

ENVIRONMENTAL AUDIT REPORT

of
GONDIA EDUCATION SOCIETY'S
S. S. GIRLS' COLLEGE
GONDIA – 441601



Estd. 1970

Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
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MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
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ECN/2022-23/CR-43/1709 10th May 2022

**CERTIFICATE OF REGISTRATION
FOR CLASS 'A'**

We hereby certify that, the firm having following particulars is registered with **MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

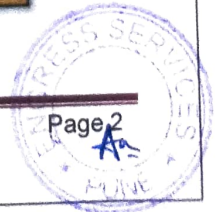
Name and Address of the firm : M/s Egress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktaganj English School,
Parvati, Pune - 411 009

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : *MEDA/ECN/2022-23/Class A/EA-32.*

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

[Signature]
General Manager (FC)



ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Mukhtangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SSG/21-22/03

Date: 18/11/2022

CERTIFICATE

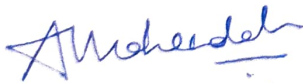
This is to certify that we have conducted Environmental Audit at S.S.Girls' College Gondia in the Academic year 2021-22.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Provision of Separate bins for Dry & Wet Waste
- The College has installed septic tanks and cleans periodically.
- Implementation of Rain Water Management Project
- Creation of awareness by Display of Posters on Resource Conservation

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,



A Y Mehendale,

Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of at S.S.Girls' College Gondia, for awarding us the assignment of Green Audit of their Campus for the Academic Year: 2021-22.

We are thankful to all the Principal and Staff members for helping us during the field study.



EXECUTIVE SUMMARY

1. **S.S.Girls' College Gondia** consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. **Various Pollution due to College Activities:**

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. **Present Energy Consumption & CO₂ Emission:**

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	16629	14.966
2	Maximum	2348	2.113
3	Minimum	753	0.677
4	Average	1385.75	1.247

4. **Various initiatives taken for Energy Conservation:**

- Usage of Energy Efficient LED Lighting
- Maximum Usage of Day Lighting

5. **Usage of Renewable Energy & Reduction in CO₂ Emission:**

- It is recommended to install roof-top solar PV Plant on college building as per availability of funds.

6. **Indoor Air Quality Parameters:**

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	85	59	62
2	Minimum	66	48	51

7. **Indoor Comfort Conditions:**

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	29	43	270	46
2	Minimum	28	41	215	32

8. Waste Management:

8.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized waste collecting agent for further recycling.

8.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

8.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

8.4 E-Waste Management:

It is recommended to dispose E-Waste through Authorized E-Waste collecting agency.

9. Rain Water Management:

The College has installed the Rainwater Management project, the rain water falling on the terrace is collected and is used for increasing the under the underground water level.

10. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Display of Posters on Resource Conservation

11. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases **0.9 Kg** of **CO₂** into atmosphere
2. Average Energy generated by **1 kWp** Solar PV Plant : **4 kWh/Day**
3. Annual Solar Energy Generation Days: **300 Nos**

12. References:

- For CO₂ Emissions: www.tatapower.com
- For Energy Saved by Solar Thermal Water Heating System: www.mahaurja.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LPD	:	Liters per Day
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers



CHAPTER-I INTRODUCTION

1.1 Important Definitions:

1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

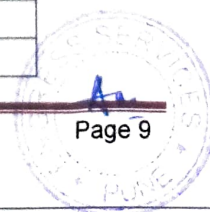
1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Table No-1: Relevant Environmental Laws in India:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Table No-2: Some Important Environmental Rules in India:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules



1.1.6 Table No-3: National Environmental Plans & Policy Documents:

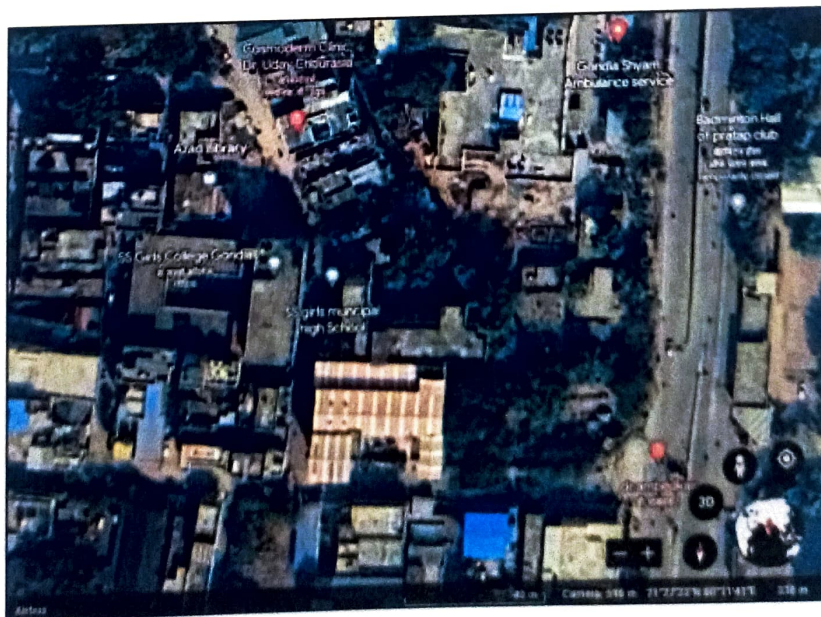
1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. Study Resource Consumption & CO₂ Emissions
2. Study of CO₂ Emission Reduction
3. Study of Indoor Air Quality Parameters
4. Study of Indoor Comfort Condition Parameters
5. Study of Waste Management
6. Study of Rain Water Management
7. Study of Environment Friendly Initiatives

1.3 General Details of College: Table No 4:

No	Head	Particulars
1	Name of Institution	S. S. Girls' College
2	Address	Gondia – 441601 (Maharashtra)
3	Affiliation	Rashtra Sant Tukadoji Maharaj, Nagpur University, Nagpur



CHAPTER-II

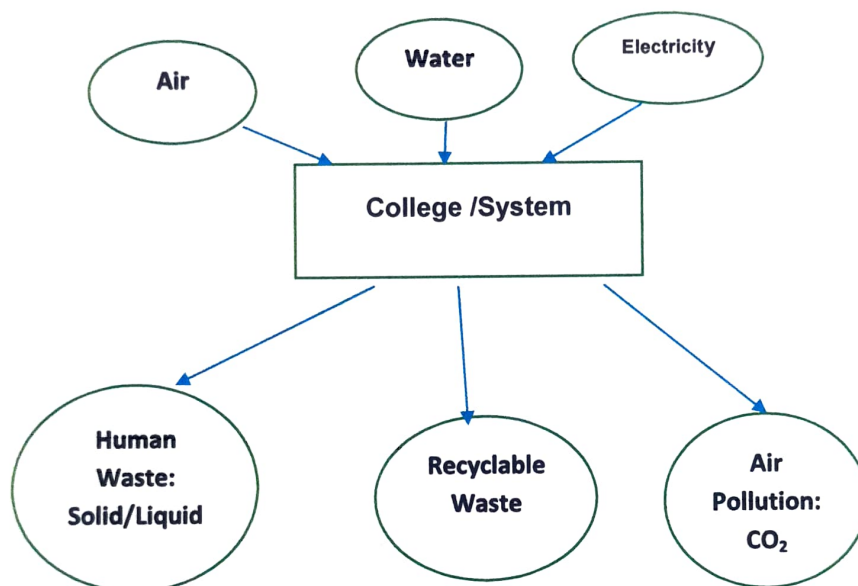
STUDY OF CONSUMPTION OF RESOURCES & CO₂ EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.

Chart No 1: Representation of College as System & Study of Resources & Waste



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy.

The basis of Calculation for CO₂ emissions due to usage of Electrical Energy are as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 2021-22:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	1558	1.402
2	May-21	2348	2.113
3	Jun-21	1527	1.374
4	Jul-21	2160	1.944
5	Aug-21	1860	1.674
6	Sep-21	753	0.677
7	Oct-21	1697	1.527
8	Nov-21	1158	1.042
9	Dec-21	1092	0.982
10	Jan-22	779	0.701
11	Feb-22	795	0.715
12	Mar-22	902	0.811
13	Total	16629	14.966
14	Maximum	2348	2.113
15	Minimum	753	0.677
16	Average	1385.75	1.2471

Chart No 2: Month wise CO₂Emissions:

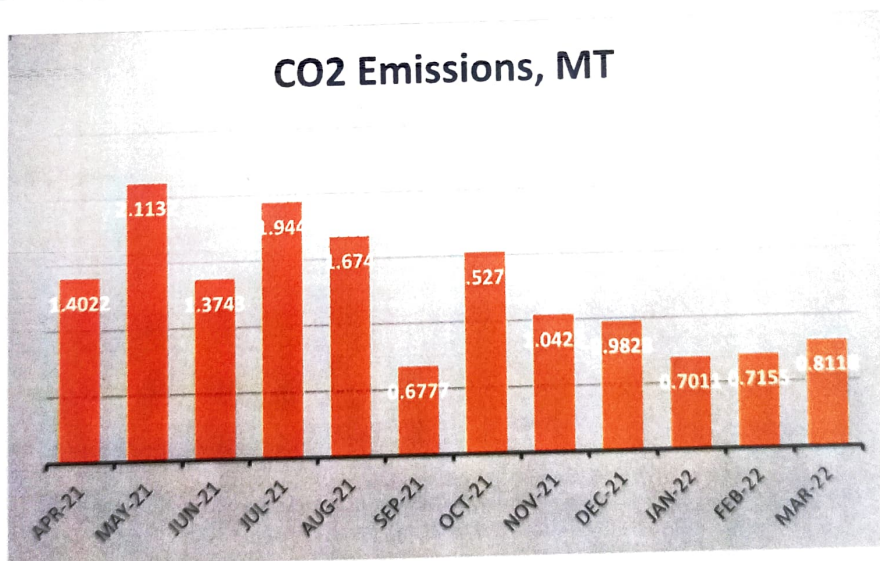


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	16629	14.966
2	Maximum	2348	2.113
3	Minimum	753	0.677
4	Average	1385.75	1.2471

CHAPTER III

STUDY OF CO₂ EMISSION REDUCTION

As on today College has not install solar roof-top PV plant, it is recommended to install solar roof-top plant on the College building.



CHAPTER IV STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 'air pollution' has been defined as **'the presence in the atmosphere of any air pollutant.'**

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the AQI requires an air monitor and an air pollutant concentration over a specified averaging period.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10micron

Table No 8: Indoor Air Quality Parameters:

No	Locations	AQI	PM2.5	PM10
Ground Floor				
1	Principal's Chamber	69	54	52
2	Administrative Block	76	55	54
3	College Library	84	52	52
4	Hindi Department	85	56	56
5	Marathi Department	77	56	54
6	Physical Education Department	75	59	59
7	Girl's Common Room	70	59	62

First Floor				
8	Staff Room – No. 209	71	59	61
9	Class Room (Home Eco) No. 206	73	59	56
10	Class Room No. 203	71	54	51
11	Class Room No. 204	71	53	53
12	Class Room No.110	71	52	53
13	N.S.S. Office	72	53	52
Second Floor				
14	Geography Department	69	49	51
16	Class Room No. 303	68	48	50
17	IQAC Office	68	48	50
18	Class Room No. 305	67	51	52
19	Class Room No. 306	66	52	51
Third Floor				
20	Biology Department	68	52	51
21	Chemistry Department	75	59	53
22	Physics Department	81	57	52
23	Maximum	85	59	62
24	Minimum	66	48	51

CHAPTER V STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit.
The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No 9: Study of Indoor Comfort Condition Parameters:

No	Locations	Temperature (°C)	Humidity (%)	Lux Level	Noise Level (dB)
Ground Floor					
1	Principal's Chamber	29	41	235	46
2	Administrative Block	29	41	260	39
3	College Library	28	43	242	34
4	Hindi Department	28	41	215	46
5	Marathi Department	28	42	220	41
6	Physical Education Department	29	44	241	32
7	Girl's Common Room	29	44	240	44
First Floor					
8	Staff Room – No. 209	28	41	225	44
9	Class Room (Home Eco) No. 206	28	43	270	46
10	Class Room No. 203	28	43	251	45
11	Class Room No. 204	28	43	246	41
12	Class Room No.110	29	43	241	46
13	N.S.S. Office	29	43	244	41
Second Floor					
14	Geography Department	28	43	236	44
16	Class Room No. 303	29	42	250	44
17	IQAC Office	28	42	244	42
18	Class Room No. 305	29	41	241	37
19	Class Room No. 306	28	41	240	35
Third Floor					
20	Biology Department	28	41	240	42
21	Chemistry Department	29	44	245	44
22	Physics Department	28	41	270	41
23	Maximum	29	43	270	46
24	Minimum	28	41	215	32

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

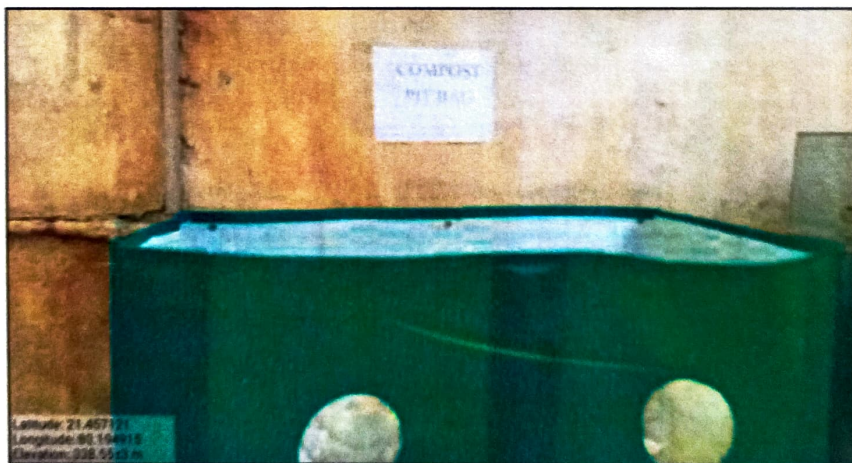
The Waste is segregated at source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

Photograph of Waste Collection Bins:



6.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



6.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

6.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

6.5 Sanitary Waste Incinerator:

The College has not installed Sanitary Waste Incinerator, it is recommended to install the Sanitary Waste Incinerator for sanitary waste disposal.



CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

Photograph of Rain Water Management Pipe:



STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Tree Plantation under NSS Cell:

The College campus is situated in market place and doesn't have enough space for plantation, but college has carried out tree plantation drive outside campus under National Service Scheme.

Photograph of Tree plantation:



8.2 Creation of Awareness about Plastic Ban:

The College has displayed posters emphasizing on importance of Plastic Ban.

Photograph of Poster on Plastic Ban:



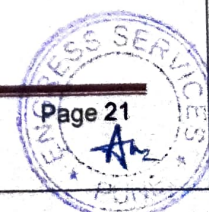
**ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR
COMFORT STANDARDS:**

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between 6.5 to 8.5 Dissolved Oxygen 6 mg/l or more
2	Drinking water source after conventional treatment and disinfection	pH between 6 to 9 Dissolved Oxygen 4 mg/l or more
3	Outdoor Bathing (Organized)	pH between 6.5 to 8.5 Dissolved Oxygen 5 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5



3. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

4. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33°C
2	Humidity	Less Than 70%