

ENVIRONMENTAL AUDIT REPORT

of

AJEENKYA D Y PATIL UNIVERSITY,

Charholi Budruk, Via Lohegaon, Pune 412 105



Year: 2021-22

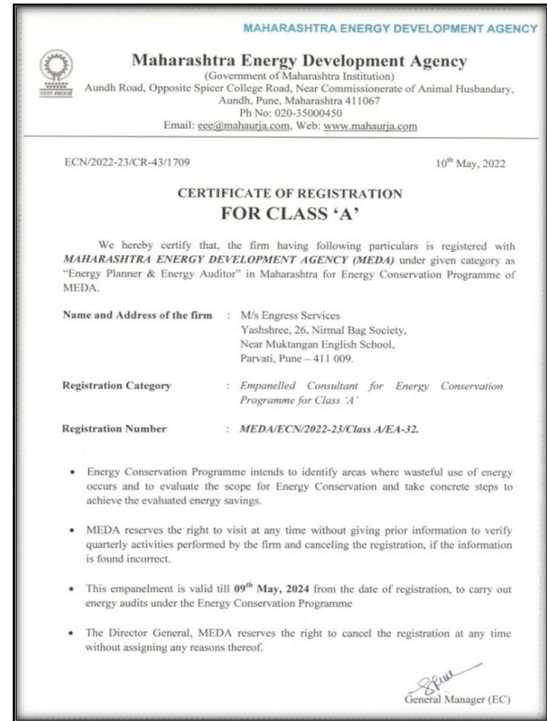
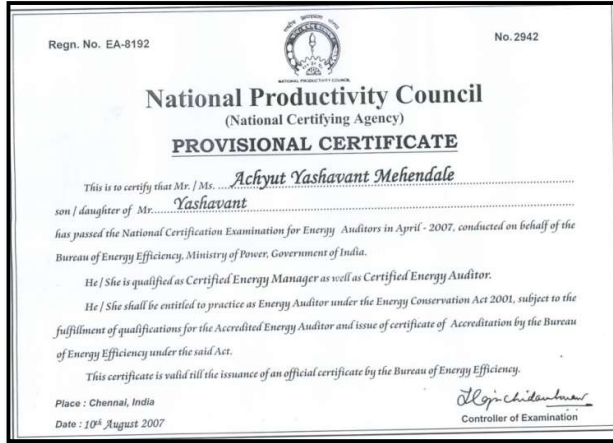
Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com



REGISTRATION CERTIFICATES



BEE AUDITOR CERTIFICATE

MEDA EMPANELMENT CERTIFICATE



ASSOCHAM GEM CP CERTIFICATE

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ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Ajeenkya D Y Patil University, Charholi Budruk Pune 412 105 for awarding us the assignment of Environmental Audit of their Charholi campus for the Academic Year: 2021-22.

We are thankful to all Faculty members & staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Ajeenkya D Y Patil University, Charholi Budruk, Pune 412 105 consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Level of Energy Consumption& CO₂ Emission:

No	Parameter	Energy consumed, kWh	CO ₂ Emissions, MT
1	Total	464070	417.66
2	Maximum	65419	58.88
3	Minimum	15612	14.05
4	Average	38672.50	34.81

3. Pollution caused due to University Activities:

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

4. Usage of Renewable Energy:

- The University has installed Roof Top Solar PV Plant of Capacity **800 kWp**.
- Energy generated by **80 kWp** Roof Top Solar PV Plant is **960000 kWh**
- Reduction in CO₂ Emission in 21-22 is **864 MT**.

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	65	40	52
2	Minimum	43	26	30

6. Indoor Comfort Condition Parameters:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	30.2	45	380	69
2	Minimum	29.1	42	39	37

7. Waste Management:

7.1 Segregation of Waste at Source:

The waste is segregated at source. Separate Dry and Wet waste collection bins are provided at key locations in the campus. It is then further disposed.

7.2 Organic Waste Management:

The organic waste generated is composted in a Bio Composting Pit and the compost produced is used for own garden in the premises.

7.3 Liquid Waste Management:

The University has a Sewage Treatment Plant of Capacity **300 KLPD**, to treat the Liquid Waste. The treated water is used for gardening purpose.

7.4 E Waste Management:

The E Waste is disposed of through Authorized Vendors.

8. Rain Water Management:

The University is installing the project of Rain water Harvesting Project. The Rain Water from the terrace is taken through pipes, filtered and further used for increasing the underground water table.

9. Eco Friendly Practices:

- Maintenance of Internal Garden
- Creation of awareness by Display of posters on Energy conservation

10. Assumptions:

1. Energy consumption is computed based on Load Utilization Factor
2. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
3. Energy generated by Roof Top Solar PV Plant: **4 kWh/kWp per Day**
4. Annual Solar Energy Generation Days: **300 Nos**

11. References:

1. For Indoor Air Quality: www.cpcb.com
2. For Indoor Comfort Parameters: www.ishrae.com
3. For Energy Generated by Solar PV Plant: www.solarroftop.gov.in
4. For Computation of CO₂ Emissions: www.tatapower.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 University)
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. To study the present Energy Consumption
2. To compute the CO₂ emissions
3. To study usage of Renewable Energy & CO₂ Emission Reduction
4. Study Indoor Air Quality Parameters
5. To study Waste Management
6. To study Rain Water Harvesting

1.3 Table No-4: General Details of University:

No	Head	Particulars
1	Name	Ajeenkya D Y Patil University
2	Address	Charholi Budruk Pune 412 105

1.4 Google Earth Image:



University Campus

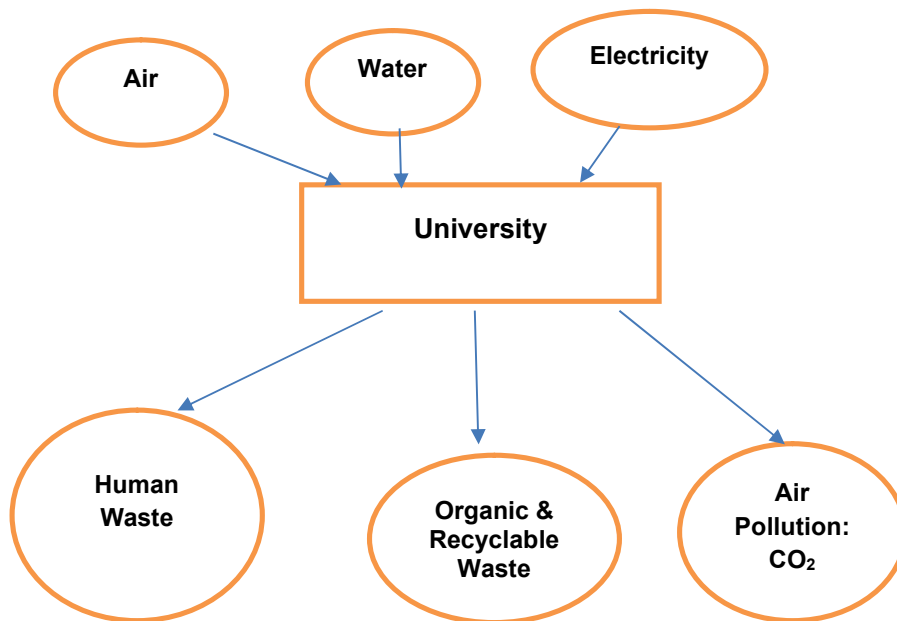
CHAPTER-II STUDY OF CONSUMPTION OF RESOURCES & CO₂ EMISSION

2.1 The University consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

2.2 Chart No 1: Representation of University as a System:



2.3 Computation of CO₂ Emissions: A Carbon Foot print is defined as the Total Greenhouse Gas Emissions, emitted due to various activities. The University uses Electrical Energy for various Electrical gadgets & day to day activities.

Basis for computation of CO₂ Emissions:

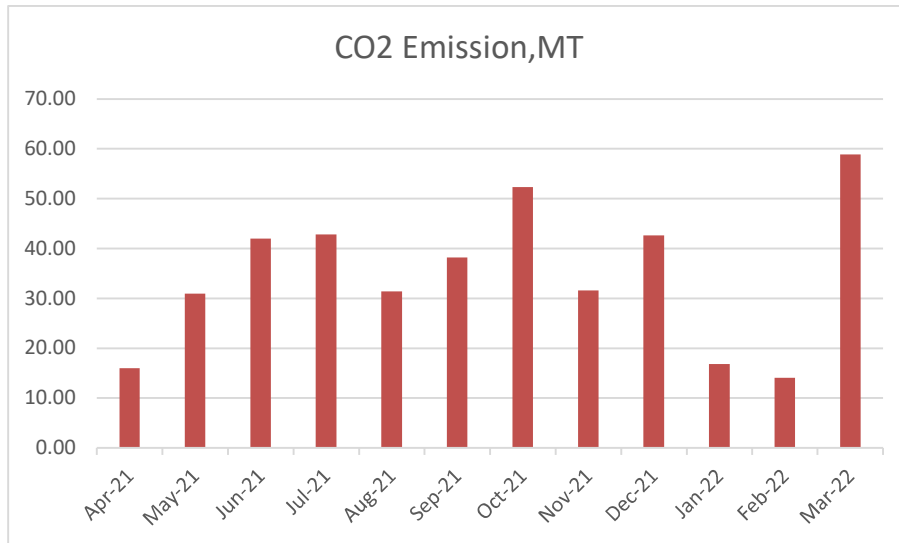
- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emission, MT
1	Apr-21	17785	16.01
2	May-21	34436	30.99

3	Jun-21	46632	41.97
4	Jul-21	47582	42.82
5	Aug-21	34875	31.39
6	Sep-21	42468	38.22
7	Oct-21	58127	52.31
8	Nov-21	35059	31.55
9	Dec-21	47366	42.63
10	Jan-22	18709	16.84
11	Feb-22	15612	14.05
12	Mar-22	65419	58.88
13	Total	464070	417.66
14	Maximum	65419	58.88
15	Minimum	15612	14.05
16	Average	38672.50	34.81

Chart No 2: Representation of Month wise CO₂ emissions:



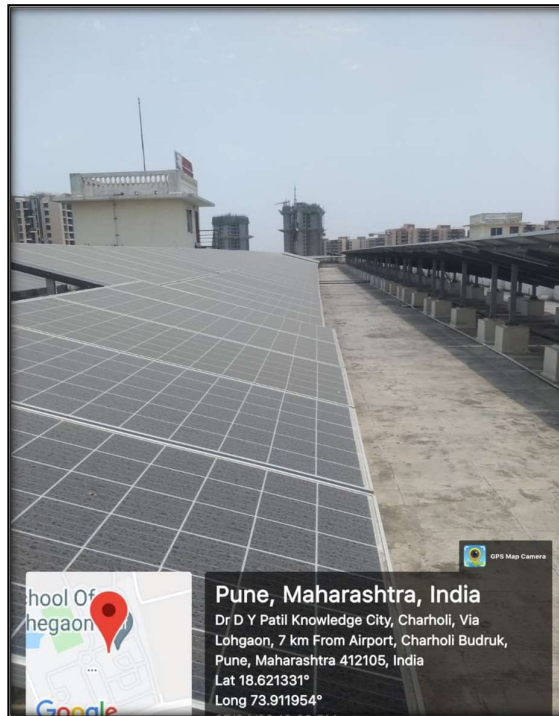
CHAPTER-III STUDY OF REDUCTION IN CO₂ EMISSION

The University has installed Roof Top Solar PV Plant of Capacity **800 kWp**.
In the following Table, we compute the reduction in CO₂ Emissions due to Solar PV Plant.

Table No 6: Computation of reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Solar PV Plant Capacity	800	kWp
2	Average Energy generated per kWp	4	kWh/kWp
3	Annual working days	300	Nos
4	Annual Energy generated = (2) * (3) * (4)	960000	kWh/Annum
5	1 kWh of Electrical Energy is equivalent to	0.9	Kg of CO ₂
6	Annual Reduction in CO₂ Emissions = 4 * 5 /1000	864	MT

Photograph of Roof Top Solar PV Plant:



CHAPTER-IV

STUDY OF INDOOR AIR QUALITY PARAMETERS

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 liveability.

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.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 'air pollutant' has been defined as 'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment

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.

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 10 micron

Table No 7: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Computer Lab	102	68	79
2	Faculty Room	94	59	72
3	Class Room-1	97	63	74
4	Class Room-2	94	61	72
5	Library	97	66	70
	Maximum	102	68	79
	Minimum	94	59	70

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 8: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	Noise Level, dB	Lux Level
1	Computer Lab	22.3	55	101	47
2	Faculty Room	22.5	52	105	42
3	Class Room-1	23	51	104	41
4	Class Room-2	23.1	53	101	40.2
5	Library	22.8	54	126	42.3
	Maximum	23.1	55	126	47
	Minimum	22.3	51	101	40.2

CHAPTER-VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The waste is segregated at source. Separate Dry and Wet waste collection bins are provided at key locations in the campus. It is then further disposed.

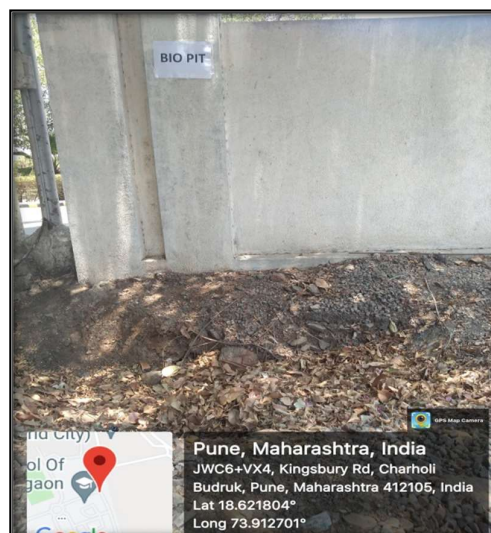
Photograph of Waste Collection Bins:



6.2 Organic Waste Management:

The organic waste generated is composted in a Bio Composting Pit and the compost produced is used for own garden in the premises.

Photograph of Vermi Composting Unit:



6.3 Liquid Waste Management:

The University has a Sewage Treatment Plant of Capacity **300 KLPD**, to treat the Liquid Waste. The treated water is used for gardening purpose.

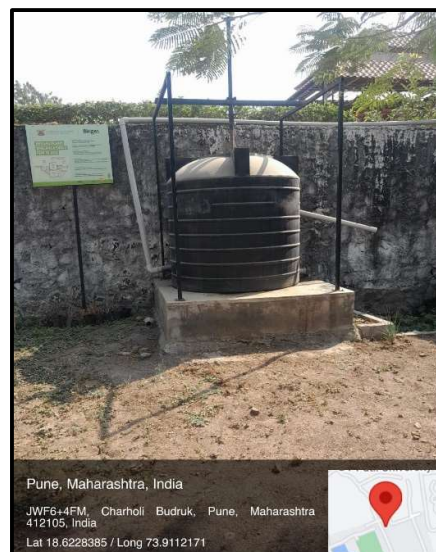
Photograph of Sewage Treatment Plant:



6.4 Food Waste Management:

The University has installed Bio Gas Plant for conversion of Food Waste

Photograph of Bio Gas Plant:



6.5 E Waste Management:

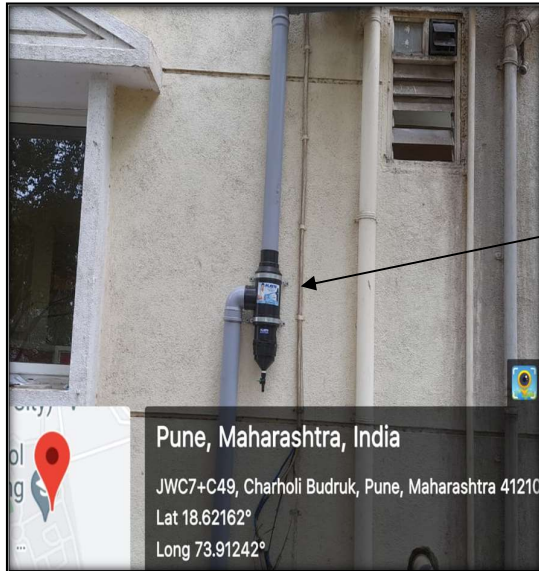
The E Waste is disposed of through Authorized Agency.

CHAPTER-VII

STUDY OF RAIN WATER MANAGEMENT

The University has installed Rain Water Management project. The Rain Water from the terrace is collected through pipes, filtered and further used for increasing the underground water table.

Photograph of Rain Water Collecting Pipe and Sand Filter Unit:



Sand Filter Unit

CHAPTER-VIII

STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Plantation in the Campus:

The University has well maintained Garden, inside the campus.

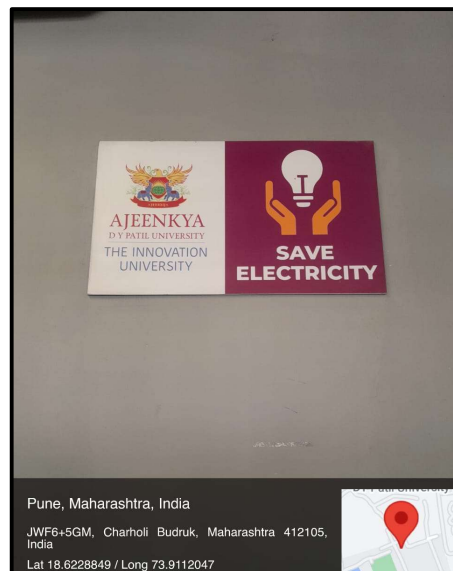
Photograph of Internal Tree Plantation:



8.2 Creation of Awareness by Display of Posters:

The University has displayed posters by display of Posters on Energy Conservation.

Photograph of Posters on Energy Conservation:



ANNEXURE: VARIOUS AIR QUALITY & 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 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

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

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