CT INSTITUTE OF MANAGEMENT & IT

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SUPPORTING DOCUMENTS FOR 7.1.6

Reports on Green, Environment and Energy Audits

The following document contains information regarding quality audits on green, environment and energy periodically undertaken by the institution.

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GREEN AUDIT
(Documents for Green Audit)

INSTITUTE OF MANAGEMENT & IT

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Acknowledgement

The Audit Assessment Team thanks the **CT Educational Society's CT Institute of Management & IT, Punjab** for assigning this important work of Green Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are extended are due to **S. Charanjit Channi** (Chairman), **S. Harpreet Singh** (Vice Chairman), **Smt. Parminder Kaur** (President), **Smt. Tanika Singh** (Treasurer), **S. Manbir Singh** (General Secretary) and **everyone from the Management.**

Our heartfelt thanks are extended to the Chairperson of the entire process **Mr. Yogesh Chhabra** (Director) for the valuable inputs.

We are also thankful to Institute's Task force the faculty members who have played a major role in data collection – **Ms. Anisha Kundra** (HoD) (Special mention for the excellent coordination), **Dr. Ramandeep Gautam**, Dean (Academics) and **Ms. Deeksha** (AP).

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Sustainable Academe
Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Disclaimer

The Audit Team has prepared this report for the **CT Educational Society's CT Institute of Management & IT** located at *Greater Kailash, Grand Trunk Road, Maqsudan, Jalandhar, Punjab 144008* based on input data submitted by the Institute analysed by the team to the best of their abilities.

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.

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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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Contents

1. Introduction

1.1 About the Institute

CT Institute of Management & IT prides itself on its diverse, dynamic, and collaborative environment, aiming to create a global and positive impact.

Guided by their motto, transformative education, they dream to cultivate world-class leaders, critical thinkers, and intellectuals ready to fight and accomplish global challenges.

Through modern pedagogies, cutting-edge technology, and advocacy, they instil in their students knowledge that transcends ages, different fields of knowledge, and physical boundaries.

1.2 Assessment of the Institute

1.2.1 Approval

The technical courses provided by the Institute are approved by **All India Council for Technical Education (AICTE), New Delhi**.

1.2.2 Affiliation

The Institute is affiliated with the **I. K. Gujral Punjab Technical University,** a State university located by Kapurthala highway in Kapurthala, India.

1.2.3 Certification

The Institute has received the following Certifications

- **AISHE** – The All India Survey of Higher Education code is C-10429
- **ISO 9001** – Quality Management Systems
- **ISO 14001** – Environment Management Systems

1.2.4 Recognition

The courses provided by the Institute have received recognition under the **section 2(f) of the University Grants Council Act, 1956** Govt. of India, New Delhi.

1.3 About the statements of the Institute

1.3.1 Vision

The Institute proposes "*To Become a leading contributor to the world by building a vibrant multicultural learning environment founded on value based academic principles, wherein all involved shall contribute effectively, efficiently and responsibly to the local, national and international community.*"

1.3.2 Mission

The Institute adheres and focuses *"To provide holistic education by confluence of diverse knowledge domains, aiming quality in association with industry; endorsing inspired competence and innovation aimed at producing skilled man power and entrepreneurs."*

1.3.3 Aim

The Institute has formulated the following aim *"To inculcate ethics and moral values for the betterment of the society."*

1.3.4 Motto

The Institute channelizes its efforts towards the motto *"To create transformative environment where research, creativity and entrepreneurship can flourish."*

1.3.5 Objectives

The objective of the Institute is *"To deepen students learning experiences through progressive and futuristic curriculum, pedagogy, and educational leadership."*

2. Overview

2.1 Populace analysis for the Academic year 2022-23

2.1.1 Students data

The student data (shared by the Institute) shows there were **a total of 348 Boys and 284 Girl students** on the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin staff	04	04	**08**
Teaching staff	18	24	**42**
Non-Teaching	06	03	**09**
Total Staff Members	**28**	**31**	**59**

Table 1: Staff data of the Institution for 2022-23

The staff data shows the premises had a total of **59** Staff Members.

2.2 Populace analysis for the Academic year 2021-22

2.2.1 Students data

The student data (shared by the Institute) shows there were **a total of 242 Boys and 219 Girl students** on the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin staff	04	04	**08**
Teaching staff	33	17	**50**
Non-Teaching	06	04	**10**
Total Staff Members	**43**	**25**	**68**

Table 2: Staff data of the Institution for 2021-22

The staff data shows the premises had a total of **68** Staff Members.

2.3 Populace analysis for the Academic year 2020-21

2.3.1 Students data

The student data (shared by the Institute) shows there were **a total of 153 Boys and 185 Girl students** on the premises.

2.3.2 Staff data

Type	Male	Female	Total
Admin staff	04	04	**08**
Teaching staff	20	15	**35**
Non-Teaching	06	03	**09**
Total Staff Members	**30**	**22**	**52**

Table 3: Staff data of the Institution for 2020-21

The staff data shows the premises had a total of **52** Staff Members.

2.4 Site area & building spread area

The **site area is 4 acres** while **Built-up area is 98,362 sq. ft.** for approx. **691 footfalls.**

2.5 Institute Infrastructure

2.5.1 Establishment

The Institute was established in **2001**.

2.5.2 Spatial Organisation

There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, a first aid room, etc.

The Institute has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.6 Operation and Maintenance of the premises

The schedule shared by the team shows that the Institute is working Monday to Friday for 5 days beginning at 09:00 hours up to 16:30 hours.

3. Research

3.1 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.

3.2 Analysis of the Green Building Study Audit

The procedure included detailed verification as follows:

- Investigation
- Technical discussion with team
- Observations
- Inferences

3.3 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.

3.4 Activities undertaken for the Green Building Study Audit

- Discussion with the Institute
- Allotment and Initiation by the Institute
- Data collection
- Submission of the files

4. Observation

Survey Results

An online survey was conducted to analyse the student and staff views about the Energy management practices adopted in Institute, following is the result received.

4.1 Participation

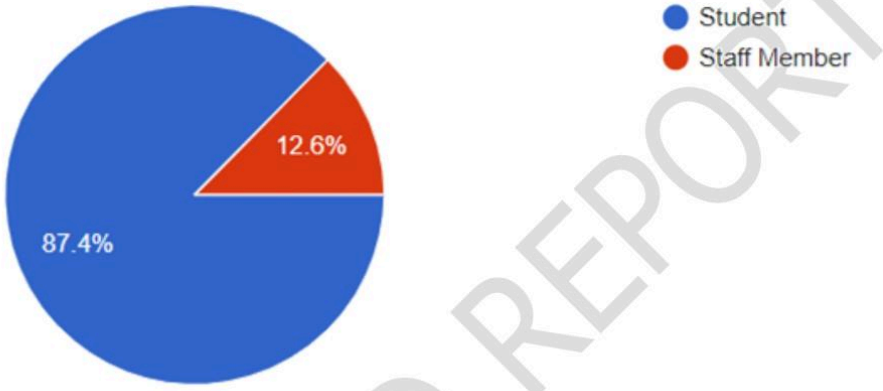


Figure 1: Participation analysis in the survey

A total of **103 responses** were received out of which 87% were students.

Note: The Participants were asked to review the practice on a scale of 1-5 with scale components as follows:

- Scale 1 – Poor
- Scale 2 – Satisfactory
- Scale 3 – Good
- Scale 4 – Very good
- Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

4.2 About the Green awareness practices adopted by Institute

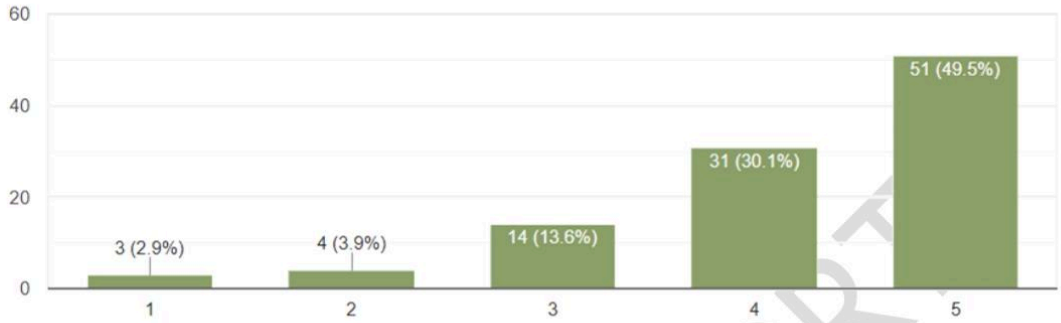


Figure 2: Green awareness practices in the Institute

Observation: The students and staff *almost 50% of the respondents* found practices to be Excellent (Rating of 5); whereas *almost 30% of the respondents* found practices to be Very Good (Rating of 4); and *14% of the respondents* found practices to be Good (Rating of 3).

Inference: Though the majority responses are for 'Excellent – Rating 5' is almost equal to 50% thus this shows that the said section requires improvement.

4.3 About the Water management practices adopted by Institute

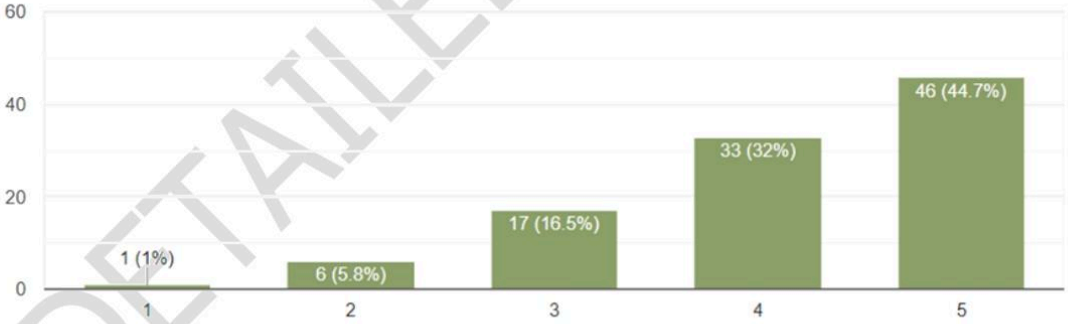


Figure 3: Water management practices in the Institute

Observation: The students and staff *almost 45% of the respondents* found practices to be Excellent (Rating of 5); whereas *almost 32% of the respondents* found practices to be Very Good (Rating of 4); and *17% of the respondents* found practices to be Good (Rating of 3).

Inference: Though the majority responses are for 'Excellent – Rating 5' is less than 50% thus this shows that the said section requires improvement.

4.4 About the Waste management practices adopted by Institute

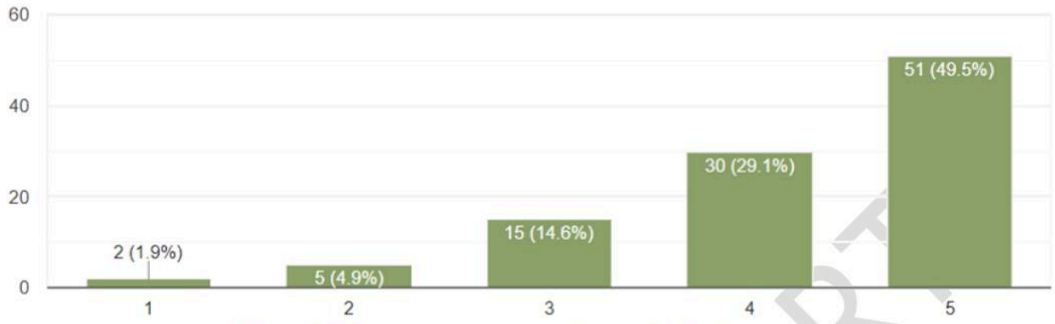


Figure 4: Waste management practices in the Institute

Observation: The students and staff *almost 50% of the respondents* found practices to be Excellent (Rating of 5); whereas *almost 29% of the respondents* found practices to be Very Good (Rating of 4); and *15% of the respondents* found practices to be Good (Rating of 3).

Inference: Though the majority responses are for 'Excellent – Rating 5' is less than 50% thus this shows that the said section requires improvement.

4.5 About the Hygiene practices adopted by Institute

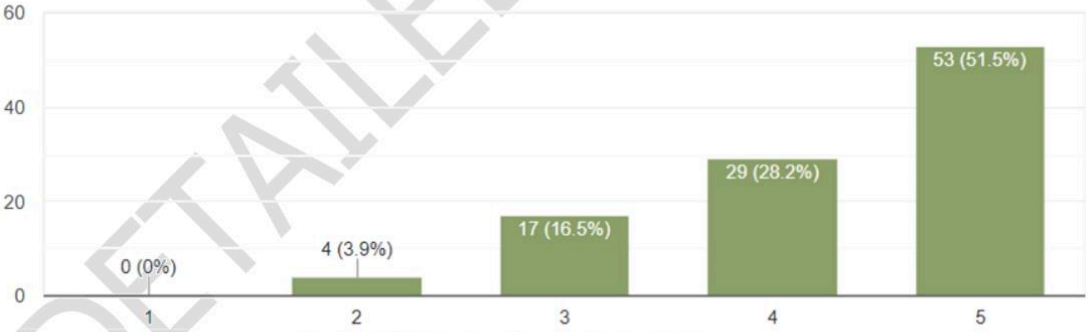


Figure 5: Hygiene practices in the Institute

Observation: The students and staff *almost 52% of the respondents* found practices to be Excellent (Rating of 5); whereas *almost 28% of the respondents* found practices to be Very Good (Rating of 4); and *17% of the respondents* found practices to be Good (Rating of 3).

Inference: Though the majority responses are for 'Excellent – Rating 5' is less than 50% thus this shows that the said section requires improvement.

5. Documentation

5.1 Green Practices Audit

The increasing global warming and climate change have made us realise that apart from the enormous strategies the individual small efforts need to be taken by individuals and Educational Institutes as the younger generations are the future of the world and once they are taught about these practices only then can we assume a better future.

5.1.1 Green practices

We observed the following points during the process.

- **Fresh environment** – *The Institute provides an eco-friendly ambience with fresh air and soothing environment which helps to maintain a physical and mental balance. This kind of a space it a must for an educational specially technical institute which is inviting and gives the stakeholders an opportunity to explore indoor and outdoor learning to a great extent.*
- **Organic farming** – *The best quality of the Institute which sets it apart is its coordinating, cooperative staff members and the approach to maintain an organic farm inside premises.*

5.1.2 Community development

The Institute conducts environmental initiatives documented as follows:

S. No.	Name of the event	Type	Date
Academic year 1 (2022-2023)			
1	Tree Plantation on World Environment Day	Physical	05-06-2023
2	Safai Abhiyan	Physical	24/03/2023
3	E-Waste Management	Physical	28/02/2023
4	Campus cleaning Drive	Physical	21/02/2023
5	Tree Plantation by new Students	Physical	28/09/2022
Academic year 2 (2021-2022)			
6	Tree Plantation by students	Physical	06-06-2022
7	Say No to Plastic	Physical	09-05-2022
8	International Earth Day	Virtual	22/04/2022

Table 4: Details of the events undertaken by the Institute

5.2 Waste Audit

Waste is an inevitable part of our lives. The audit provides an approximation of the types of waste generated, location of waste collections, disposal techniques used, waste segregation methodologies adopted. The waste management strategies are studied and ways that can be adopted aiming to make the premise clean and sustainable are proposed.

5.2.1 Waste produced

S. No.	Type	Quantity (Daily basis)	Management
1	Solid waste (Toilets)	1 or 2 quintal	Solid waste is taken by a vendor every two days and he treats the waste at his own place.
2	Organic waste (Regular)	1 or 2 quintal	
3	Liquid waste (Toilets, wash basins)	NA	Comes under Municipal Sewerage
6	E-waste	2 quintal	A MoU with a vendor who takes all the responsibility of E-waste after every 6 months
7	Plastic waste	NA	Plastic Waste is sold to a vendor every 15 days
8	Bio-waste (Sanitary)	NA	Sanitary Vending Machine is in Process

Table 5: Details of the waste management practices adopted by the team

There are 130 dustbins in the Indoor areas which cater to the waste management practices.

5.3 Water Audit

Water is one of the basic needs. Pure drinking water is a resource that needs to be preserved efficiently. A water audit helps to identify the sources of water consumption, and the water requirement by the premises is met by these sources. The effective usage of water without any wastage should be a mandatory practice. Understanding the techniques as per site context to increase water conservation in terms of awareness and practice can be identified and executed as part of this exercise.

5.3.1 Water availability and consumption

5.3.1.1 Source of Primary water supply

The Institute uses drinking water for daily consumption through the 'OVERHEAD' water tanks available on the terrace in a total of 2 tanks; bifurcated for primary and secondary purposes.

5.3.1.2 Source of Secondary water supply

The Institute uses the secondary sources of water supply for general usages such as watering plants, kitchen, toilets, and wash basins connected to the labs and other spaces. **At present, there are no sources such as well/ bore well/ tube well and the existing water tanks are bifurcated for primary and secondary uses.**

5.1.3.3 Source of Tertiary water supply

The tertiary source of water is the additional source of water harvesting. *The premises have 4 nos. of pits (Each being 60 ft. deep).*

5.1.3.4 Source of Reusing waste water

The initiative is not under practice at present completely only the chemicals are neutralized before letting it down in the drains. *Since, the Institute is focused on Management studies this practice is not a part of the academics; however, the toilet and kitchen sink waste water can be used for recycling purpose but it is not an immediate requirement.*

5.3.2 Areas of water usage

Based on the inventory done and data shared by the staff it was found that the premise has the following facilities:

- Taps for indoor usage : 45 nos.
- Taps for garden usage : 8 nos.
- Drinking water coolers : 8 nos.
- Toilet for the male stakeholders : 35 nos.
- Toilet for the male stakeholders : 29 nos.
- Toilet for the specially abled : 1 nos.
- Eco-toilet/ Green building feature : Nil
- Net-metering for water supply : 1 no.

5.4 Health and Hygiene Audit

The hygiene is a part and parcel of our daily life. It is extremely essential to keep the surroundings clean in the same manner as we would want our houses to be.

Educational Institutes have a bigger role to play in order to affect the young minds in the positive manner through better hygienic practices.

5.4.1 Facilities available

The Institution has washroom facility, hand wash, drinking water and dustbin facilities.

5.4.2 Hygiene aspects

There was no major hygiene issue observed anywhere in the premises.

6. Suggestions

Section-wise suggestions related to premises

The following suggestions are to be considered as a ***first priority*** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

6.1 Green practices Audit

- **Plant as a gift -** As a kind gesture, the guests visiting the premise can be asked to plant a small plant on the premise itself and they can be even given plants/bouquets from the flowers of the plants on the premise as a gift.

- **Environmental awareness -** There can be various slogans in local and national lanuage on the compound wall giving the message of saving the environment through the joint efforts of the students and staff thereby making the student socially and environmentally responsible citizens.

6.2 Waste Audit

- **Signages -** Messages about avoiding wastage should be placed at appropriate locations.

- **Include better plastic/ E-waste management measures** - The Institute can celebrate one day of every month as a 'Plastic/ E-waste awareness day' The stakeholders (Students and staff members) can be asked to bring plastic/ E-waste which can be further given to an NGO for recycling or better purpose.

- **Organic compost pit maintenance methodology -** The Institute can recheck the current methodology as it can yield better results in terms of quantity if it is well maintained with the following strategies:
  - The sanitary pad incineration dust can be sent to the compost pit
  - There should be a balance of brown and green waste material
  - Shred the materials before adding them to pit
  - Add twigs and stir occasionally
  - Add water in less quantity to avoid the smell
  - Keep ample air circulation to avoid the smell
  - Regular monitoring and maintenance.

6.3 Water Audit

- **Water flow stopper -** The water flow stopper should be installed to avoid overflow and smart use of the system. Install water-saving showerheads or flow restrictors. No leakage anywhere on-premises. Water lawn only when it needs it.
- **Waterless urinals -** There can be the provision of waterless urinals as a Green Building initiative in the premise, either the existing ones can be replaced with such a facility or new toilets can be constructed in this manner.
- **Rain water bunds –** There should be landscape beautification project undertaken to appropriate channelize the rain water through bunds and similar facilities.

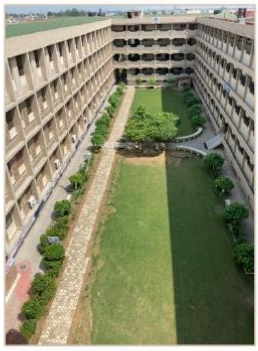
6.4 Health and Hygiene Audit

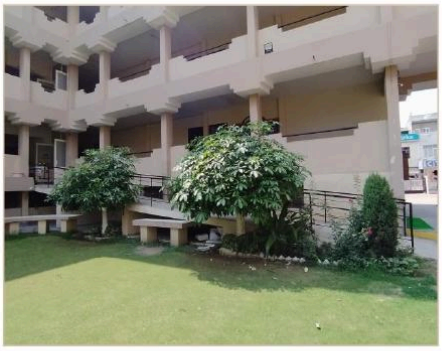
- **Signboards** – The Institute should have multiple signboards about 'No smoking' and 'Healthy premises' at every nook and corner of the Institute.
- **Compound wall** – The compound wall should have awareness messages about 'No Smoking' and 'No Tobacco'
- **Sanitary vending and incinerator -** There should be provision for sanitary vending, incinerator machine and incinerator in every ladies common room, and toilet on the premises.

Investigation

Evidences collected during data documentation

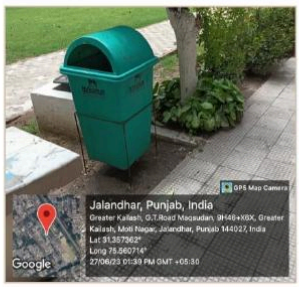
Unique feature of the Institute – Organic farming area within the premises





Investigative parameters – Ecological Management – Plantations, covered parking and ramp

Investigative parameters – Water Management – Water sources and rain water harvesting system



Investigative parameters – Waste Management and the team working on the project

7. Compilation

The study is based on the data collected, analysed, 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 analyse 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 center for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation and www.umassd.edu
- The city of Cheyenne, Streetscape/ Urban Design elements - Wyoming Planning Association, Gillette, Wyoming, United States
- Images on site by Coordinators of the both teams
- Icon images used by https://www.vecteezy.com/free-vector/security-camera-icon and https://www.vecteezy.com/free-vector/electric-car-icon

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ENVIRONMENT AUDIT
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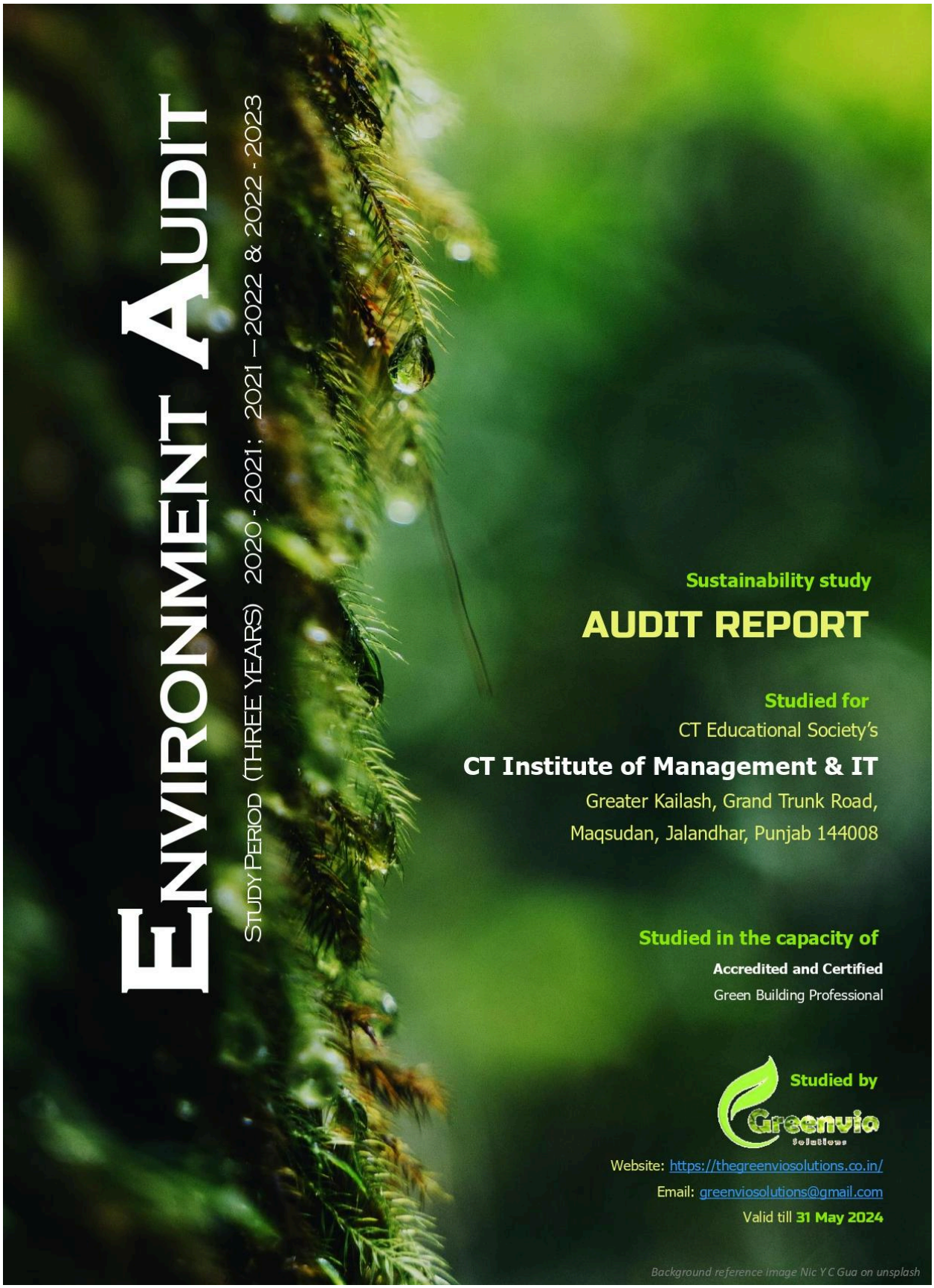

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1.2 Assessment of the Institute

1.2.1 Approval

The technical courses provided by the Institute are approved by **All India Council for Technical Education (AICTE), New Delhi**.

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The objective of the Institute is *"To deepen students learning experiences through progressive and futuristic curriculum, pedagogy, and educational leadership."*

2. Overview

2.1 Populace analysis for the Academic year 2022-23

2.1.1 Students data

The student data (shared by the Institute) shows there were **a total of 348 Boys and 284 Girl students** on the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin staff	04	04	**08**
Teaching staff	18	24	**42**
Non-Teaching	06	03	**09**
Total Staff Members	**28**	**31**	**59**

Table 1: Staff data of the Institution for 2022-23

The staff data shows the premises had a total of **59** Staff Members.

2.2 Populace analysis for the Academic year 2021-22

2.2.1 Students data

The student data (shared by the Institute) shows there were **a total of 242 Boys and 219 Girl students** on the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin staff	04	04	**08**
Teaching staff	33	17	**50**
Non-Teaching	06	04	**10**
Total Staff Members	**43**	**25**	**68**

Table 2: Staff data of the Institution for 2021-22

The staff data shows the premises had a total of **68** Staff Members.

2.3 Populace analysis for the Academic year 2020-21

2.3.1 Students data

The student data (shared by the Institute) shows there were **a total of 153 Boys and 185 Girl students** on the premises.

2.3.2 Staff data

Type	Male	Female	Total
Admin staff	04	04	**08**
Teaching staff	20	15	**35**
Non-Teaching	06	03	**09**
Total Staff Members	**30**	**22**	**52**

Table 3: Staff data of the Institution for 2020-21

The staff data shows the premises had a total of **52** Staff Members.

2.4 Site area & building spread area

The **site area is 4 acres** while **Built-up area is 98,362 sq. ft.** for approx. **691 footfalls.**

2.5 Institute Infrastructure

2.5.1 Establishment

The Institute was established in **2001**.

2.5.2 Spatial Organisation

There are provisions for staircase for accessibility on the premises, whereas there are amenities such as CCTV, a first aid room, etc.

The Institute has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.6 Operation and Maintenance of the premises

The schedule shared by the team shows that the Institute is working Monday to Friday for 5 days beginning at 09:00 hours up to 16:30 hours.

3. Research

3.1 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.

3.2 Analysis of the Green Building Study Audit

The procedure included detailed verification as follows:

- Investigation
- Technical discussion with team
- Observations
- Inferences

3.3 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.

3.4 Activities undertaken for the Green Building Study Audit

- Discussion with the Institute
- Allotment and Initiation by the Institute
- Data collection
- Submission of the files

4. Observation

Survey Results

An online survey was conducted to analyse the student and staff views about the Energy management practices adopted in Institute, following is the result received.

4.1 Participation

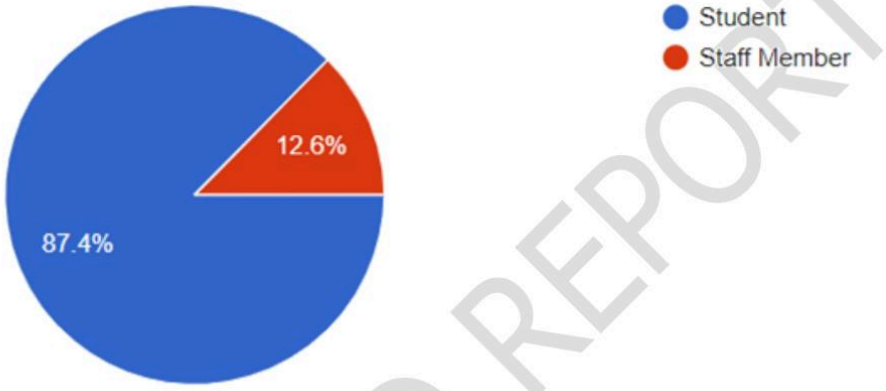


Figure 1: Participation analysis in the survey

A total of **103 responses** were received out of which 87% were students.

4.2 Mode of commute to the Institute

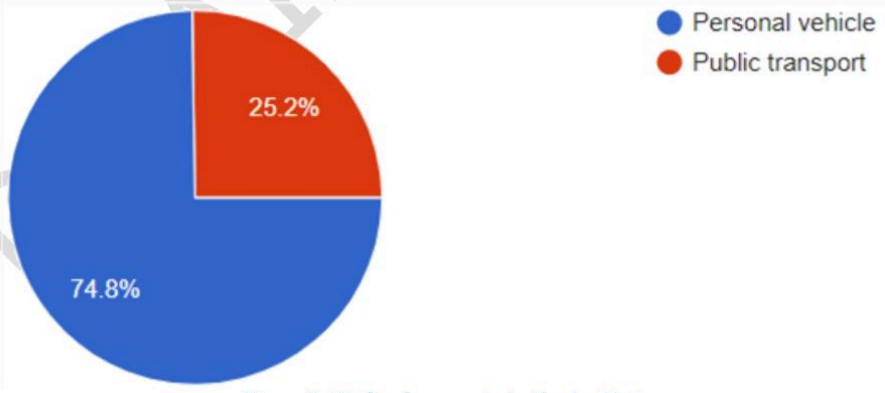


Figure 2: Mode of commute to the Institute

Around **75% of responses** *confirmed public transport as their mode of commute*, since this result is more than 75% this is a good practice.

4.3 Mode of travel to the Institute

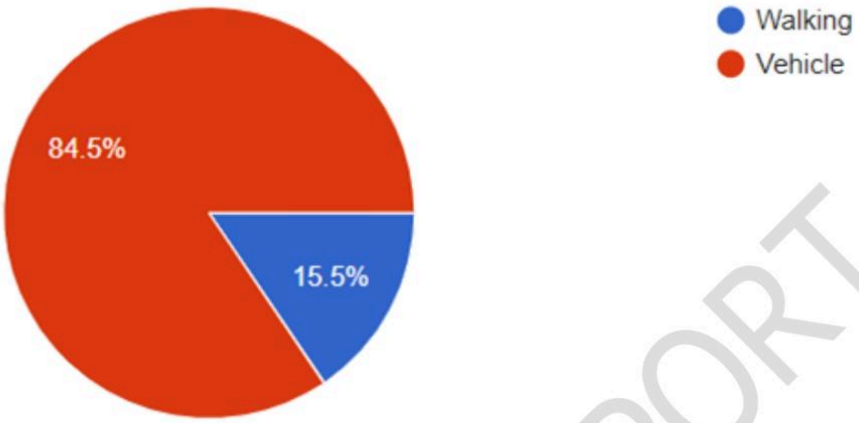


Figure 3: Mode of travel to the Institute

Around **85% of responses** *confirmed the use of vehicle as their mode of travel*, since this result is more than 75% this emphasis on carbon footprint contribution by the stakeholders.

4.4 Use of E-vehicle for commute to the Institute

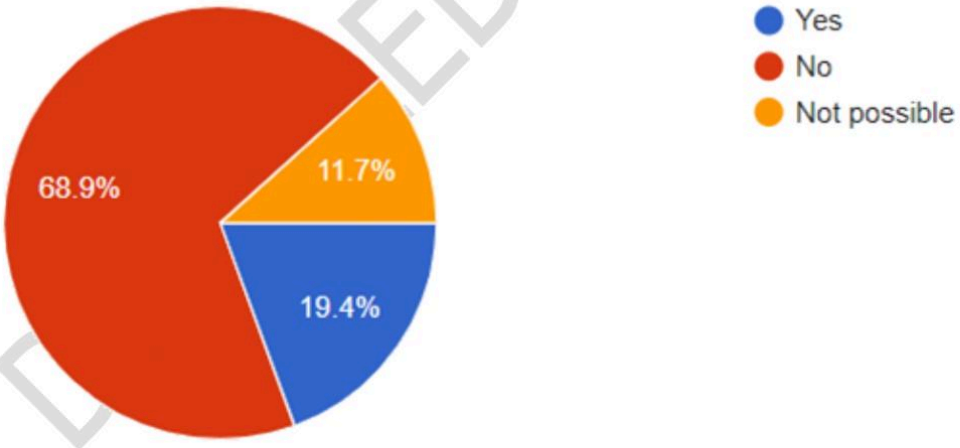


Figure 4: Use of E-vehicle for commute to the Institute

Around **19% of responses** *confirmed the use of E-vehicle as their mode of travel*, since this result is less than 25% this emphasis on improvement of this practice by the stakeholders.

5. Documentation

5.1 Open Spaces

There is an open space used by students at present for sports and cultural gatherings. **There are provisions for natural plantations enhancing the beauty of the space.**

5.2 Flora audit

A flora survey was carried out to identify the total numbers of plants and trees. The flora survey is common for the entire campus as documented below.

S. No.	Plant name	Type	Nos.	Planted by
1	*Alstonia*	Tree	36	Planted by Staff
2	*Kaner*	Tree	3	Planted by Staff
3	*Ficus*	Tree	51	Planted by Staff
4	*Ashoka*	Tree	29	Planted by Staff
5	*Bottle Palm*	Tree	3	Planted by Staff
6	*Neem Tree*	Tree	10	Planted by Staff
7	*Mango Tree*	Tree	2	Planted by Staff
8	*Bittergourd*	Plant	15	Planted by Staff
9	*Cucumber*	Plant	4	Planted by Staff
10	*Raddish*	Plant	25	Planted by Staff
11	*Lady Finger*	Plant	50	Planted by Staff
12	*Beet Root*	Plant	20	Planted by Staff & Students
13	*Tomato*	Plant	10	Planted by Staff & Students
14	*Green Chilli*	Plant	5	Planted by Staff & Students
15	*Armenian Cucumber*	Plant	8	Planted by Staff & Students
16	*Lettuce*	Plant	20	Planted by Staff & Students
17	*Brocali*	Plant	15	Planted by Staff & Students
18	*Cauliflower*	Plant	15	Planted by Staff & Students
19	*Green Beans*	Plant	15	Planted by Staff & Students
20	*Unimus*	Plant	2	Planted by Staff
21	*Hamelia*	Plant	12	Planted by Staff
22	*Rose*	Plant	50	Planted by Staff & Students

23	*Oriental Arbor-Vitae*	Plant	7	Planted by Staff & Students
24	*Hibiscus*	Plant	2	Planted by Staff & Students
25	*Nephthyic*	Plant	20	Planted by Staff
26	*Black Eyed Susan*	Plant	12	Planted by Staff
27	*Chlorophytum*	Plant	15	Planted by Staff
28	*Mugwort*	Plant	20	Planted by Staff
29	*Amaranthus*	Plant	12	Planted by Staff
30	*Rohdea Japonica*	Plant	12	Planted by Staff
31	*Money Plant*	Plant	5	Planted by Staff
32	*Dahlia*	Plant	3	Planted by Staff
33	*Periwinkle*	Plant	10	Planted by Staff
34	*Sprengers Asparagus*	Plant	6	Planted by Staff
35	*Mint Plant*	Plant	5	Planted by Staff

Table 4: Details of the Flora in the premises

At present there are 529 numbers of plantations comprising of plants, trees, shrubs. Timely maintenance and care has resulted in positive benefits for the surroundings.

5.3 Noise Audit

On a macro level the Institute is surrounded by public buildings and minimal residential blocks **thus there is a peaceful and noise free arena observed inside the premises.**

5.4 Carbon Footprint Audit

5.4.1 Eco-friendly Commuting Practices

- The site is located in an urban locality.
- Overall, the carbon footprint is well under control.
- Students and staff members commute using public transport.
- There are no major fossil fuels used inside the premises.

5.4.2 Heat Island Reduction

The summer of 2023 was quite severe and has raised alarms about maintaining cooler outdoor temperature for a normal lifestyle.

As per the evidence study, we would like to emphasise that the roofs have a scope of improvement by architectural intervention.

5.4.3 Outdoor Light Pollution Study

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

5.5 Universally accessible premises

As per World Report on Disability, 2011 there are 180 million approx. Persons with Disabilities that makes it 15% of total population of India.

The following facilities are available on the premises for the specially-abled as part of universally accessible premises initiatives.

- Handrails for support
- Ramps at the entrance of only one block
- Universal toilet – The current toilet should be upgraded with appropriate amenities including grab bars, hand rails etc.

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.

At present, the following provisions are available in the premises.

- Fire extinguisher.
- Open staircase without any barriers and free of storage or combustible material.

6. Suggestion

The following suggestions are section-wise recommendations and are supposed to be considered as a ***first priority*** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

6.1 Site beautification

- **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.
- **Child area -** There can be one provision where if student's or staff relative who are toddlers or senior citizens can rest and this area could have facilities accordingly.

6.2 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.

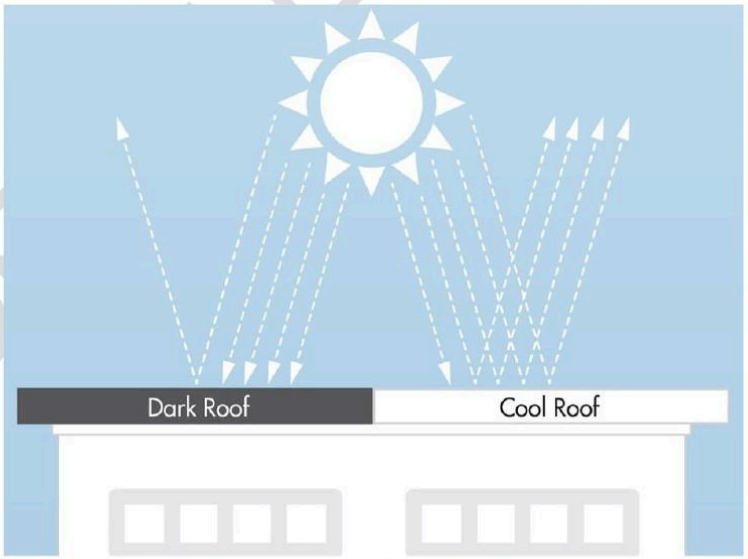


Plate 1: Cool roof comparative analysis (For reference purpose only)

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

- **Thermally cool roof interiors** - The heat reflective roof interior will help in reducing the heat absorption further once the Cooltop material is applied on the rooftop.

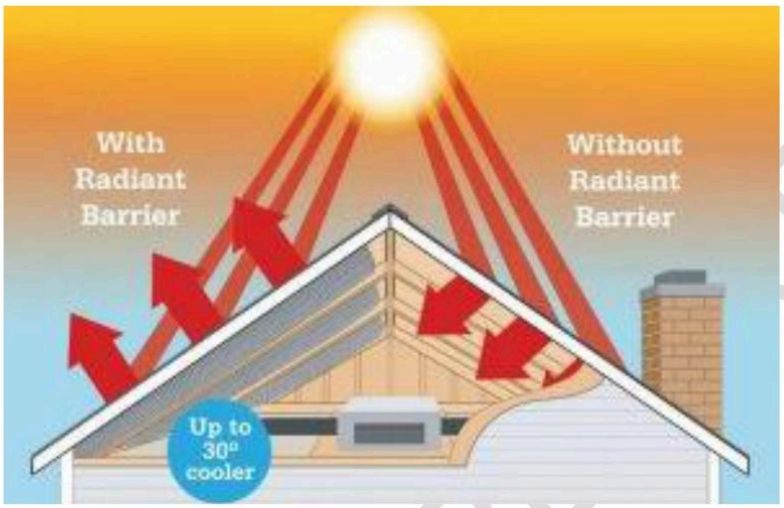


Plate 2: Thermally cool roof interiors analysis (For reference purpose only)

Source: Image by https://www.srikrishnaoverseas.com/heat-reflective-roof-coating.html

6.3 Universally accessible premises

- **Universal Toilet -** There should be a minimum of 1 toilet in every block for the specially-abled people as per guidelines of National Building Code 2016.
- **Resting places -** There should be increased provision for resting places on-premises outdoor and indoors.
- **Provisions for visually impaired - Signages –** In addition to the signages being in regular language there should be additional signages in braille language for the specially-abled students.
- **Provisions for visually impaired - Tactile flooring** – The indoor and outdoor of the premises should have dedicated tactile flooring for the visually impaired.
- **Provisions for hearing and speech impaired – Sensor based fire system** – There should be smoke detectors, sensor based facilities and signages, floor layouts for emergency situations such as fire. Additionally, one maintenance staff should be allocated for assistance at every corner of the Institute.

6.4 Life safety

- **Fire station** – A dedicated fire station could be established within the premises as part of the Fire and Life safety practices.
- **Mandate fire extinguisher in spaces** - One fire extinguisher should mandatorily be there in every space which has an air conditioner/ gas cylinder.
- **Combustible equipment** - Every space which has a gas cylinder 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.
- **Sensitization programs** - Regular seminars/ webinars by experts such as Architects, Govt. Fire department on subjects related to fire and life safety should be organized and the outputs should be adopted and documented.

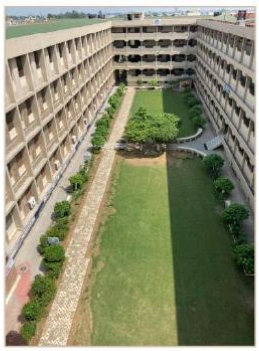
6.5 Pollution Control

- **Vehicle usage -** Restricting the speed limit of vehicles on the premises to 10 km per hour, not horning on the premises will help in maintaining the sound in control and emphasis on a silent zone.
- **Specific area designated for E-vehicles –** There should be designated area dedicated to E-vehicles parking and charging and this zone should be demarcated as 'Eco-Zone'
- **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.
- **Bicycles as a gift -** As an appreciation gesture maybe the student's toppers/ staff best performers can be awarded a bicycle occasionally.

Investigation

Evidences collected during data documentation

Unique feature of the Institute – Organic farming area within the premises



Investigative parameters – Ecological Management – Plantations, covered parking and ramp

Investigative parameters – Water Management – Water sources and rain water harvesting system

Investigative parameters – Waste Management and the team working on the project

7. Compilation

The study is based on the data collected, analysed, 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 analyse and study the data collected.

7.1 National references

- 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

7.2 International references

- Form, Space and Order by Francis D. K. Ching
- 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 center for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation and www.umassd.edu
- The city of Cheyenne, Streetscape/ Urban Design elements - Wyoming Planning Association, Gillette, Wyoming, United States
- Streetscape elements – Chapter 6 on San Francisco
- American lung association https://www.lung.org/
- Study related to air pollution https://www.airgle.com/
- Exploring the light pollution https://education.nationalgeographic.org/
- Accessibility study https://www.washington.edu/
- Urban heat island effect https://www.epa.gov/heatislands/what-you-can-do-reduce-heat-islands

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7.3 Reference images for suggestions:

- https://www.gaf.com/en-us/blog/six-truths-about-cool-roofs-281474980105387
- https://coolroofs.org/resources/what-is-a-solar-reflective-wall
- https://earthbound.report/2021/07/14/5-ways-to-reduce-the-urban-heat-island-effect/
- https://www.dutchiesstoneworks.com/outdoor-living-spaces/stone-walkways-and-stairs/

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ENERGY AUDIT

(Documents for Energy Audit)

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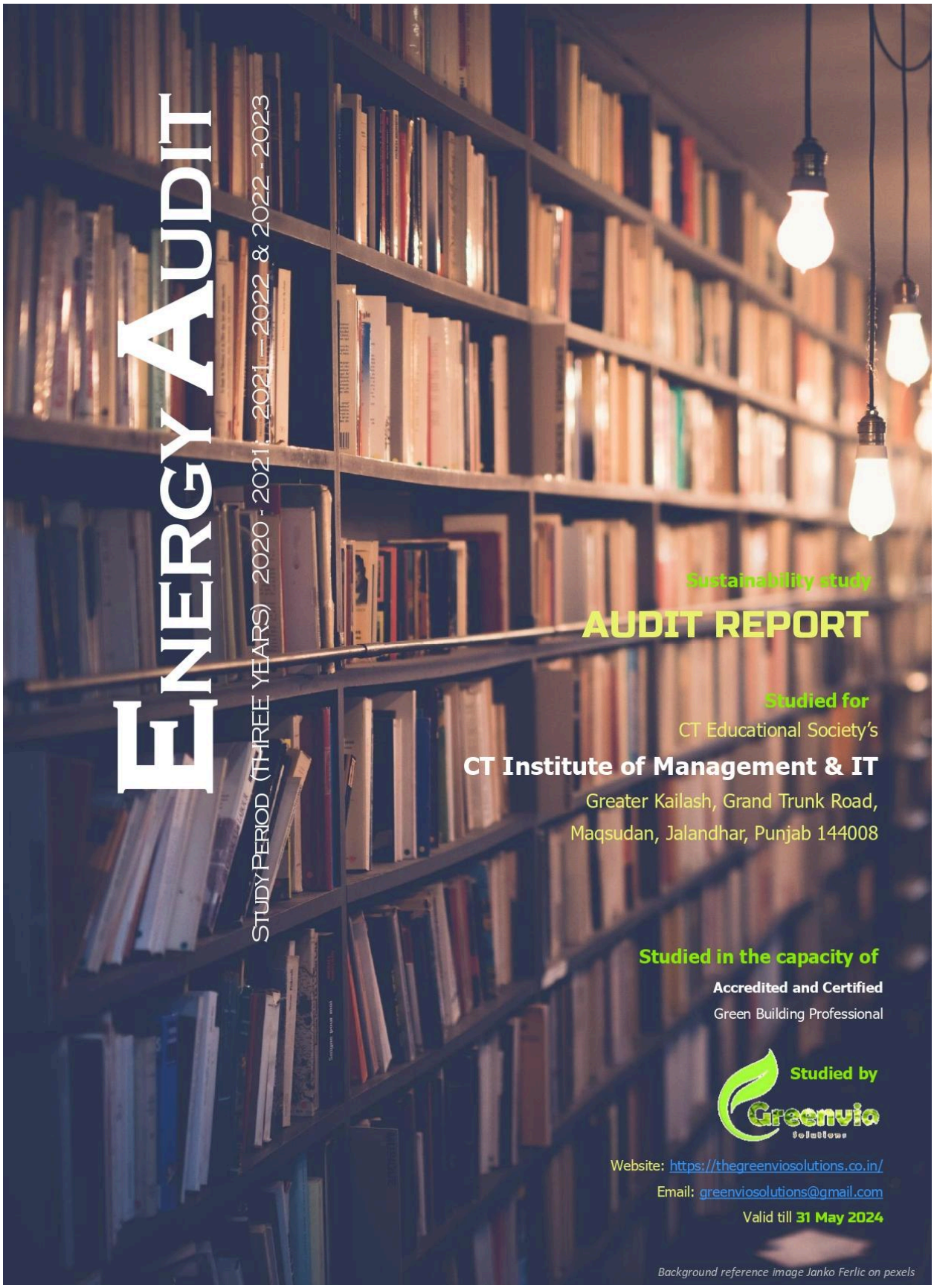

Disclaimer

The Audit Team has prepared this report for the **CT Educational Society's CT Institute of Management & IT** located at *Greater Kailash, Grand Trunk Road, Maqsudan, Jalandhar, Punjab 144008* based on input data submitted by the Institute analysed by the team to the best of their abilities.

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 Hon'ble Management and Institute. 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.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

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
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Acknowledgement

The Audit Assessment Team thanks the **CT Educational Society's CT Institute of Management & IT, Punjab** for assigning this important work of Energy Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are extended are due to **S. Charanjit Channi** (Chairman), **S. Harpreet Singh** (Vice Chairman), **Smt. Parminder Kaur** (President), **Smt. Tanika Singh** (Treasurer), **S. Manbir Singh** (General Secretary) and **everyone from the Management.**

Our heartfelt thanks are extended to the Chairperson of the entire process **Mr. Yogesh Chhabra** (Director) for the valuable inputs.

We are also thankful to Institute's Task force the faculty members who have played a major role in data collection – **Ms. Anisha Kundra** (HoD) (Special mention for the excellent coordination), **Dr. Ramandeep Gautam**, Dean (Academics) and **Ms. Deeksha** (AP).

We highly appreciate the assistance of the admin staff - **Mr. Kawaljit Singh** (Deputy Registrar), **Ms. Diljeet Kaur** (HR) and the Non-teaching staff members - **Mr. Ramniranjan** (Head Supervisor), **Mr. Manoj** (Network administrator), **Mr. Nardev Singh** (Video) for their support while collecting the data.

Sustainable Academe
Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

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The Institute has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.6 Operation and Maintenance of the premises

The schedule shared by the team shows that the Institute is working Monday to Friday for 5 days beginning at 09:00 hours up to 16:30 hours.

3. Research

3.1 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.

3.2 Analysis of the Green Building Study Audit

The procedure included detailed verification as follows:

- Investigation
- Technical discussion with team
- Observations
- Inferences

3.3 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.

3.4 Activities undertaken for the Green Building Study Audit

- Discussion with the Institute
- Allotment and Initiation by the Institute
- Data collection
- Submission of the files

4. Observation

Survey Results

An online survey was conducted to analyse the student and staff views about the Energy management practices adopted in Institute, following is the result received.

4.1 Participation

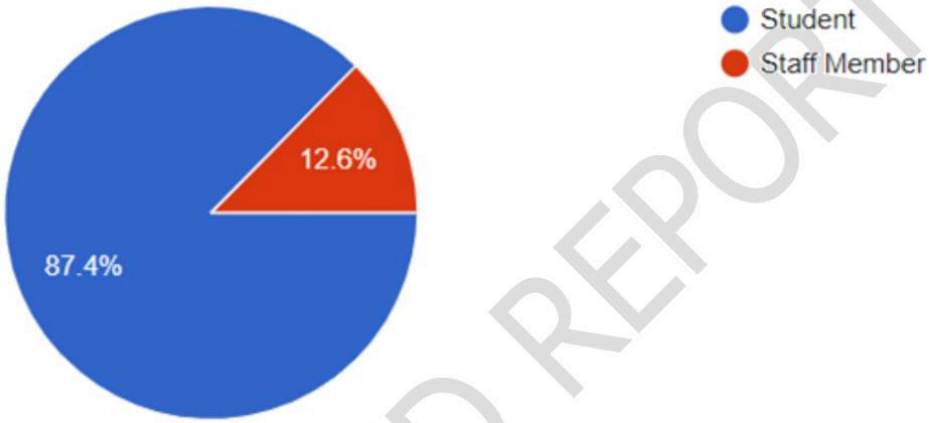


Figure 1: Participation analysis in the survey

A total of **103 responses** were received out of which 87% were students.

Note: The Participants were asked to review the practice on a scale of 1-5 with scale components as follows:

- Scale 1 – Poor
- Scale 2 – Satisfactory
- Scale 3 – Good
- Scale 4 – Very good
- Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

4.2 About the Energy management practices adopted by Institute

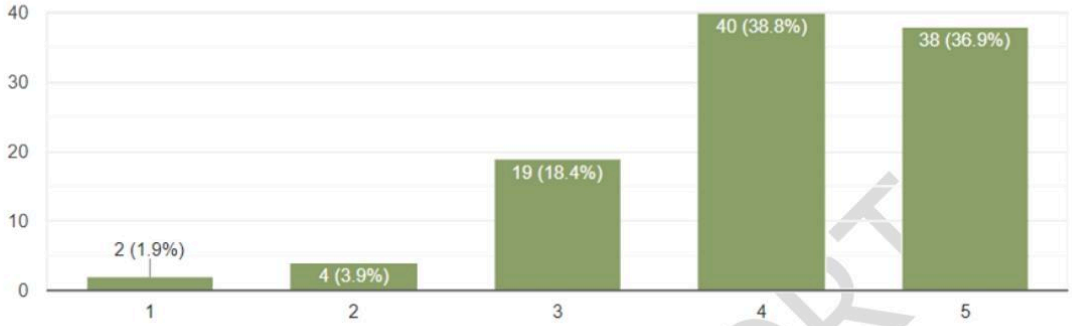


Figure 2: Energy management practices in the Institute

Observation: The students and staff *almost 37% of the respondents* found practices to be Excellent (Rating of 5); whereas *almost 39% of the respondents* found practices to be Very Good (Rating of 4); and *18% of the respondents found practices to be Good (Rating of 3).*

Inference: Though the majority responses are for 'Excellent – Rating 5' is less than 50% thus this shows that the said section requires improvement.

5. Documentation

The premise uses following sources of energy consumption.

5.1 Primary sources of energy consumption

- **Electrical (Metered) –** Light, Fans, Equipments, Pumps comprise these sources.
- **Renewable energy –** The installation of solar panels and sensor based lights, taps is under process and is expected to be completed soon.

5.2 Secondary sources of energy consumption

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

S. No.	Name	Nos.
1	UPS	12
2	Inverters	1
3	Batteries	1
4	Gas cylinders	25
5	Induction stove	2

Table 4: Details of secondary sources of energy consumption

5.3 Actual electrical consumption as per bills

The Institute spends a substantial amount on electricity bills every month. However, we would like to recommend the use of alternate sources of energy to harness the electrical loads and reduce the monetary expenses.

We have been informed by the team that the introduction of solar (Renewable) source of energy is under process.

S. No.	Month	Year	Amount	Units consumed
2022-2023				
1	June	2022	5,22,890	24,237
2	July	2022	5,44,330	41,597

3	August	2022	5,84,650	45,912
4	September	2022	6,38,550	52,843
5	October	2022	4,95,960	24,403
6	November	2022	4,23,900	27,914
7	December	2022	4,05,830	26,280
8	January	2023	2,68,950	25,599
9	February	2023	2,76,820	27,041
10	March	2023	2,64,800	26,446
11	April	2023	4,48,140	35,690
12	May	2023	5,76,500	49,880
2021-2022				
13	June	2021	3,40,045	16,349
14	July	2021	4,87,260	11,582
15	August	2021	4,87,258	33,237
16	September	2021	4,84,020	33,022
17	October	2021	4,45,070	20,647
18	November	2021	3,65,800	19,918
19	December	2021	3,70,600	21,458
20	January	2022	3,47,940	17,474
21	February	2022	3,55,730	18,482
22	March	2022	3,41,530	19,469
23	April	2022	4,38,140	34,690
24	May	2022	5,76,510	49,883

Table 5: Documentation of the electrical bills

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 in summarised in the following sections.

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

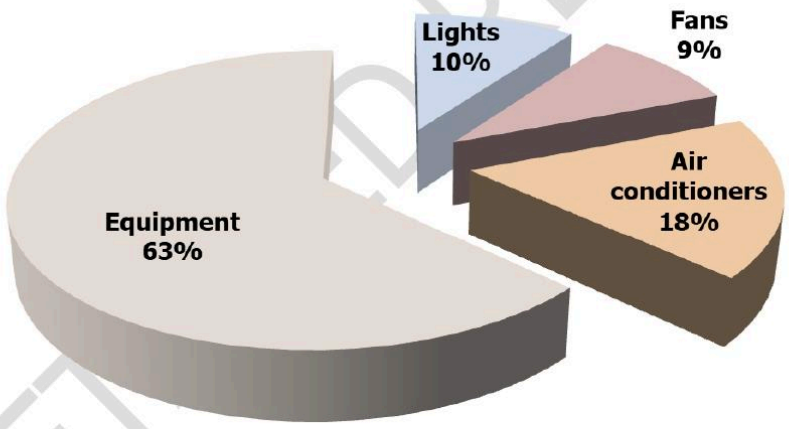


Figure 3: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consumes 63% whereas the air conditioners consume 18% while the lights consume 10% and the fans consume 9% of the total calculated electrical energy.

5.5 Lights

5.5.1 Types of lights based on the numbers

There are a total of **576 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)	197
2	**Non-LED lights** (Non-Energy efficient appliance)	379

Table 6: 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 **50,968 kWh** of energy.

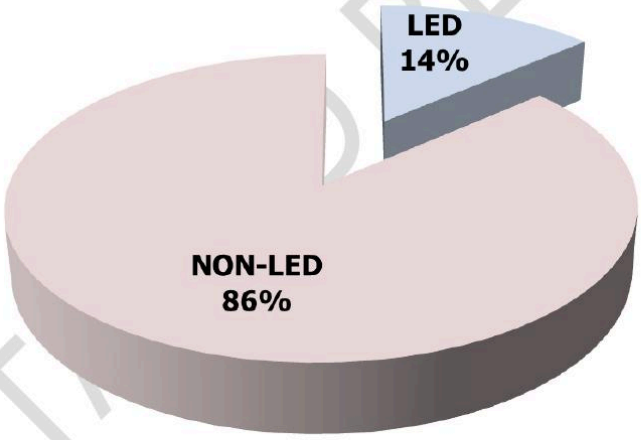


Figure 4: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights on-premises shows **Non-LED lights consume 86%** whereas the **LED lights consume 14%** of the total power consumed by lights.

5.6 Fans

5.6.1 Types of fans based on the numbers

There are a total of **473 fans** on the premises as follows:

S. No.	Type	Nos.
1	Ceiling fans	412
2	Large motor exhaust fans	7
3	Medium Motor exhaust fans	34
4	Small Motor exhaust fans	5
5	Wall mounted fans	15

Table 7: 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 **46,223 kWh** of the energy.

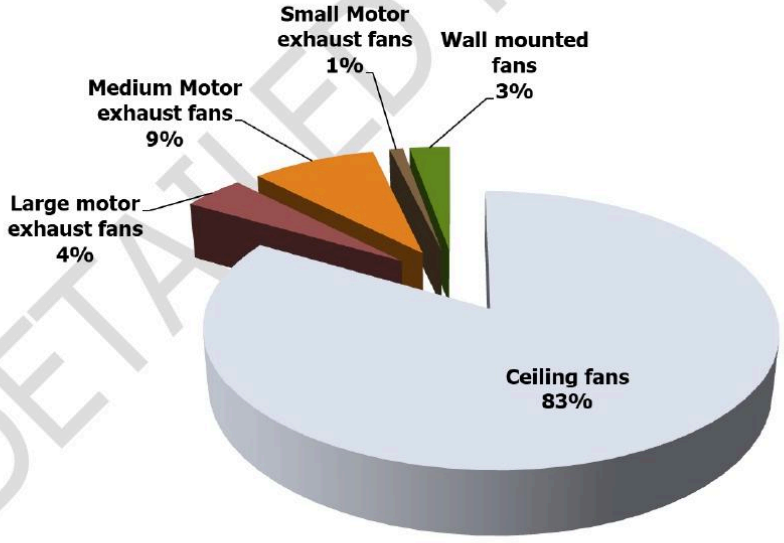


Figure 5: Types of fans based on power consumption

The above analysis shows the **Ceiling fans consume 83%** whereas the **medium motor exhaust fans consume 9%** while the **large motor exhaust fans consume 4%** whereas the **wall mounted fans consume 3%** and the **small motor exhaust fans consume 1%** of the total power consumed by fans.

5.7 Air conditioners

5.7.1 Types of air conditioners based on the numbers

There are **50 air conditioners** on the entire premises**.**

5.7.2 Building-wise consumption analysis

The energy consumption of air conditioners is **89,817 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 **393 nos. of equipment** in the Educational sector.

5.8.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **3,20,887 kWh** of energy.

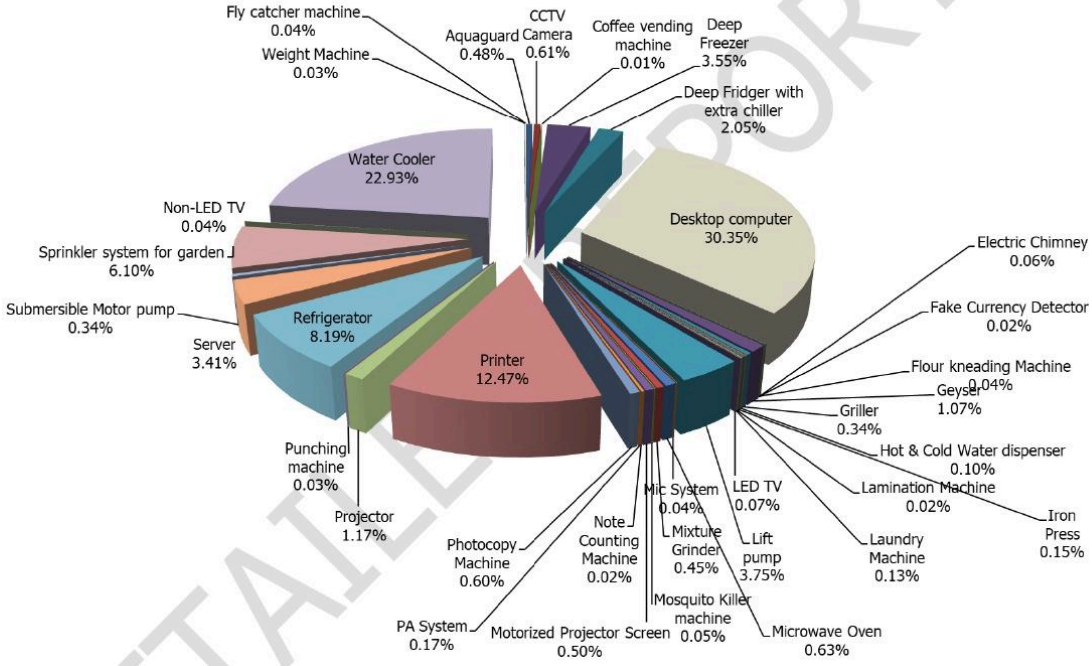


Figure 6: Energy consumed by types of equipment in the educational sector based on the usage study

The above summary shows that the **desktop computer consumes more energy at 30.94%** while the **water cooler consumes 22.46%** the **printer consumes 12.72%** and the **refrigerator consumes 8.02%** these are the maximum consumers as compared to other equipment.

6. Suggestion

6.1 Section-wise suggestions

The following suggestions are to be considered as a ***first priority*** for implementation. These **should be executed within the next 1.5 to 2.5 years from the date of the Report submission.** The Institute can execute a plan after discussion with Project Head.

6.1.1 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 through lights specifically as a part of the electro - mechanical system if all **Non-LED lights on all floors** are replaced with an energy efficient appliance whenever the Institute undergoes renovation.

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 states that is all the **ceiling fans on all floors** if replaced with star rated appliance results in a reduction of average of **69% reduction** in energy consumption if replaced with energy efficient appliance. It will be suggested to either replace these now if Institute can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

6.2 General suggestions

The following details are consolidated study recommendations related to 'entire Institute' and should be considered as ***second priority*** for implementation, once the section wise recommendations are implemented. The following recommendations should be ***implemented within 2.5 to 3.5 years from the date of the Report submission.***

6.2.1 Alternatives to increase renewable energy

6.2.1.1 Solar farms

This option can be explored with due discussion with the surrounding and adjacent farmland owners. This will serve as a noble project and will provide dual benefits to farm land and University w.r.t to electricity bill power reduction.

Plate 1: Solar farm concept for the Institute (For reference purpose only)

Image source: Zsuzsa Bóka from Pixabay

6.2.1.2 Solar parking

The Institute can turn its existing parking areas into solar panel powered parking areas. This will provide shade and renewable energy benefit to the Institute.

Plate 2: Solar parking concept for the Institute (For reference purpose only)

Source: Image by https://solarpowerproject.in/solar-panels-for-parking-lots.php

6.2.2 Alternatives towards Smart premises mechanisms

6.2.2.1 Facility management systems, controls

(Includes electromechanical systems – Electrical, Water)

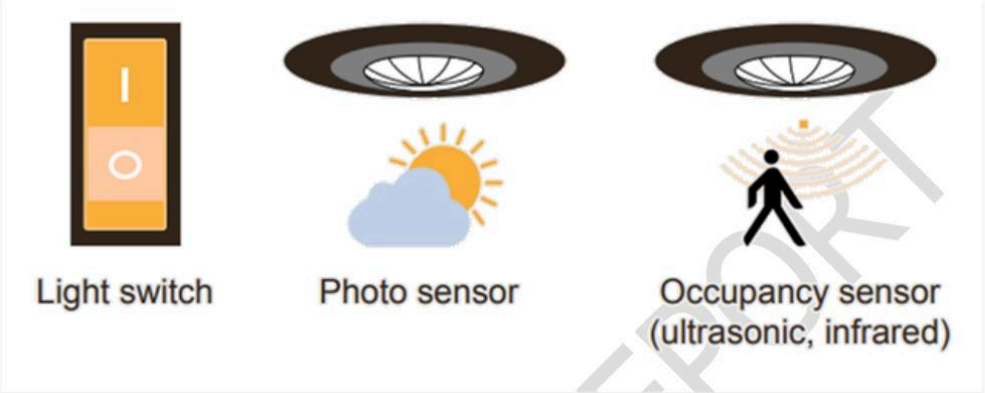


Plate 3: Understanding the lighting concepts

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

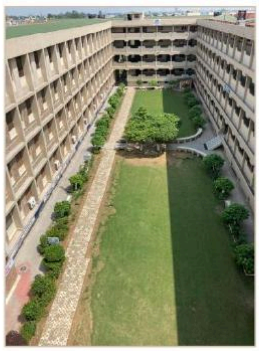
The above diagram provides a detailed study of how the system controls should be incorporated in the premises as fare as lighting systems are considered. The suggestions for this sub-section are listed below.

- 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.

Investigation

Evidences collected during data documentation

Unique feature of the Institute – Organic farming area within the premises



Investigative parameters – Ecological Management – Plantations, covered parking and ramp

Investigative parameters – Water Management – Water sources and rain water harvesting system

Investigative parameters – Waste Management and the team working on the project

7. 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/
- Inference study reference image - Zsuzsa Bóka from Pixabay
- Inference study reference image - https://solarpowerproject.in/solar-panels-for-parking-lots.php

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