   |        |
|-------------------------------|---|--------|
| Total Loss at 50% Load        | = | 5302W  |
| Total Loss at 100% Load       | = | 15750W |
| Transformer Efficiency at 50% | = | 99%    |

## **Average KWH/MD/PF**

|                         |   |          |
|-------------------------|---|----------|
| Transformer capacity    | = | 2000 KVA |
| Sanctioned KVA Demand   | = | 1250 KVA |
| Recorded Demand Average | = | 472 KVA  |
| Recorded KWH Average    | = | 189921   |
| Recorded PF Average     | = | 0.92 Lag |

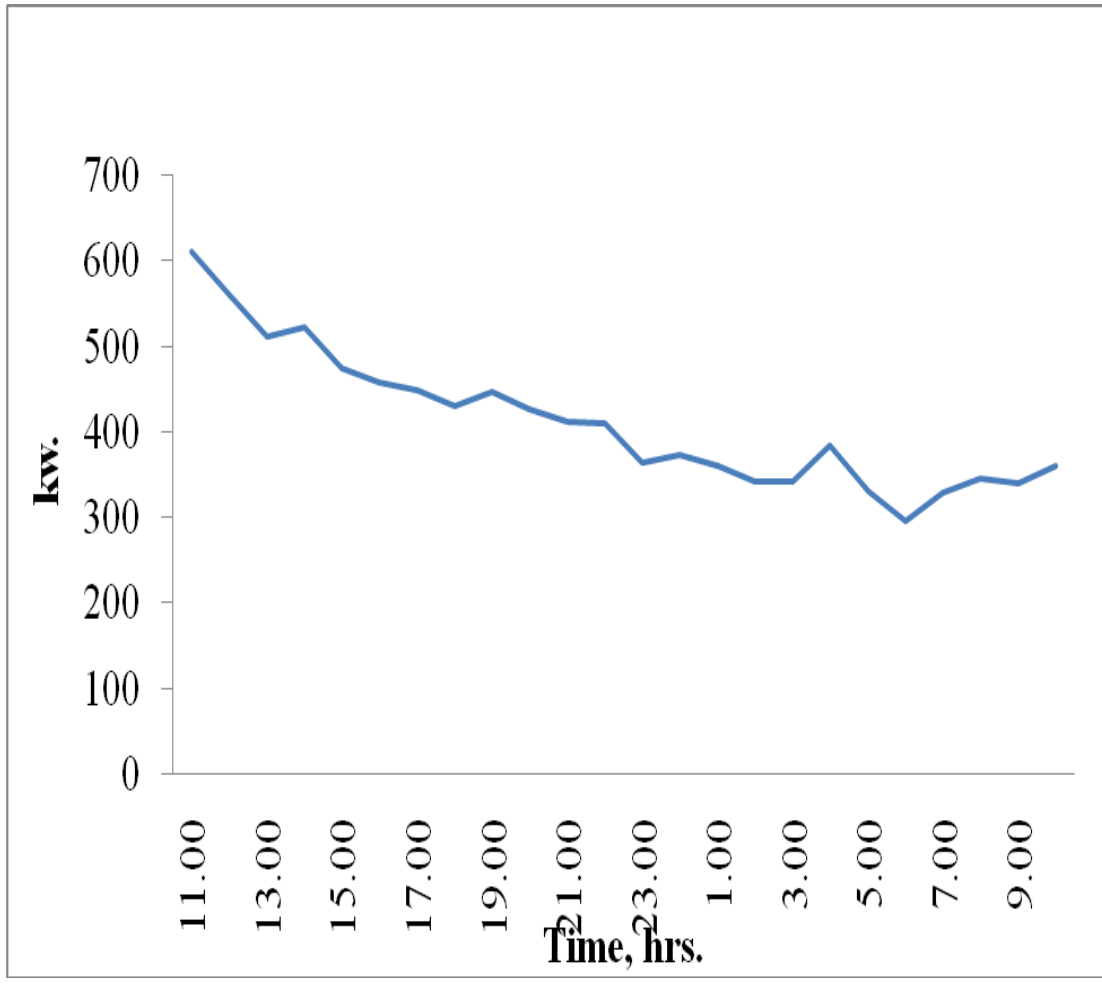
## **Component of Electricity Billing**

|                                       |   |                               |
|---------------------------------------|---|-------------------------------|
| Energy charges (unit.kwh)<br>Billing) | = | Rs.5.45/KWH (As per           |
| Max Demand Charges                    | = | Rs.420/KVA                    |
| BPSC Charge 2%                        | = | Bill Amount X 2% X no of days |

-----  
30

| <b>Daily Load Pattern in kw - 24Hrs</b> |           |
|---|-----------|
| <b>Time</b>                             | <b>KW</b> |
| 11.00                                   | 610       |
| 12.00                                   | 561       |
| 13.00                                   | 510       |
| 14.00                                   | 522       |
| 15.00                                   | 474       |
| 16.00                                   | 457       |
| 17.00                                   | 447       |
| 18.00                                   | 430       |
| 19.00                                   | 446       |
| 20.00                                   | 426       |
| 21.00                                   | 411       |
| 22.00                                   | 410       |
| 23.00                                   | 363       |
| 0.00                                    | 373       |
| 1.00                                    | 359       |
| 2.00                                    | 341       |
| 3.00                                    | 341       |
| 4.00                                    | 384       |
| 5.00                                    | 330       |
| 6.00                                    | 295       |
| 7.00                                    | 329       |
| 8.00                                    | 344       |
| 9.00                                    | 340       |
| 10.00                                   | 360       |

## LOAD CURVE



## POWER FACTOR IMPROVEMENT

Automatic Power Factor Controller installed

Power Factor Setting = 0.99 Lag

50 KVAR Capacitor = 6 Nos.

25 KVAR Capacitor = 4 Nos.

**Note:** All Capacitors have Individual Control Total

Capacitor Installed = 400 KVAR.

PF should improve from 0.92 to 0.99 for save maximum demand 40kVA/Month, Monthly cost saving is Rs.16800 in monthly EB Bill.

### **Comments:**

The performance of the capacitor should monitor – monthly once, by Record the current reading of individual capacitor unit. If below 50 % of actual current, it should replace by New.

### Monthly Power Consumption F.Y. 22-23

| <b>MONTH</b>   | <b>KWH</b>    | <b>KVAH</b>   | <b>P.F</b>  | <b>M.D, KVA</b> |
|----------------|---------------|---------------|-------------|-----------------|
| April-22       | 153120        | 164420        | 0.93        | 414             |
| May-22         | 172500        | 184780        | 0.93        | 408             |
| June-22        | 160680        | 173580        | 0.93        | 416             |
| July-22        | 150700        | 164180        | 0.92        | 380             |
| August-22      | 152500        | 164800        | 0.93        | 386             |
| September-22   | 182960        | 199720        | 0.92        | 512             |
| October-22     | 229440        | 252140        | 0.91        | 506             |
| November-22    | 160120        | 178020        | 0.9         | 492             |
| December-22    | 219060        | 242540        | 0.9         | 428             |
| January-23     | 219720        | 240880        | 0.91        | 514             |
| February-23    | 207620        | 224460        | 0.92        | 576             |
| March-23       | 270640        | 290080        | 0.93        | 636             |
| <b>AVERAGE</b> | <b>189921</b> | <b>206633</b> | <b>0.92</b> | <b>472</b>      |

## **HARMONICS STUDY**

- Harmonics are created by various device like diodes, silicon controlled rectifiers, PWN systems, thyristors, voltage and current chopping, Saturated and core reactors, induction and arc Furnaces are also deployed for various requirements and due to their varying impedance characteristics the NON LINEAR device can cause distortion in voltage and current wave forms.
- The above devices are not used in our system so that harmonics Frequency may be varying negligible.

## **HVAC AND REFRIGERATION SYSTEM**

- 5 x 5 = 25 TR refrigeration system is running for cooling system
- Energy saving is possible by VFD system fix in AHU 5 nos.
- In AHU will be running by VFD save energy,



## LIGHTING SYSTEM

Sub.: we have changed old type CFL/FOCUS lamp and tube light fittings replaced by LED Lamps/fittings

| Sl. No. | Type of Light Fittings          | Area              | Qty. Nos. | T. Power, W |
|---------|---------------------------------|-------------------|-----------|-------------|
| 1       | LED Down Lamp fittings 36W      | Ground floor      | 380       | 1368W       |
| 2       | LED Light fittings 22W          | Ground floor      | 133       | 2926W       |
| 3       | LED 24W Fittings                | Hospital          | 295       | 7080W       |
| 4       | 2 x 20W Tube Light LED fittings | Hospital & Hostel | 3000      | 120000W     |
| 5       | 20W LED Single Fittings         | Hospital & Hostel | 1100      | 22000W      |
| 6       | 10W LED Bulb                    | Hospital & Hostel | 60        | 600W        |

**Total KW = 264**

LED Focus and LED tube light fittings installed in Hospital & College Hostel area. We have saved energy in 167 units per day.

Energy savings per year = 60,120 units

Cost savings per year = Rs.300600

## **DG SET PERFORMANCE**

### **DG set 250 KVA 2nos**

- 250kva DG Set-I Generate 3.5 units/Ltr diesel.
- 250kva DG set –II Generate 3.3 units/Ltr diesel.
- At max Load of 160 KW generation, the efficiency should be 3.8-4 Units/Ltr.
- By service the DG set, Engine can improve in fuel savings.

# SOLAR POWER

## Proposal Stage – I

1. Use 10kW Solar Power for lighting circuit in the office and Hospital

Energy Production from Solar in 10kw = 80 kwh /day  
= 2400 kwh/mth

Cost saving per year = Rs. 156960

Initial Investment = Rs.5,00,000

Pay Back Period = 3 years

2. Solar Heater Installed 50LPH capacity 10 Nos

The replacement of electrical heaters.

The saving of 70 Kwh/day

Monthly saving =  $70 \times 30 = 2100$  Units.

Yearly power saving = 25200 Units

Cost Saving = 137340/-

3. Solar street Light 24W Installed 30 nos for the replacement of 150w Focus Lamps.

The energy saving =  $37.8$  Units per day  $\times 30$  days = 1134 Units

Yearly savings = 13608 Units

Yearly Cost savings = Rs.73483

## RECOMMENDATIONS & COMMENTS

| Sl. No. | Description   | RECOMMENDATIONS & COMMENTS                          |
|---------|---|---|
| 1       | Sanction Load /<br>Connected Load /<br>Maximum Demand | Within Standard Limits                              |
| 2       | Power Factor  | To improve 0.96 to 0.99                             |
| 3       | Lighting System                                       | To be Replace By LED                                |
| 4       | HVAC  | By Cleaning of Heart Exchanger<br>Yearly Once.      |
| 5       | Automatic Power Factor<br>Control                     | to set power factor in controller to<br>be 0.99 Lag |
| 6       | Lighting ON / OFF                                     | Timer Relay to be provide                           |
| 7       | Solar Power   | 10kW for Light and Fan Load for<br>Stage - 1        |