

ENVIRONMENT AUDIT

STUDY PERIOD (TWO YEARS) 2021 – 2022 & 2022 - 2023

Sustainability study
AUDIT REPORT

Studied for
Gokhale Education Society's
**R.H. Sapat College of Engineering,
Management Studies and Research**

Prin. T. A. Kulkarni Vidyanagar, College Road,
Nashik Pin. 422 005, Maharashtra, India

Studied in the capacity of
Accredited and Certified GBP



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Disclaimer

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The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole depending on the decision taken by the internal team. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh who is as an Accredited and Certified Green Building Professional-Architect. Green Building consultancy is her forte and she is one of the most sought after names when it comes to providing excellent quality services within the stipulated time frame.

The Study is conducted in capacity of Accredited & Certified Green Building Professional with extensive experience.

Greenvio Solutions

Developing Healthy and Sustainable Environments

We are an Environmental and Architectural Design Consultancy firm

Sustainable Academe is our department for conducting Audits

Palghar District, Maharashtra- 401208

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Acknowledgement

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Our heartfelt thanks are extended to the Chairperson of the entire process **Dr. Prafull C. Kulkarni** (Principal) for the valuable inputs.

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Sustainable Academe

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1. Introduction

1.1 About the Institution

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- *Leadership: To set standards in our teaching learning process*
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- *Excellence: To strive relentlessly and constantly improving ourselves, to achieve the best*
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1.2.1 Vision

The Institute proposes

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- *To develop these college as Academy Of Higher Learning in the field of Engineering and Technology*

1.2.2 Mission

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- *To nurture creativity and critical thinking in applying engineering skills to face the fast growing globalisation*
- *To develop Holistic personality of the learners to make this Institute as a lead centre of research*

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1.3.1 Affiliations

The College has all its courses approved and affiliated to the **Savitribai Phule Pune University**, formerly the University of Poona, is a collegiate public state university located in the city of Pune, India.

1.3.2 Approvals

- Approved by **All India Council for Technical Education (AICTE), New Delhi**
- Approved by **Directorate of Technical Education, Maharashtra**

1.3.3 Certification

The institute has received the following Certifications

- AISHE – The code is C-41921
- ISO 9001:2015 Certification

1.3.4 Accreditation

National Assessment & Accreditation Council (NAAC) - The College received a CGPA of 2.94 with a 'B++ Grade' in its first cycle of Accreditation in 2019.

The College shall enter its second cycle of NAAC in 2027.

2. Overview

2.1 Summarised Populace analysis for 2022-2023

2.1.1 Students data

The data (shared by the Institute) shows there were **1,401 male and 754 female students.**

2.1.2 Staff data

S. No.	Type	Male	Female	Total
1	Admin staff	05	02	07
2	Teaching staff	73	23	96
3	Non-Teaching staff	21	01	22
Total Staff Members		99	26	125

Table 1: Staff data of the Institution for 2022-2023

The staff data shows the Institute premises had **125 Staff Members.**

2.2 Summarised Populace analysis for 2021-2022

2.2.1 Students data

The data (shared by the Institute) shows there were **1,383 male and 809 female students.**

2.2.2 Staff data

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Table 2: Staff data of the Institution for 2021-2022

The staff data shows the Institute premises had **125 Staff Members.**

3. Research

3.1 Site Area

The **site area is 10 acres**

3.2 About the Green Building Study Audit

It is a systematic study of the aspects which make the Institution sustainable and healthy premises for its inhabitants.

3.3 Analysis of the Green Building Study Audit

The procedure included detailed verification as follows:

- Investigation
- Technical
- Observations
- Inferences

3.4 Strategy adopted for Green Building Study Audit

The strategies included data collection from the admin department, actual inventory, investigation to check the operation and maintenance, analysis of the data collection, and preparation of the Report.

4. Investigation



Plate 1: Investigation of the spaces and facilities



Plate 2: Soar panels and Composter in the premises

5. Documentation

5.1 Open Spaces

The campus has three types of pocket landscapes with potted and natural plantations; additionally being a shared campus with multiple institutes there are recreational spaces available as well. ***The study suggests that, boards identifying these spaces as 'BREAKOUT ZONE' and 'GREEN ZONE' can be displayed around the site.***

5.2 Flora audit

A flora survey was carried out to identify the total numbers of plants and trees. The landscape area has a variety of plantations the details of the same documented by internal team.

S. No.	Plant name	Type	Nos.	Planted by
1	<i>Neem</i>	Tree	10	Grown naturally
2	<i>Pipal</i>	Tree	1	Grown naturally
3	<i>Mango</i>	Tree	3	Grown naturally
4	<i>Hattifal</i>	Tree	1	Grown naturally
5	<i>Mahogani</i>	Tree	4	Grown naturally
6	<i>Rakt Chandan</i>	Tree	1	Grown naturally
7	<i>Badam</i>	Tree	8	Planted by staff, students
8	<i>Putranjiwa</i>	Tree	4	Grown naturally
9	<i>Spathodia</i>	Tree	3	Grown naturally
10	<i>Silver Oak</i>	Tree	3	Grown naturally
11	<i>karanj</i>	Tree	2	Grown naturally
12	<i>Wad</i>	Tree	1	Grown naturally
13	<i>Chandan</i>	Tree	1	Grown naturally
14	<i>Bottle palm</i>	Tree	4	Grown naturally
15	<i>Custard Apple</i>	Tree	1	Grown naturally
16	<i>Ardhi Supari</i>	Tree	12	Planted by staff, students
17	<i>Shisaw</i>	Tree	1	Grown naturally

18	<i>Kanchan</i>	Tree	5	Grown naturally
19	<i>Kailaspati</i>	Tree	2	Grown naturally
20	<i>Amala</i>	Tree	1	Grown naturally
21	<i>Vilayati Chinch</i>	Tree	1	Grown naturally
22	<i>Ficus</i>	Tree	33	Planted by staff, students
23	<i>Malabar Palm</i>	Tree	2	Grown naturally
24	<i>Exxora</i>	Tree	18	Planted by staff, students
25	<i>Gumohar</i>	Tree	3	Grown naturally
26	<i>Fan Plam</i>	Tree	4	Grown naturally
27	<i>Chafa</i>	Tree	2	Grown naturally
28	<i>Pimparni</i>	Tree	1	Grown naturally
29	<i>Morpankhi</i>	Shrub	22	Planted by staff, students
30	<i>Hibiscus</i>	Shrub	2	Grown naturally

Table 3: Details of the Flora in the premises

At present there are more than 156 numbers of plantations in the premises. All of these are planted by the on various occasions and some have grown naturally.

5.3 Fauna audit

There are varieties of biodiversity available as fauna in the premises.

Fauna	Types
Birds	Dove, Green bee eater, Drongo, Sparrow, Swallow, Pied indian Robin, Copper smith, Warbler, Iora
Insects	Butterflies, moth
Reptiles	Garden Lizard

Table 4: Details of the fauna in the premises

5.4 Noise Audit

On a macro level the Institute is surrounded by sister Institutes in an area comprising over 50 acres of land; thereby making space a commercial/ industrial/ traffic related noise free zone.

5.5 Carbon Footprint Audit

5.5.1 Heat Island Reduction

The campus is located in an urban area, but there are thousands of green plantations that provide a shaded area that is cool and free of direct exposure to sun rays or heat wave phenomena; there due to the huge extent of green cover, there is no heat island effect.

5.5.2 Outdoor Light Pollution Study

The Institute compound lights are not upward looking thus, these do not cause light pollution.

5.6 Fire Safety

Fire and life safety are an important consideration of the National Building Code 2016. This aspect is touched upon as part of this study in the capacity of an Architect registered with the Council of Architecture. As part of the research, fire safety audit was considered from the 'Building systems' perspective. ***There are extinguishers (with Board), hose reel, fire tank as measures. These should continue and can be improved.***

6. Observations

6.1 Investigative suggestions

The following suggestions can be implemented *in next 1.5 years* from the date of the Report submission.

➔ Extra care for the rooftop areas

- Introduce the signboards about 'No students are allowed to enter this area'
- Increase the height of parapet walls
- Upgrade the space as cool roof by painting it with cooltop material.
- Undertake feasibility study of before and after temperature reading.
- Take precautions to keep terrace areas free of any kind of storage materials

➔ Messages on the beam area

Include quotes and messages from eminent personalities all over the premises on beam for inspiration and beautification.

➔ Inspirational timelines on the blank interior facades

Include quotes, messages, timelines, details about specific subject or career prospects in the interior areas for inspiration and beautification.



Reference suggestions 1: Sample about display board

7. Inferences

7.1 Section-wise suggestions

The following suggestions can be implemented *in next 2.5 years* from the date of the Report submission.

7.1.1 Site beautification

- **Beautification of the entrance pathway** - The existing bricks (waste from the existing new construction going on) can be used or upgraded the pathway through an appropriate Landscape Architecture design.
- **Bird house/ Feeders** - At appropriate locations there can be provisions for drinking water and some grains for birds as they visit the site much frequently.
- **Garden development** - The existing open space should be designed as an Architectural landscape.
 - *Nursery documentation, expansion and beautification* – The premises should have a nursery, details can be decided as per the landscape beautification.
 - *Scientific name plates and QR codes* – The team should undertake a project to have name plates with QR codes on every plant of the premises.
- **Architectural landscape and streetscape features such as:**
 - *Speed limit signage*
 - *Speed breakers*
 - *Parking mirror*
 - *Dedicated paved walkway*
 - *Outdoor landscape lights*
 - *No parking signboards at dedicated locations*
 - *Direction sign board*
 - *Post box*
 - *First aid box*

7.1.2 Heat island reduction

Cool rooftops - The Terrace rooftops should be painted with Cooltop – reflective materials to reflect the harsh sun rays and reduce the heat absorption in the top most floor and surrounding areas of the building.

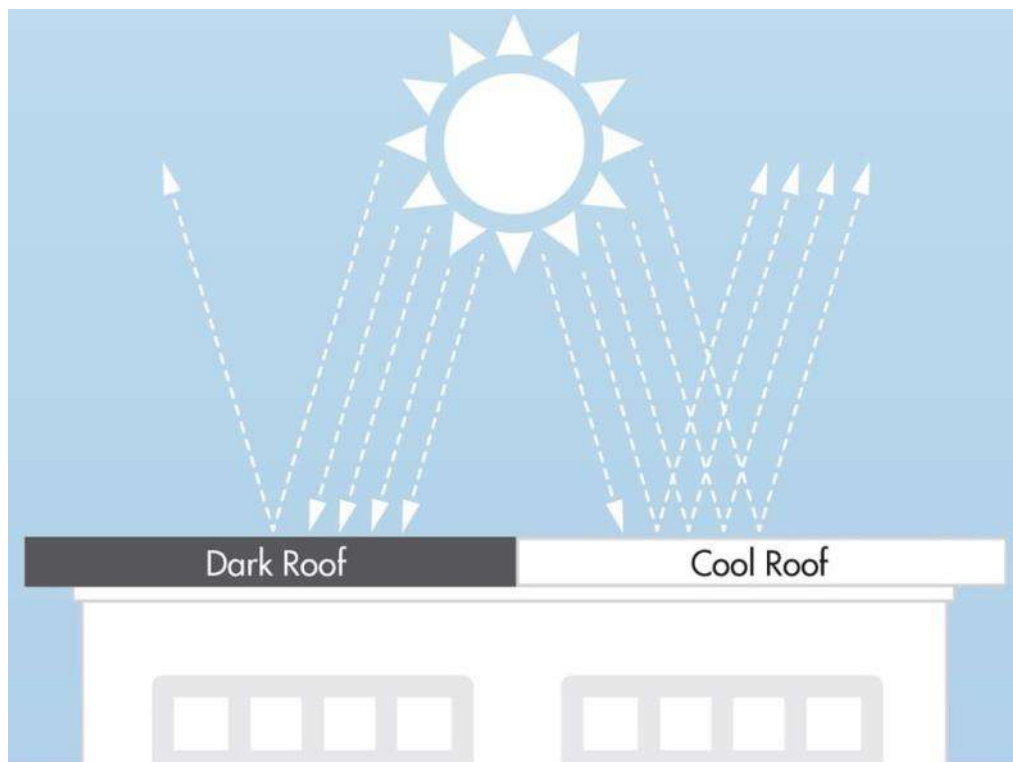


Plate 3: Cool roof comparative analysis (For reference purpose only)

Source: Image by <https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387>

7.1.3 Life safety

- **Fire station** – A dedicated fire station could be established within the premises as part of the Fire and Life safety practices.
- **Combustible equipment** - Every space which has a gas cylinder, air conditioner or combustible equipment should have a provision for the barricade around the gas cylinders, appropriate safety board's mentioning 'danger sign' and 'Do not touch' with an additional small fire extinguisher close by.
- **Awareness** - Fire layouts in immediate spaces outside the lift, on the staircase landing, signages mentioning 'Do not use lift in case of fire' additionally fire exit signages, boards should be put up at all possible locations.

7.1.4 Pollution Control

- ➔ **Vehicle usage** - Restricting the speed limit of vehicles on the premises to 10 km per hour, not honking on the premises will help in maintaining the sound in control and emphasis on a silent zone.
- ➔ **Promote the use of Eco-friendly vehicles** - There can be student and staff sensitization program on eco-friendly and battery-operated vehicles/ low emission vehicles for daily use.
- ➔ **Internal circulation** – (applicable only to large campuses) – There could be an e-vehicle for public transportation that can be used by the stakeholders for internal circulation.
- ➔ **Battery charging points for Eco-friendly vehicles** - There can be provision for battery charge points, this would inspire students to change their mode of transportation and adopt sustainable practices.
- ➔ **Avoid burning waste** - The waste produced on the premises should not be burned as it is dangerous to the health of students and staff
- ➔ **Bicycles as a gift** - As an appreciation gesture maybe the student's toppers/ staff best performers can be awarded a bicycle occasionally.
- ➔ **Avoid using plastic in premise** - There should be a provision for a ban on the use of plastic bags or products on the Premise.
- ➔ **Paperless technologies for offices** - The Institute can go technology-friendly and go paperless in the functioning of premises to a certain extent maybe not fully.

8. Compilation

The study is based on the data collected, analyzed, rechecked, and confirmed through multiple modes. For the quality study, some standards/ notes have been referred to. These are listed and noted below. However, no direct references have been used anywhere. These are used as a base to analyze and study the data collected.

- ➔ Uniform Plumbing Code – India, 2008
- ➔ IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
- ➔ IGBC Green Landscape Rating system, March 2013
- ➔ BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
- ➔ Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.

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2.1.1 Students data

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4. Investigation



Plate 1: Investigation of the spaces and facilities



Plate 2: Solar panels and Composter in the premises

5. Documentation

5.1 Primary sources of energy consumption

- **Electrical (Metered)** – Light, Fans, Equipments, Pumps comprise these sources.
- **Renewable energy** – There are '**96 nos. of SOLAR PANELS**' as sources of **renewable energy** available.

5.2 Secondary sources of energy consumption

The premise uses batteries, UPS as backup for administrative purposes. The details of the existing sources are documented below:

S. No.	Name	Nos.
1	UPS	12
2	Batteries	192
3	Gas cylinders	2

Table 3: Details of secondary sources of energy consumption

5.3 Actual electrical consumption as per bills

The information was shared for the meters:

S. No.	Month	Year	(A) Total units consumed	(B) Solar units generated	(C = A-B) Gross units after deduction
1	June	2021	1,640	1,516	124
2	July	2021	2,520	1,715	805
3	August	2021	6,640	3,445	3,195
4	September	2021	6,080	2,624	3,456
5	October	2021	6,560	1,761	4,799
6	November	2021	5,680	3,293	2,387
7	December	2021	4,680	3,111	1,569
8	January	2022	7,320	2,855	4,465

9	February	2022	7,040	3,679	3,361
10	March	2022	4,040	311	3,729
11	April	2022	8,360	5,889	2,471
12	May	2022	9,080	2,869	6,211
13	June	2022	9,000	2,670	6,330
14	July	2022	10,000	3,060	6,940
15	August	2022	12,560	3,037	9,523
16	September	2022	10,463	2,781	7,682
17	October	2022	10,066	3,802	6,264
18	November	2022	11,081	3,615	7,466
19	December	2022	10,374	3,218	7,156
20	January	2023	8,942	3,292	5,650
21	February	2023	9,388	2,983	6,405
22	March	2023	10,749	3,675	7,074
23	April	2023	11,565	3,912	7,653
24	May	2023	14,584	3,992	10,592

Table 4: Details of the electrical consumption

The observation related to above information states:

- ⇒ The **total units** consumed in past two years **~1,98,412 units (Electrical + solar)**
- ⇒ The **average units** consumed every month are **~ 8,267 units (Electrical + solar)**
- ⇒ The **total units** consumed in past two years is **~ 73,105 units (Only solar)**
- ⇒ The **average units** consumed every month are **~ 3,046 units (Only solar)**
- ⇒ **Alternate source of energy is available in form of solar panels on the rooftop.**
- ⇒ **The percentage of energy met by alternate (solar (renewable)) source is very less and comes to around 37%**

5.4 Calculated Electrical Consumption as per inventory

The electricity bills provide actual consumption data. The following is the calculated consumption. It is done to understand the percentage of energy usage in the premises by various applications. It is based on the inventory collected and interviews with the staff.

The additional data such as wattage is taken from market research. In terms of electrical consumption, the main sources are lights, fans, air conditioner, and equipment. The inventory and data collection for sources of energy consumed in the premise is summarised in the following sections.

The following documentation is based on the consumption practice of the premises on a regular working day.

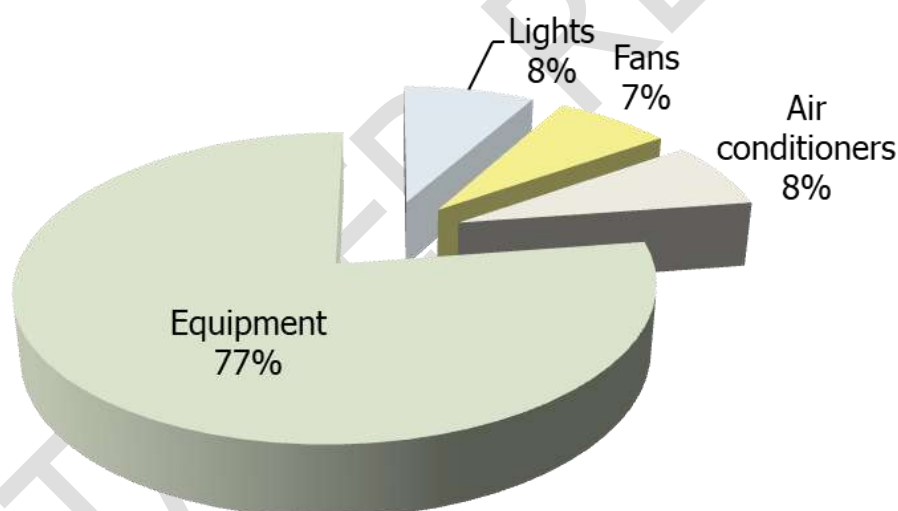


Figure 1: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consume 77% whereas the air conditioners and lights consume 8% while the fans consume 7% of the total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are **717 lights on the premises**; the following table shows the various types of lights on the premises.

S. No.	Type	Nos.
1	LED lights (Energy efficient appliance)	651
2	CFL lights (Non-Energy efficient appliance)	66

Table 5: Summary of the types of lights on-premise

5.5.2 Types of lights based on the power consumption

The energy consumption of lights is **46,068 kWh** of energy.

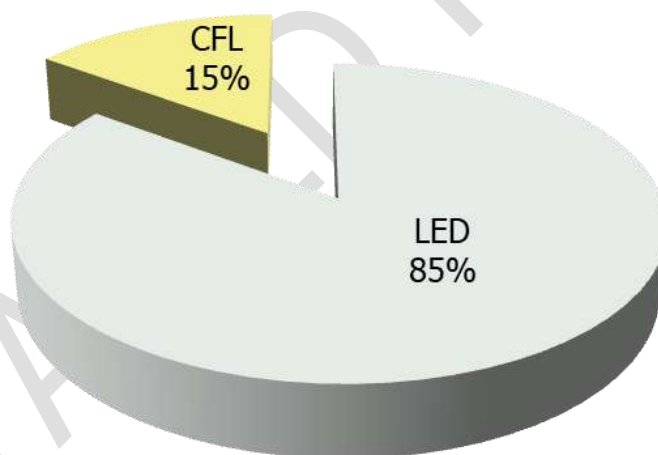


Figure 2: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights on-premises shows **LED lights consume 85%** whereas the **CFL lights consume 15%** of the total power consumed by lights.

5.6 Fans

5.6.1 Types of fans based on the numbers

There are **533 fans** on the premises as follows:

S. No.	Type	Nos.
1	Ceiling fans	518
2	Wall mounted fans	15

Table 6: Summary of the types of fans in the premises

5.6.2 Types of fans based on the power consumption

The energy consumption of fans is **40,790 kWh** of the energy.

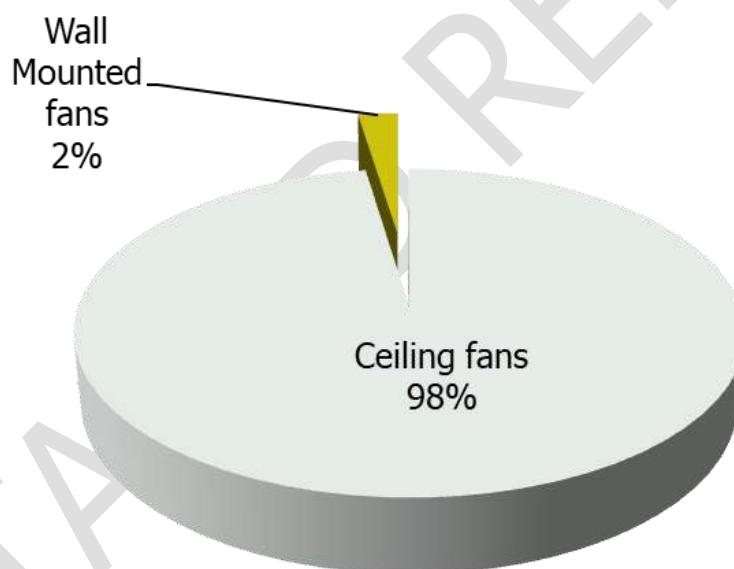


Figure 3: Types of fans based on power consumption

The above analysis shows that the **Ceiling fans consume 98%** whereas the **wall mounted fans** consume 2% of total power consumed by fans.

5.7 Air conditioners

5.7.1 Types of air conditioners based on the numbers

There are **15 air conditioners** on the entire premises.

5.7.2 Building-wise consumption analysis

The energy consumption of air conditioners is **41,819 kWh** of energy.

5.7.3 About the replacement of current air conditioners

- The current air conditioners are well maintained
- Though there is not an immediate requirement for replacement, whenever the Institute undergoes redevelopment there can be provisions for replacement with energy-efficient appliances or new air conditioners that require less power consumption.

5.8 Equipment

5.8.1 Types of Equipment

There are **862 nos. of equipment** in the Educational sector.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **4,39,639 kWh** of energy.

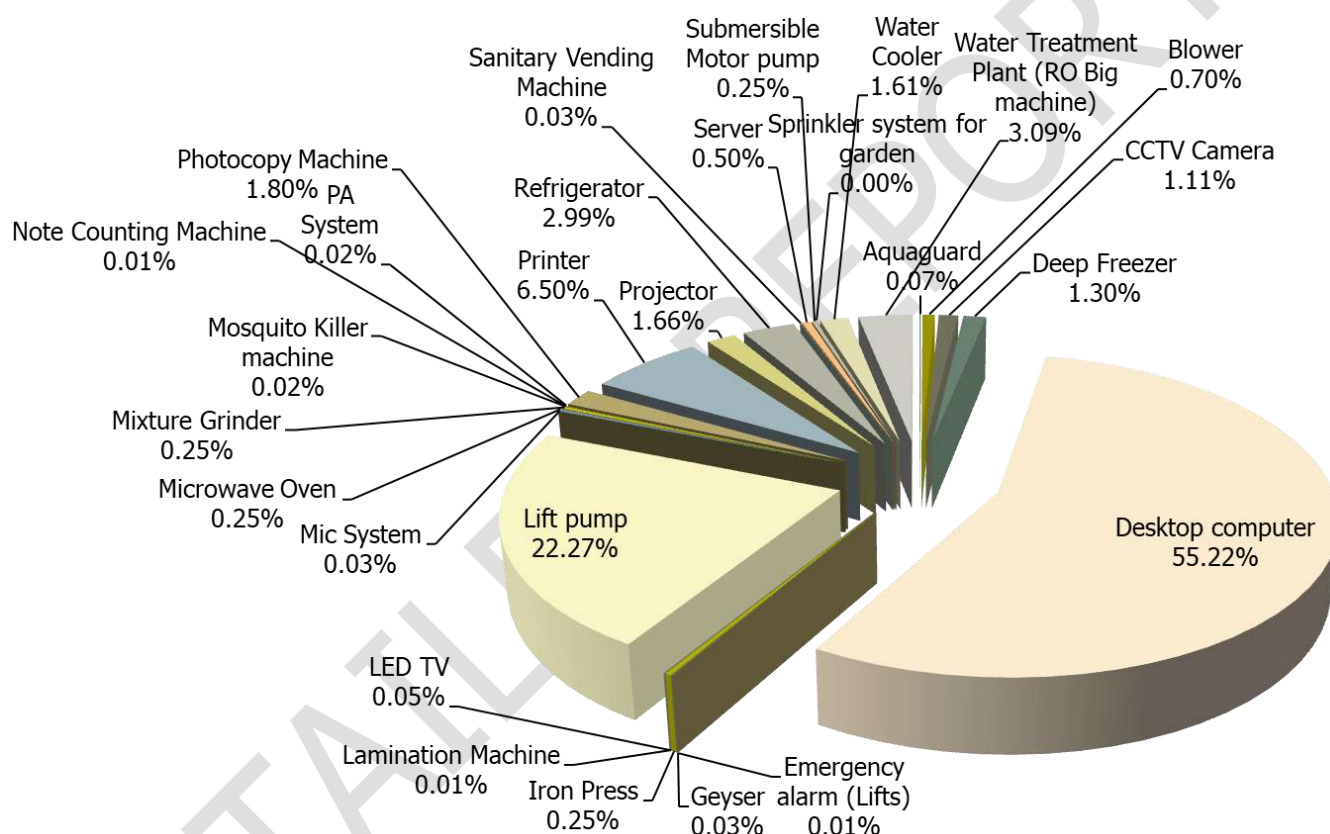


Figure 4: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that the **desktop computer consumes more energy at 55.22%** while the **lift pump consumes 22.27%** whereas the **printer consumes 6.50%** and the **water treatment plant (RO big machine) consumes 3.09%** these are the maximum consumers as compared to other equipment.

6. Observations

6.1 Investigative suggestions

The following suggestions can be implemented ***in next one year***. The Institute can execute a plan after discussion with Project Head.

Certain aspects noted below in red font should be upgraded as per the convenience of the Institute; these are common to the site and can be considered for entire premises wherever there are similar areas.

➔ DG and Transformer area

- Add safety *signages* such as 'Danger-do not touch' etc.
- Add *signboards* about the usage such as 'Transformer areas' and 'Diesel Generator area' etc.
- Every user in this space should compulsorily jacket, helmet, gloves, boots while working and being a part of this space.
- Code the earthing pits in the courtyard.
- Add additional fire extinguishers

➔ General safety aspects

- Rubber flooring in the laboratories to avoid an electric shock.
- Introduce *'PASS' information board* about how to use Fire extinguisher and *'FIRE ZONE' display board* where safety equipments are kept.

7. Inferences

7.1 Section-wise suggestions

The following suggestions are to be considered as a ***first priority*** to be executed within the next 1.5 to 2.5 years from the date of the Report submission.

4.1.1 Electromechanical systems - Electrical and Lighting

Section 1 - Non-LED lights

The current light analysis shows that Non-LED lights consume anywhere between 50W to 54W and even more when in use; these should be replaced with LED lights which consume on an average 12-16W when in use.

Our technical research shows that there would be a reduction of an average of **67% reduction** in energy consumption if replaced with energy efficient appliance.

It will be suggested to either replace these now if the Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

Section 2 - Ceiling fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 45W when in use. These should be replaced with energy efficient fans consuming 14W when in use.

Our technical research shows that there would be a reduction of an average of **69% reduction** in energy consumption if replaced with energy efficient appliance.

It will be suggested to either replace these now if the Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

7.2 General suggestions

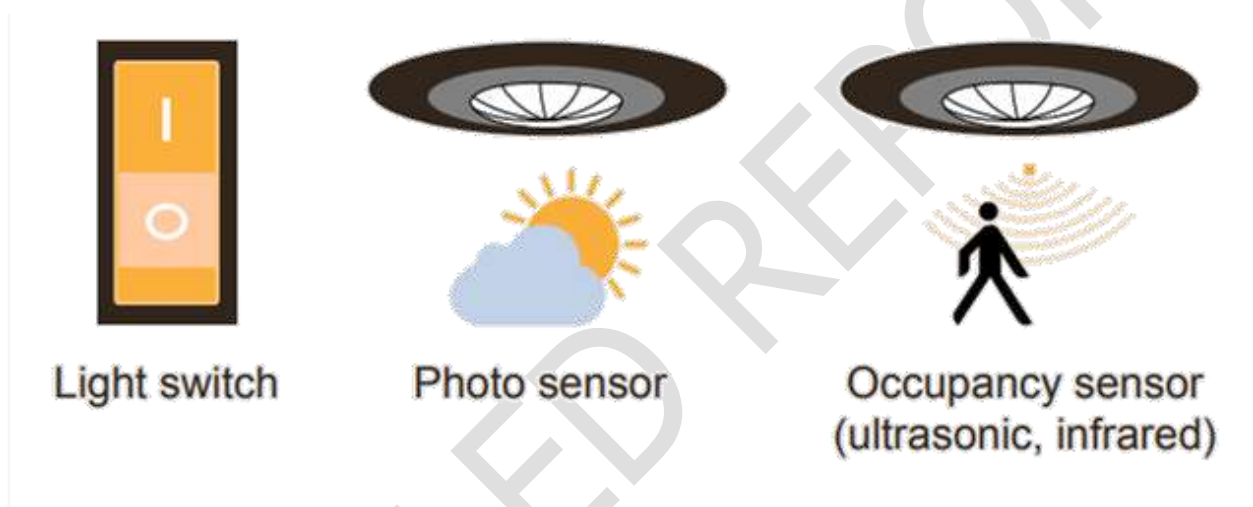
The following are consolidated study related to 'entire Institute' should be considered as **second priority** once section wise recommendations are implemented.

Note: Geothermal mode of energy consumption should be explored

7.2.1 Alternatives towards Smart premises mechanisms

7.2.1.1 Facility management systems, controls

(Includes electromechanical systems – Electrical, Water)



Reference suggestions 1: Understanding the lighting concepts

Source: https://seors.unfccc.int/applications/seors/attachments/get_attachment?code=NG125PFE4WHMWSYAK8TCAKIHMWX0F4QD

The above diagram provides a detailed study of how the system controls should be incorporated in the premises as far as lighting systems are considered. The suggestions for this sub-section are listed below.

- Install PIR control of the lighting in the toilet areas.
- Install low flow taps with automatic shut off in the toilets.
- Install push button timer control in all rooms lighting and ceiling fans.
- Install Power Electronics control of the Foyer notice board lighting.
- Installation of intelligent lighting controller will help in controlling the lighting energy.
- Use of photo sensor switch for street light controlling helps in conserving the lighting energy.

7.2.2 Smart gardening

The Institute can undertake a Smart Gardening system using IoT Technology. This will result in saving time by scheduling time for watering; saving money through automated water schedules tracking dampness of soil to know when, how much water garden needs.



Reference suggestions 2: Solar farm concept for the Institute (For reference purpose only)

Image source: <https://housing.com/news/smart-gardening/>

Data source: <https://www.happysprout.com/inspiration/what-is-smart-gardening/>

DETAILED

8. Compilation

The study is based on the data collected, analyzed, rechecked, and confirmed through multiple modes. For the quality study, some standards/ notes have been referred to. These are listed and noted below. However, no direct references have been used anywhere. These are used as a base to analyze and study the data collected.

Specific references for study related to energy

- ➔ <https://www.energy.gov/eere/buildings/zero-energy-buildings>
- ➔ <https://www.dsaarch.com/zero-net-positive-energy>
- ➔ U.S. Energy Information Administration
- ➔ <https://www.happysprout.com/inspiration/what-is-smart-gardening/>
- ➔ <https://housing.com/news/smart-gardening/>

Gokhale Education Society's
R.H. Sapat College of Engineering, Management Studies and
Research, Nashik-05

Solar Power Generation 30KW Rooftop solar panels

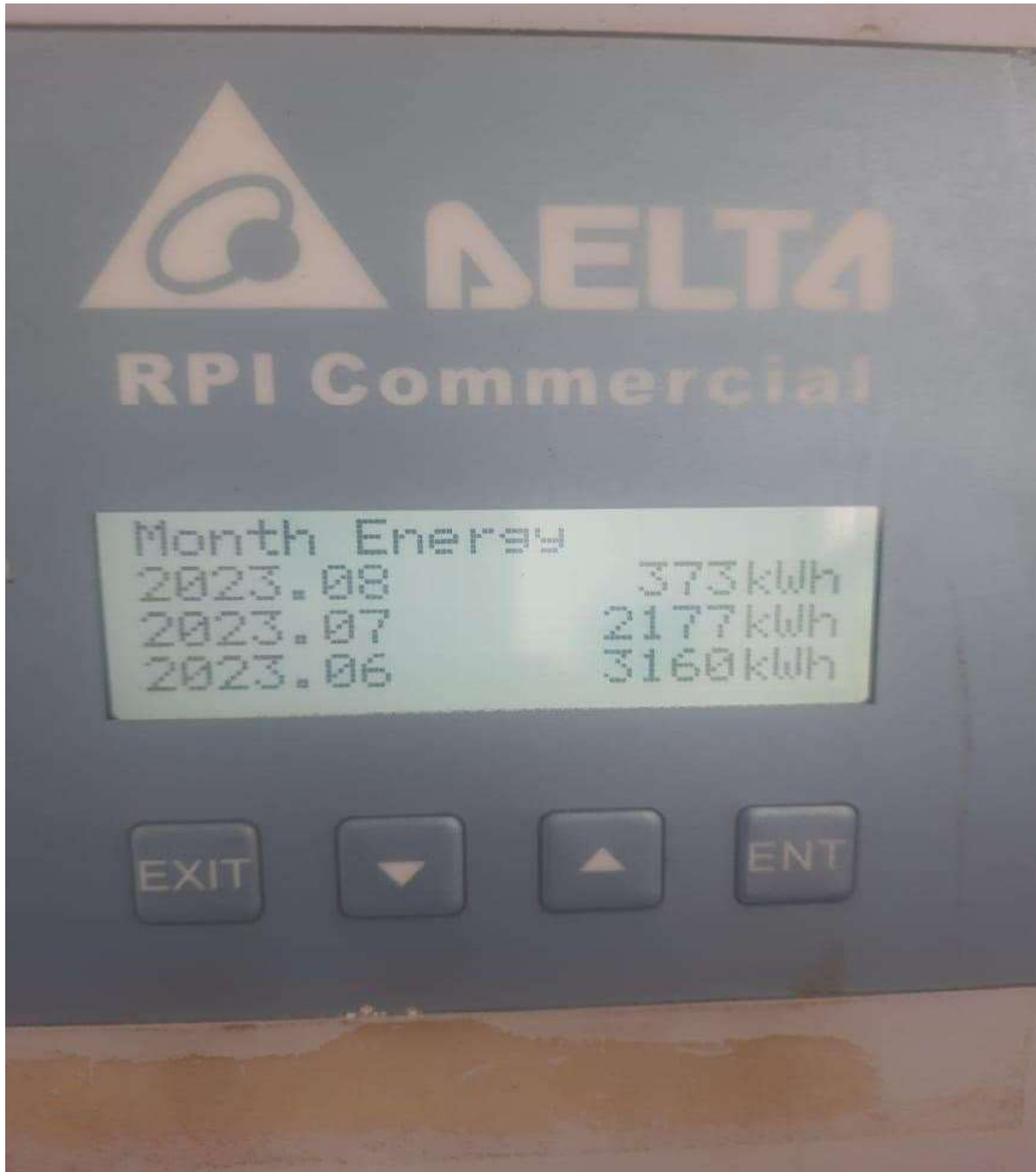


Solar Panels



Solar On Grid System (Net-meter)

Meter Reading at Generation



Meter Reading at Generation



Meter Reading at Generation

Meter Reading at Generation





DELTA

RPI Commercial

Month Energy

2022.11

3615kWh

2022.10

3802kWh

2022.09

2781kWh

EXIT



ENT

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.

URBAN TESTING DIVISION

Phone No- 02532352959

Fax No- 0253 2360120

Email-eetnashik@gmail.com



Office of the Executive Engineer,
Plot No-C -22/23, Near Victor Gasket,
Pole factory, MIDC, Satpur, Nashik.

(A Government of Maharashtra Undertaking)

CIN: U40109MH2005SGC153645

EE/UTD/NSK/Tech/1630

Date: 29 DEC 2017

To,
The Executive Engineer,
M. S. E. D. Co. Ltd.,
Urban I Division, Nashik.

Sub: Verification of Solar PV roof top system in r/o The Principal, College Of Engineering, NVHPT College Complex, Vidya Nagar, College Road, Nashik (Cons. No. 049016705585), NOC thereof.

Ref: 1.Addl.EE/STP/Tech/3853 Dt. 28.12.2017.

2. MSEDCL commercial circular No. 258 Dt. 25.01.2016.

The testing engineers were deputed on Dt. 28.12.2017 to the site of above said Solar PV cell roof top system in r/o The Principal, College Of Engineering. As per the clause no. 6. of commercial circular No. 258 Dt. 25.01.2016, the installation is verified and found ok for islanding from MSEDCL Network in the extert of Failure of MSEDCL supply. However as per

Clause no. 6.2-The consumer is responsible for safe operation, maintenance and rectification of any defect in the installed system up to the point of Net Metering.

Clause No. 6.3: Consumer should maintain the healthiness of isolation system in the event of supply failure..Further it is advised that

1. Consumer should maintain & keep up the earthing electrode provided for P. V. system.
2. No Battery Back-up Inverter supply should be extended to Grid Inverter.
3. Energy meter shall be provided to measure solar generation units at Grid Inverter output for RPO credit etc.

The above verification done in the presence of

MSEDCL Representative -

Mr. Dinesh R Pawar, A.E., UTD, Nashik

Consumer Representative -

Shri. Nagesh S Pande

It is also requested to observe the power flow (Import/Export) in the metering after commissioning of Net Meter at the consumer installation for the first month of billing.

Remark:

1. Net Meter not installed yet.
2. Properly tested & approved Net meter should be provided.

This is submitted for information & n. a. pl.

M.S.E.D.Co.Ltd. URBAN - DN.-1, NASHIK	
Inward No :- 467	Date:- 15/12
Addl. EE (I)	
Dy. EE (I)	
AE (I)	
AE (II)	

S B Kachare
Executive Engineer,
Urban Testing Division,
MSEDCL, Nashik.

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION CO. LTD.
URBAN TESTING DIVISION

Phone No- 02532352959
Fax No- 0253 2360120
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MAHADISCOM

Office of the Executive Engineer,
Plot No-C -22/23, Near Victor Gasket,
Pole factory, MIDC, Satpur, Nashik.

(A Government of Maharashtra Undertaking)
CIN: U40109MH2005SGC153645

EE/UTD/NSK/T/ /2017-180 = 084

Date- 22 JAN 2018

To,
The. Executive Engineer
Urban- I, Division,
MSEDCL, Nashik.

Sub: Testing of 3 Phase CT operated Net meter for solar roof top PV system.

Ref: 1. EE/NUD-I/T/113 (Dated: 11/01/2018)

With reference to the above subject, the meter is tested as per IS 14697-1999 and results are found within limit but the meter is not complying with the following clause of MSEDCL NF-I meter Tech Specification No. CE/MMC/MS-IV/CT operator/NET/ Dated: 20.07.2017

a) Clause No. 6.06.01 (Meter base is not transparent)

Consumer Name: M/s The Principal, College of Engineering, NVHPT college complex,
Vidya Nager, College road, Nashik.

Consumer No: 049016705585

Meter Make: Secure, 3P4W, -/5A, 8000 i/u, CI: 0.5s

Meter Sr. No. : XC463914



S. B Kachare
Executive Engineer,
Urban Testing Division, Nasik.

**TESTING AND QUALITY ASSURANCE LABORATORY,
URBAN TESTING DIVISION,
MSEDCL, NASHIK.**

MAHA

Instrument Sr. No-XC463914.


Page No-2/2

Date of Testing:13/01/2018

Test on limits of error.

Connection-3P4W Terminal : Vn= 240 Volts & Ib = 5 Amp

Value of Current in % and @ PF	Limit +/-	Percentage Error
Test of Starting Condition Vref, 0.1%Ib, UPF +P	Started & continue to registered	OK
Test of Starting Condition Vref, 0.1%Ib, UPF -P	Started & continue to registered	OK
115%Un No Load Test	No Pulse o/p more than 1	OK
Vref, 10%RYB UPF +P	0.5%	0.02%
Vref, 10%RYB 0.5 Lag +P	0.6%	0.17%
Vref, 10%RYB 0.866 Ld +P	0.5%	-0.04%
Vref, 100%RYB UPF +P	0.5%	0.10%
Vref, 100%RYB 0.5 Lag +P	0.6%	0.04%
Vref, 100%RYB 0.866 Ld +P	0.5%	0.00%
Vref, 10%RYB UPF -P	0.5%	0.02%
Vref, 10%RYB 0.5 Lag -P	0.6%	0.14%
Vref, 10%RYB 0.866 Ld -P	0.5%	-0.07%
Vref, 100%RYB UPF -P	0.5%	0.03%
Vref, 100%RYB 0.5 Lag -P	0.6%	0.12%
Vref, 100%RYB 0.866 Ld -P	0.5%	0.00%
Vref 100% RYB 1.0 UPF Dial KWH +P	0.5%	0.13%
Vref 100% RYB 1.0 UPF Dial KWH -P	0.5%	0.15%
Vref, 10%RYB ZPF +Q	1.0%	0.02%
Vref, 10%RYB 0.5 Lag -Q	1.0%	0.01%
Vref, 100%RYB ZPF +Q	1.0%	-0.05%
Vref, 100%RYB 0.5 Lag +Q	1.0%	-0.19%
Vref, 10%RYB ZPF -Q	1.0%	-0.02%
Vref, 10%RYB 0.5 Lag -Q	1.0%	-0.06%
Vref, 100%RYB ZPF -Q	1.0%	0.02%
Vref, 100%RYB 0.5 Lag -Q	1.0%	0.01%
Vref 100% RYB 0.866 Dial RKvah +Q	0.5%	0.03%
Vref 100% RYB 0.866 Dial RKvah -Q	0.5%	0.03%


Checked By
P.B. Dalu


Tested By
D.R. Pawar

METER TEST CERTIFICATE



ial number : XC463914

voltage : 240V CT Ratio : -/5A Accuracy Class : 0.5s Ref. Standard : IS:14697

1. AC VOLTAGE TEST :- PASS
2. TEST OF NO LOAD CONDITION :- PASS
3. TEST OF STARTING CURRENT CONDITION :- PASS
4. INSULATION RESISTANCE TEST :- PASS
5. POWER CONSUMPTION :- PASS
6. TEST OF METERS CONSTANTS :- PASS
7. LIMIT OF ERROR
- 7(a) Conditions-vref = 240V Ib = 5A Amb. Temp. = 77°C +/- 2°C Relative Humidity < 70%.
- 7(b) Errors shown in the tables are given after accounting the error of reference meter.
- 7(c) Reference meter serial no. EWST3S07 class 0.2S traceable to national & international standards.

IMPORT MODE ERRORS

(d) %Active Errors(Balance Mode 3p4w)				(e) %Reactive Errors(Balance Mode 3p4w)		
Load % Ib	0.5 Lag	0.8 Lead	UPF	Load % Ib	0.5 Lag	0.8 Lead
200	0.16	-0.15	-0.03	200	-0.08	0.14
100	0.01	-0.05	0.00	100	-0.01	0.11
10	0.11	0.03	0.05	10	0.02	0.10
5			-0.02	2	-0.04	-0.21
2	0.00	-0.05				
1			0.08			

EXPORT MODE ERRORS

(d) %Active Errors(Balance Mode 3p4w)				(e) %Reactive Errors(Balance Mode 3p4w)		
Load % Ib	0.5 Lag	0.8 Lead	UPF	Load % Ib	0.5 Lag	0.8 Lead
200	0.15	-0.10	0.04	200	-0.08	0.14
100	0.12	0.03	0.05	100	0.07	0.14
10	0.11	-0.01	0.02	10	-0.02	0.09
5			-0.04	2	-0.15	0.05
2	-0.18	-0.08				
1			-0.02			

Date :- 31/10/2017

This is a computer generated test certificate.No signature required.



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www.securemeters.com

Units Consumption of Electricity after reducing solar Units Generated
Case study September 2022 to Jun 2023, Solar Generation 30 KW Plant

Bill Month	Units Consumption of Electricity at Institute	Units Consumption of Electricity after reducing solar Units Generated	Solar Units Generated
Jun-2023	12,889	9729	3,160
May-23	14,584	10,592	3,992
Apr-23	11,565	7,653	3,912
Mar-23	10,749	7,074	3,675
Feb-23	9,388	6,405	2,983
Jan-23	8,942	5,650	3,292
Dec-22	10,374	7,156	3,218
Nov-22	11,081	7,466	3,615
Oct-22	10,066	6,264	3,802
Sep-22	10,463	7,682	2,781
Total	110101	75671	34430

Life Energy E-Total: 185.97 MWH

Run Time: 21,213 Hrs.

Case study for September 2022 to Jun 2023 Comparison of Cost Saving on Energy Bills Using Solar Generation 30 KW Plant

Bill Month	Units Consumption of Electricity at Institute	Units Consumption of Electricity after reducing solar Units Generated (Units)	Solar Units Generated	Bill Amount Paid to MSEDCL in Rs.	Amount Saved with solar generation Rs.
Jun-2023	12,889	9729	3160	1,44,221.28	47400
May-23	14,584	10592	3992	1,57,014.27	59880
Apr-23	11,565	7653	3912	1,18,123.86	58680
Mar-23	10,749	7074	3675	1,03,927.32	55125
Feb-23	9,388	6405	2983	95,923.76	44745
Jan-23	8,942	5650	3292	86,303.80	49380
Dec-22	10,374	7156	3218	1,05,776.03	48270
Nov-22	11,081	7466	3615	1,08,778.54	54225
Oct-22	10,066	6264	3802	92,794.80	57030
Sep-22	10,463	7682	2781	1,11,019.50	41715
Total	110101	75671	34430	11,23,883.16	5,16,450

MSEDCL: Maharashtra State Electricity Distribution Company Limited

Bill Amount Paid for 10 Months to MSEDCL in Rs: **11,23,883.16**

Bill amount Approximately (@15Rs./Unit as per block rate) saved for Solar Generation:
Rs.5,16,450.00

Calculations for carbon dioxide emission reduction Solar Generation 30 KW Plant

Considering average value 0.932 kg of carbon dioxide emission reduction per KWh for the Solar PV plant installed in India.

With 30KW solar generation plant approximate generation is 3000 KWH per month.
The carbon dioxide emission reduction= $0.932 * 3000 = 2796$ Kg per month.
Annually it is reducing $2796 * 12 = 33,552$ kg; That is 33.55 tons of CO₂/ annum.




PRINCIPAL
G.E.S. s R.H. Sapat Collage of Engg.,
Mgt. Studies & Research
Prin. T.A Kulkarni Vidya Nagar, Nashik-5.

