GREEN, ENVIRONMENT AND ENERGY AUDIT REPORTS

2020-21

AT

Dr. K. N. Modi Institute of Engineering and Technology

Modi Nagar, Ghaziabad (Uttar Pradesh)

By: -

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A C K N O W L E D G E M E N T

Energy Consultancy Services, Green Audit Team thanks to the management of Dr. K.N.Modi Institute Of Engineering and Technology, Modi Nagar Ghaziabad for assigning this important work ofGreen Audit(Environmental & Energy).We appreciate the co-operation to our team for completion of study. Our special thanks are due to: ♣Director of the college – Dr.Varun Mittal ♣ Dr. Deepankar Sharma (Coordinator IQAC), Dr. B.K.Chauhan (Coordinator Audits) & Supporting Staff of College for giving us necessary inputs to carry out this very vital exercise of Green Audit. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

D I S C L A I M E R

Energy Consultancy Services Green Audit/ Energy and Environment Audit Team has prepared this report for Dr. K.N.Modi Institute of Engineering and Technology Modi Nagar Ghaziabad, based on input data submitted by the representatives of College complemented with the best judgment capacity of the expert team. It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express 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. If you wish to distribute copies of this report external to your organization, then all pages must be included. ECS and staff shall keep confidential all information relating to your organization and shall not disclose any such information to any third party, except that the accreditation bodies.

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INTRODUCTION:

Green audit **a**ims at evaluating environmental practices within and outside of the concerned institution, college and organization, which will caste an impact on the eco-friendly ambience. Green audit is a helpful tool for an institution to establish energy or water resources. It may also be used to determine the volume and type of waste, which may be used for a recycling project or to develop waste minimization plan. It may promote health consciousness and spread environmental awareness. It gives better understanding to staff and students about Green impact in campus. It becomes necessary to accept the system of the Green Campus for an institution which will direct for sustainable development. The National Assessment and Accreditation Council, (NAAC), New Delhi has made Green audit compulsory that all Higher Academic Institutions must present an annual Green Audit Report. It is allocated to Criteria 7 of NAAC.

OBJECTIVES:

In present scenario, the Green Audit of an institution has become important for self assessment of an institution which diminishes the present ecological tribulations. The Institution is making efforts to keep the environment green since its beginning. Hence, the main aim of the green audit is to describe framework of Environment Sustainability in fulfillment with the applicable policies, and regulations. The key points of carrying out Green Audit are as follows:

- To map the Geographical Location of the Institution
- To document the floral and faunal diversity of the Institution
- To secure environment
- To document the rain water harvesting system of the Institution
- To document solid waste treatment, liquid waste treatment and E- waste treatment
- To make aware students to real concerns of environment and its sustainability through Awareness Program
- To document Energy Conservation Measures

1. ABOUT THE INSTITUTION:

Dr. K. N. Modi Institute of Engineering and Technology, Modinagar is a co-educational Institute established in 1995 under the aegis of Dr. Kedar Nath Modi Institute of Pharmaceutical Education and Research Trust. The Institute was started with the approval of AICTE, New Delhi as an affiliated college of C.C.S. University, Meerut with undergraduate programme in B.Tech. In the year 2002, Uttar Pradesh Technical University, Lucknow came into existence and this Institute got affiliated with this in the year 2002. Presently, this Institute is running with M.B.A. and B.Tech. (Civil, Mechanical, Chemical, Computer Science, Electrical, Information Technology and Electronics & Communication Engineering) programmes affiliated to Dr APJ Abdul Kalam Technical University, Lucknow (Formerly UPTU, Lucknow) The college has undergone assessment & accreditation by NBA in 2005 and three branches of B.Tech -Electrical Engg, Chemical Engg and Electronics & Communication Engg. were Accreditated for 3 years. Subsequently, this Institute has undergone assessment & accreditation by NBA in 2016 and its one branch Mechanical Engg was accreditated for 3 years.

Institution Website: http://www.knmiet.edu

The founder Dr.Kedar Nath Modi was contributing to the cause of the Society and a pioneer establishing educationalist to offer quality and value based professional education primary to higher levels.

Fig:- Arial View of DKNMIET

2. Land Distribution: Dr. K. N. Modi Institute of Engineering & Technology covers around 10.1 acre area from which 29000 square meter area goes under construction of buildings and remaining area used for plantation and cropping purpose.

Sr. No.	Particulars	Land Area (Sqr mtr)
1.	Main Building/Hostels/ Residential Quarters	29000
2.	Playground & other amenities	8159
	Total	

3. Green Measure: A green campus is healthy and safe place to work. Green Measure helps to reduce health problems, water & soil erosion. It gives shelter to animals & birds and saves rain water. Through Green measure human being gets fresh air, healthy food & fruits. To maintain eco-friendly environment in the campus, the following green measures are adopted to save environment for coming generations:

3.1 Lawn& Open Air Stadium: There is a lawn in front of workshop at Dr. KNMIET. The boundary of lawn is marked with green hedge which is well maintained and enhances the beauty of campus. It has an open air stadium where students play outdoor games.

Fig:-Lawn in front of DR KNMIET

Fig:-Open air stadium of DR KNMIET

3.2 Trees: There are various types of trees and plants which make the whole campus airy, free from carbon dioxide, soothing as well campus seems decorated. Plantation is also done every year in campus. These plants are 388 which maintain the biodiversity and healthy surroundings.

S.N.	COMMON NAME	BOTANICAL NAME	FAMILY	No. of Name Plate
1.	False ashoka	*Polyalthialongifolia*	Annonaceae	20
2.	Lipstick	*Bixa orellana*	Bixaceae	25
3.	Mango	*Mangifera indica*	Anacardiaceae	05
4.	fiekas	*Ficus racemosa*	Moraceae	20
5.	sagwan	*Tectona grandis*	Lamiaceae	50
6.	jamun	*Syzygium cumini L*	Myrtaceae	03
7.	gular	*Ficus racemosa*	Moraceae	05
8.	Pepal	*Ficusreligiosa*	Moraceae	10
9.	Ashoka tree (ashapal)	*Saracaasoca*	Fabaceae	50
10.	Neem	*Azadirachtaindica*	Meliaceae	04
11.	Bottlebrush	*Callistemon spp.*	Myrtaceae	05
12.	common guava	*Psidium guajava*	Myrtaceae	10
13.	White Mulberry	*Morus alba*	Moraceae (Mulberry family)	04
14.	tulsi	*Ocimum sanctum L.*	Lamiaceae	15
15.	Carandas	*Carissa carandas*	Apocynaceae	50
16.	Flower Plants	Magnoliophyta	Plantae	112
			Total	**388**

3.3Fruit Trees:

SR. NO.	PLANT NAME	BOTANICAL NAME	VARIETY	TOTAL NO. OF PLANTS
1.	Mango	*Mangifera indica*	Anacardiaceae	05
2.	jamun	*Syzygium cumini L*	Myrtaceae	03
3.	common guava	*Psidium guajava*	Myrtaceae	10
4.	White Mulberry	*Morus alba*	Moraceae (Mulberry family)	04
			Total plants	**22**

3.4: FLOWER PLANTS

Sr. No.	Plant Name	Botanical Name	Family
1.	Gudhal Red	Hibiscus acetosella	Malvaceae
2.	Gudhal White	Hibiscus rosa-sinensis	Malvaceae
3.	Rose	Rosa	Rosaceae
4.	Marigold	Tagetes	Asteraceae
5.	yellow oleander	Cascabela thevetia	Apocynaceae
6.	Nerium oleander	Nerium	Apocynaceae
7.	marigolds	Calendula	Asteraceae
8.	Harshringar	Nyctanthes arbortristis	Oleaceae
9.	crape jasmine	Tabernaemontana divaricata	Apocynaceae
10.	night-scented jessamine	Cestrum nocturnum	Solanaceae
11.	Mongra	Jasminum sambac	Oleaceae
12.	Kena	Commelina bengalensis	Commelinaceae
13.	Guldavari yellow	Hibiscus rosa-sinensis	Malvaceae
14.	Jasmine	Jasmine	Oleaceae

15.	Common chicory	(Cichorium intybus)	Asteraceae
16	S plant		
17	Jafri	Tagetes Marigolds	Asteraceae
18	Bogan beliya	Bougainvillea	Nyctaginaceae
19	Cactus	Cactus	Cactaceae

4. Water conservation:

Water is the most important element for life. The ground water level is being depleted day by day therefore it is essential to save water and recharge the ground water. Dr. K. N. Modi Institute of Engineering & Technology adopts several ways to reuse water and recharge the ground water.

4.1 Rain Water Harvesting System

Rain water harvesting is the storage of water of rain. Rainwater is accumulated and sent to a tank, well or borehole. It is used for watering the plants, agriculture and domestic use. Rainwater harvesting is the simplest method to collect the water. In last years rainfall is decreasing which created huge pressure on other water resources in different regions. Several water resources are speedily utilized without recharging them causing shortage of water. Therefore there is a great need to remove this hazard through ground water resource management. To increase ground water level, the Institution has started Artificial Recharge Project with Parle Agro Private Limited.

4.1.1 Aritificial Recharge Project:

- College campus has 8 pits for water recharge.
- In campus first of all when rain falls, water goes in well constructed drains from where water is sent to the deeper part of ground with the help of borewell in pits. By which water level is being increased.
- In the duration of one year these pits collect 3.456 crore ltr. water, out of which college uses 2.5 crore ltr. water and saves (+).956 crore ltr. water in a year.

Artificial
Recharge
Project
Modinagar, Uttar Pradesh, India
C-281, Devendra Puri, Modinagar, Uttar Pradesh 201201, India
Lat N 28° 50' 52.7244"
Long E 77° 34' 48.0252"
27/03/21 02:24 PM
Google

Artificial
Recharge
Project
Modinagar, Uttar Pradesh, India
C-287, Devendra Puri, Modinagar, Uttar Pradesh 201201, India
Lat N 28° 50' 53.0988"
Long E 77° 34' 48.3964"
03/04/21 02:44 PM
Google

Artificial
Recharge
Project
Modinagar, Uttar Pradesh, India
C-18, Devendra Puri, Modinagar, Uttar Pradesh 201201, India
Lat N 28° 50' 47.5908"
Long E 77° 34' 48.9324"
03/04/21 02:49 PM
Google

5. Waste Management: In this institution waste is managed in the following ways:

5.1 Solid Waste Management:

- Garbage cart is arranged for transport of solid waste management.
- At various places dustbins are arranged to keep campus neat and clean.
- Green and Blue dustbins are used in campus for wet waste and dry garbage respectively.
- Waste food of hostel mess and canteen are converted into manure in compost pits to make fertilizer for saplings.

5.2 Liquid Waste Management:

- Waste water from hand wash tap and drinking water tap is utilized for gardening. Both type of water taps are fitted adjacent to plants.
- All the chemicals are diluted properly before discarding in to wash basin in Chemistry Practical laboratory.
- In the laboratory glass ware are washed with minimum quantity of water.
- Push taps are installed in place of moveable taps to save water.

5.3 E-Waste Management:

- Non-functioning compact disk is used by the students for embellishment of rooms at Fresher party, annual fest etc.
- The cartridge of laser printer is refilled from the vendor outside the college premises.
- Computers having low configuration are given to nearby schools.
- The non working equipments and computers, and its spare parts are safely discarded.
- UPS batteries, CPU, Key Boards and mouse are repaired by the mechanic.

6.Proper Arrangement of Transport:

6.1 Bicycles: Dr. KNMIET non-teaching staff and students who live at nearby area of institution, use bicycles to commute. They are making efforts to reduce pollution and fuel expenditure.

6.2 **Pedestrian Friendly Campus:** There is a parking area in institution campus where every staff member and student has to stand their cars, bikes and bicycles which makes campus free

from any kind of accident. Therefore students and staff can move safely in the campus.

7. Alternative of Plastic or No Plastic: Dr. KNMIET is a plastic free campus. Institute has organized several programs to spread awareness among staff and students, like how plastic is harmful for everyone. Keeping hot edible in plastic boxes is injurious for health. Under UBA programme institution arranged a, Plastic Free India Campaign, in Paluata and Bhartsna village to ban plastic. Jute Bags should be used in place of polythene bags.

8. Energy Conservation Measures:

- Stickers are pasted at various places to spread awareness for energy saving on which '***Switch off light when you leave'*** is mentioned.
- Ac and fans are used when needed.
- LEDs are used in place of tube light.
- During daylight, lights are turned off.
- Computers, UPS and other appliances are disconnected from power supply at the time of college-closure.
- Solar water heater plants are fixed at the roof of hostel building. By which Girls and boys may get hot water during winter season. It is very easy and comfortable way to make water hot while stereotyped methods consume more electricity or LPG.

9. Awareness Program:

The main purpose of awareness program is to make Dr KNMIET greener, healthy and eco-friendly to spread awareness for safe environment where everyone may take fresh air, feel calm and soothing. Different activities were organised at institute campus to serve this purpose:

1. A Faculty Development Program was organised by Chemical Engineering Department of Dr. KNMIET on the topic ***Safety and Hazard Management in Chemical Laboratories & Industries*** from 21st May to 25th May 2018sponsored by APJ Abdul Kalam Technical University, Lucknow.

2. On 29th February 2020 an International Conference on ***Emerging Trends in Science & Engineering for Sustainable Development (ICETSESD-2020)*** was organized at KNGD auditorium by Dr. K N Modi Institute of Engg. & Tech., Modinagar with technical support Institution of Water & Environment (IWE), India.

3. Institution of Water and Environment, India has established its ***Student Chapter*** at Dr KNMIET, Modinagar on 29th February 2020. Through which IWE motivates students for water conservation. Students go to Delhi to visit IWE & its Set Up by which they learn how to save water in several ways like waste water of RO can be used in garden. IWE solicits different innovative ideas from the side of students.

4. A National seminar was organised by Dr. K N Modi Institute of Engg. & Tech., Modinagar with technical support from Institution of Water & Environment (IWE), India & AKTU, Lucknow on ***Zero Waste Discharge: Issues Challenges & Way Forward*** on 28th April 2019 at KNGD auditorium.

5. On 5 June World Environment Day was celebrated in campus. On this day Administrator, Director and other teachers planted different saplings.

6. Students of this institution go outside from the campus to motivate people for plantation and as well they themselves planted around 50 to 100 sapling nearby areas of institution.

ENVIRONMENTAL AUDIT REPORT

2020-21

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DISCLAIMER

This report has been produced for Dr. K.N Modi Institute of Engineering & Technology, Modinagar. The information in the report is prepared based on the information obtained from various sources, the data available to us, parameters observed at the site, and discussions held with the relevant officials at the campus.

The detailed Information and analysis presented in this report are valid as on the date of visit and period of study at the site. The work presented represents our best efforts and judgments based on the information available at the time this report was prepared.

The consultancy makes no assurances as to the accuracy of any such information or any conclusions based there on. The observations made in this report are only an indication of the performance of the facility based on our assessment and should not be considered as the comment on the functioning of the facility. The observation is purely based on the data recorded at that point of time.

The consultancy is not responsible for the reader's use of, or reliance upon, the report, nor any decisions based on the report. Readers of the report are advised that they assume all liabilities incurred by them, or third parties, as a result of their reliance on the report, or the data, information, findings and opinions contained in the report.

EXECUTIVE SUMMARY

A Nation's growth starts from its educational institutions, where the ecology is thought as a prime factor of development associated with the environment. Clean and healthy environment aids effective learning and provides favorable learning environment. Educational institutions now days are becoming more sensitive to environmental factors as more concepts are being introduced to make them eco-friendly. To preserve the environment within the campus, various viewpoints are applied by the several educational institutes to solve their environmental problems, such as promotion of energy savings measures, usage of recycled water, water-use reduction, and rain water harvesting etc. The activities pursued by colleges and universities can create a variety of adverse environmental impacts.

The aim of the report is to identify scope for improvement and recommend implementable and economically viable solutions achieving the most optimize utilization of energy and water in the campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Therefore, it is imperative that the college evaluate its own contributions towards sustainable future.

In Dr. K.N. Modi Institute of Engineering & Technology, Modinagar the audit process involved initial interviews of management to clarify policies, activities, records and the cooperation of staff and students in the implementation of mitigation measures.

This was followed by staff interviews, review of records, observation of practices and observable outcomes. In addition, the approach ensured that the

Management and staff are active participants in the green auditing process in the college.

The baseline data prepared for the Dr. K.N. Modi Institute of Engineering & Technology, Modinagar will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the Institute. Existing data will allow the Institute to compare its programs and operations with those of peer institutions, identify are assigned of improvement and priorities the implementation of future projects. We expect that the management will be committed to implement the green audit recommendations.

RECOMMENDATION FOR ESTABLISHMENT OF "CORE MANAGEMENT TEAM" ON CAMPUS:

In order to ensure that the provisions as suggested and advised in the audit report are actualized or their potential is realized thoroughly, we further suggest constituting a **CORE MANAGEMENT TEAM** on campus, comprising of senior administrative officers, staff members, teachers and student ambassadors. The team will be responsible for overseeing the implementation of the identified measures, which will be imperative to it succession ground.

PROPOSED CORE TEAM MEMBERS WILL INCLUDE:

- Institute owner and members from the management.
- Staff members responsible for Institute facilities.
- Student ambassadors as support team.

THE TEAM WILL, THUS, BE RESPONSIBLE FOR:

- Identifying specific objectives.
- Developing a **GREEN CAMPUS ACTION PLAN.**
- Communicating the plan to other student bodies.
- Implement conservation measures.

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INSTITUTE AT A GLANCE

Dr. K. N. Modi Institute of Engineering & Technology is situated in Modinagar, Ghaziabad in Uttar Pradesh state of India. Established in 1995, it is accredited from AICTE and it is affiliated to Uttar Pradesh Technical University. Dr.KNMIET, Modinagar, Ghaziabad offers various courses across various streams.

ARIAL VIEW OF Dr. K.N.M.I.E.T

Dr. K.N. Modi Institute of Engineering & Technology, Modinagar is one of the leading educational hubs of professional courses with in numerable students enrolled in different educational programs. It offers an array of multi–disciplinary courses making it acknowledge portal where excellence matters.

The institute currently offers comprehensive facilities, cultural activities, wide range of academic courses and industry interface. This institute campus is well-resourced with state-of-the-art technical infrastructure and facilities. With green environment and technically advanced campuses, this institution is the ideal destinations for perfection oriented learning. The well organized infrastructure helps the students to concentrate on studies more and also

provides them everything and every facility they require to keep their mind focused on their aim and success.

LAND DISTRIBUTION

Dr.K.N.M.I.E.T covers around - acre area from which - acre area goes under construction of buildings and roads and remaining area is used for plantation and cropping purpose.

SR. NO.	PARTICULARS	LAND AREA
1.	Main Building/Hostels/ Residential Quarters (Including roads)	10.1 Acres
2.	Playground & other amenities	8159 Sqm.
	Total	

PROJECT BACKGROUND

Buildings in the education sector contribute to over 230 million tons of CO_2 emissions per annum approximately in India. The need for water, land and resources are growing enormously as more educational and institutional developments are under way to accommodate the ever- growing population of India. There is growing interest in many up and coming universities today, to frame practical strategies for resource savings, conservation and waste reduction to make centers of learning deliver excellence in terms of sustainable green campuses and sustainable communities, at large.

A clean and healthy environment aids effective learning and provides a favorable learning environment. There are various efforts around the world to address environmental education issues. Green Audit is them cost-efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who are the part of economic, financial, social and environmental factor .It is necessary to conduct green audit in college campuses because students become aware of the green audit, its advantages to save the planet and they become good citizens of our country. Thus, green auditing becomes necessary at the college level.

As a first step, Dr. K.N. Modi institute of engineering & technology is undertaking a comprehensive Green and Environmental Auditing of campus to understand the energy and

water use patterns and identify opportunities for improvement. The main objective of this appraisal report is to provide a technical assessment of energy, water and resource conservation opportunities and their projected savings.

Ultimately, the audit report should ensure that the agreed-upon conservation measures, when implemented, would enable the campus to minimize energy, water and resource consumption and adhere to statute requirements such as the National Building Code 2016.

Green and Environmental Auditing is NOT a fault-finding exercise, but an approach to identify energy, water and resource saving opportunities and scope for performance improvement.

Before initiating Green and Environmental Auditing process, it is necessary to understand the scope of the audit and amount of efforts required to complete the desired activity. The type of energy audit mainly depends on the category of building, the depth to which final audit is needed, and the potential and magnitude of cost reduction desired.

THE OBJECTIVE OF THIS STUDY WAS TO FIND ANSWERS TO THE FOLLOWING QUESTIONS:

- What is the benchmark for water consumption?
- Is water use monitored and recorded?
- How are water leaks checked?
- Is there a management team constituted for the Institute?
- Identifying water conservation opportunities.
- How much energy is used?
- Identify obvious sources of energy waste or inefficiency
- Identify areas for further, more rigorous study.
- Identify the scope of improvement based on measurement
- What is the technical and economic potential?
- What are the risks involved in execution?

It is worth mentioning that auditing is not a means to amend. It is a technique to identify opportunities for energy, water and resource savings. The campus management team must act on the findings of the audit report and implement the identified opportunities in order to realize savings.

GREEN AUDIT

A TOOL FOR ENVIRONMENTAL PROTECTION AND CONSERVATION:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife ,producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and in hospitable .Today ,people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Considering the present environmental problems of pollution and excess use of natural resources, Hon. Prime Minister, Shri.Narendra Modi ji has declared the Mission of Swachch Bharat Abhiyan .Also, Institute Grants Commission has mentioned, Green Campus, Clean Campus "mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well

as waste water, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics .Through green audit one can get direction about how to improve the condition of environment.

NEED OF GREEN AUDIT

Green auditing is the process of identifying and determining whether the institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially ,in common areas. Now, it is necessary to check whether our processes are consuming more than required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resourcedepletionitisnecessarytoverifytheprocessesandconvertitintogreenandcleanone.Gree n audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

OBJECTIVES OF GREEN AUDIT

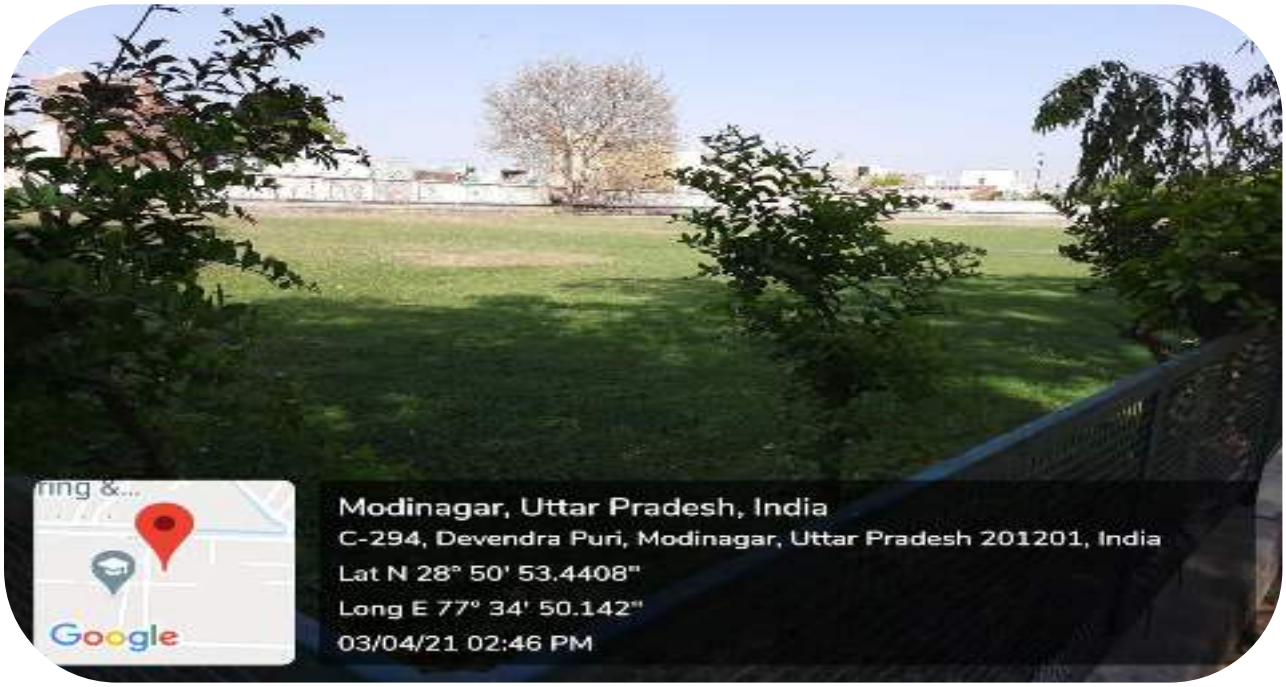
1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.

2. To identify and analyze significant environmental issues.

3. Set up goal, vision and mission for Green practices in campus.

4. Establish and implement Environmental Management in various departments.

5. Continuous assessment for betterment in performance e in green practices and its evaluation.



Greenery play ground

6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

ENVIRONMENTAL CONSCIOUSNESS

Institute is playing a key role in development of human resources Nationwide. Higher education institutes campus run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

BENEFITS OF GREEN AUDIT TO INSTITUTE

There are many advantages of green audit:

- It would help to protect the environment in and around the campus.
- Recognize the cost saving methods through waste minimization and energy conservation.
- Find out the prevailing and forth coming complications.
- Empower the organization to frame a better environmental performance.
- It portrays good image of institution through its clean and green campus.

  Finally, it will help to build positive impression through green initiatives for the upcoming NAAC visit.

APPROACH & METHODOLOGY

During the study, the entire building was visited and studied in detail. The audit involved carrying out various measurements and analysis covering all major energy, water and resource consuming sections, to realistically assess losses and potential for savings. The study focused on improving energy, water and resource use efficiency and identifying saving opportunities .A very simple civilsing system has been devised to monitor the environmental performance of Dr. K.N. Modi Institute of Engineering & Technology. It comes with a series of questions to be answered on a regular basis. This innovative scheme is user friendly and completely voluntary. The aim of this auditing report is to help the institution set environmental examples for the community and to educate the young learners.

A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit and discussions were held on the practicalities associated with the audit. This meeting was an important prerequisite for the green audit because it was the first opportunity to meet the Institute concerned personnel for audit and deal with any concerns.

The major areas of study are broadly categorized into:

- Air conditioners, Lighting and Fan
- Solar PV installation
- Water consumption
- Waste generating indicators
- Health indicators
- Transportation
- Training& awareness

METHODOLOGY ADOPTED

DATA COLLECTION

- Water use patterns and demand study.
- Inventory of toilets, wash basins and urinals.
- Energy performance indexing.
- Waste management and type of waste generated.
- Sound-based polluters for health auditing.
- Food procurement and disposal.
- Custodial chemical use.
- Transportation.
- Paper use, etc.

The data is collected includes maximum demand, units consumed, liters consumed and conserved.

ENVIRONMENTAL AND GREEN POLICY STATEMENT

Dr. K.N. MODI INSTITUTE OF ENGINEERING & TECHNOLOGY is committed to managing its estates in accordance with responsibilities to the environment. These responsibilities shall be demonstrated within the following areas as a minimum. The policy shall be reviewed annually or as per requirement:

TOBACCO FREE PREMISES: The Institute administration pledges to make the premises totally tobacco free. No tobacco products shall be allowed inside the Institute campus.

PURCHASING: In purchasing its services, materials, equipment and consumable items, the Institute will, where possible, purchase items produced in ways which do least environmental harm, which are not supplied with excessive packaging; which are benign orat least harmless in their effect on the environment. Where possible, preference wills be given to local or regional suppliers to maximize the Institute input to the local community as well as reduction of environmental impact due to transportation.

CLEANING: The Institute shall use cleaning products based on environmental considerations as well as cost and suitability. It will monitor its working practices with a view to administering dosages so as to reduce the risk of over concentration and excess residue of unused cleaning mixtures finding their way in to piped waste disposal systems.

WASTE DISPOSAL AND RECYCLING: The Institute will seek to minimize its generation of waste by reduction of purchased materials where this does not compromise its primary functions, or by re-use of materials within or outside the Institute campus. Where reduction or re-use is not feasible, materials will be recycled wherever possible.

ENERGY: The Institute is environmentally responsible for its use of energy and will therefore consider the sources, type, origin and destination of energy input and output throughout the Institute. This will require careful monitoring of consumption, the elimination of excessive or unnecessary use, and an ongoing program of energy conservation. Renewable energy solar plants shall be installed and in future also efforts shall be made to use renewable energy to the extent possible for mitigation of impact of energy use by Institute on environment.

NEW BUILD AND BUILDING REFURBISHMENT: The Institute will ensure that whenever new construction or refurbishment, work is planned and executed in a manner which reflects environmentally- responsible approaches defined by the National Building Code-2016.

GREEN TRAVEL PLAN: The Institute actively promotes the use of public transport, walking and cycling. The Institute owns vehicles and requires staff where possible to use public transport when on Institute assignments. This plan is regularly reviewed. The travel of students shall also be encouraged through public transport for those who are not using shared Institute buses for commuting to and from Institute.

FOOD POLICY: The Institute will ensure that decisions pertaining to the purchase of food, together with the use and disposal of plastic crockery/cutlery, should at all times include environmental implications as well as such factors as cost and nutritional value.

ENVIRONMENTAL RULES AND GUIDELINES: The Institute is committed to ensuring compliance to extant pollution control and other applicable environmental guidelines

WATER USE: The Institute intends to promote optimization of water use by avoidance of wastage, treatment and re-use of black water for other possible uses. The Institute also commits for Plastic free environment in Institute premises.

TARGET AREAS OF GREEN AUDITING

Green audit forms part of our source management process .Although they are individual events, the real value of green audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; Minimize waste generation or pollution and also economic efficiency.

All these indicators are assessed in process of **"Green Auditing of educational institutes".** Co-campus focuses on the reduction of contribution to emissions, procures a cost effective and secure supply of energy, encourages and enhances energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

WATER AUDIT

Water which is precious natural national resource available with fixed quantum. The availability of water is decreasing due to increasing population of nation, as per capita availability of utilizable water is going down. Due to ever rising standard of living of people, industrialization, urbanization, demand of fresh water is increasing day by day. The unabated discharge of industrial effluent in the available water bodies is reducing the quality of the sample sources of water continuously. Hence, the national mission on water conservation was declared by the Hon. Prime Minister Narendra Modi as 'Jal Shakti Abhiyan' and appealed to all citizens to collectively address the problem of water shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use. Water audit can be defined as a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. Water Audit is nothing but an effective measure for minimizing losses, optimizing various uses and thus, enabling considerable conservation of water in irrigation sector, domestic, power and industrial as well. A water audit is a technique or method which makes possible to identify ways of conserving water by determining any inefficiencies in the system of water distribution. The measurement of water losses due to different uses in the system or any utility is essential to implement water conservation measures in such an establishment.

Water usage can be defined as water used for all activities which are carried out on campus from different water sources. This includes usage in all residential halls, academic buildings, on campus and on grounds. Waste water is referred as the water which is transported off the campus. The wastewater includes sewerage, residence; hall water used in cooking, showering, clothes washing as well as wastewater from chemical and biological laboratories which ultimately going down in sink or drainage system.

AUDIT PROCESS

Measurements

Calculations

Audit observations

Report

Discussions

Zeroing in on conservation steps that can be taken

Planning and process finalization

Implementation

INTRODUCTION

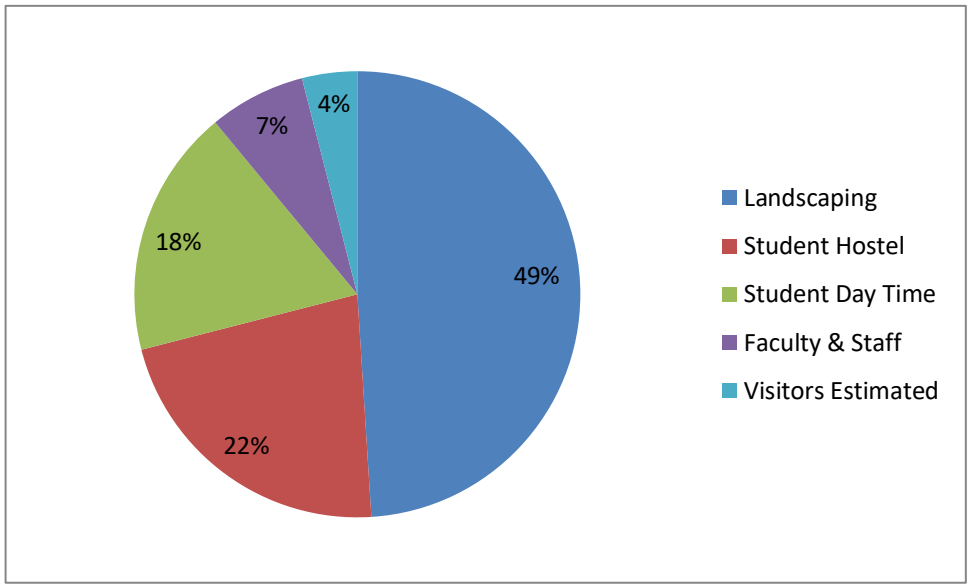
AUDIT PROCESS

MOVING AHEAD

ZEROING CONSERVATION STEPS THAT CAN BE TAKEN

From Pie Chart it is observed that of total annual water consumption-Theoretical allowance is in Hostels due to 24-hour stay of students and it is followed by day time occupants like students and faculty members.

OVERVIEW OF WATER CONSUMPTION



The maximum conservation opportunities lie in these areas. Special attention should be given in Hostels and there should be regular water leak audits conducted and report should be documented. As presently data for extraction of water is not available, it is recommended that all input source of water should be metered and the consumption pattern should be reviewed daily/weekly and monthly and any significant deviation in consumption should be immediately addressed.

OBSERVATIONS

OBSERVATIONS AND RECOMMENDATIONS:

S.NO.	OBSERVATION/PARAMETERS	YES/NO	RECOMMENDATIONS
1	Is there any bench mark for water use	No	The bench mark should be got prepared for improvement on the basis of NBC-2016 and fixing targets for improvement. The consumption of water should be adjusted as per variation in occupancy whenever there is any change in Occupancy is envisaged.
2	Is consumption of water as per NBC-2016 standard for use of water as applicable	NA	Further reduction targets should be fixed for reduction
3	Is the water use monitored and recorded?	No	Establish procedures so that a staff member is responsible for reading your meter daily, analyzing water use and knows what to do if water use changes unexpectedly. Record the data.
4	Is the water conservation opportunities identified	Yes	Water conservation is identified in the form of Plant and daily uses.
5	Are there any signs, posters or stickers in college premises to encourage water efficiency and remind students to report Leaks?	Yes	Suitable water conservation stickers should be displayed conspicuously for creating awareness.
6	Is there any system in place where leaks are specifically checked during pecial drives For any leaking /damaged pipes, taps or cisterns etc.	Yes	There should be a written periodical program for addressing any type of leaks in water lines periodically.
7	Is there any water management team to review water use?	Yes	There is a team which looks after the water management. There are several members including, students, teachers, administrative staff and even parents, Visitor's and volunteers.
8	Have you developed a water management plan?	Yes	There is a plan for water audit to maintain & circulate the water throughout the institute for water savings.

AMENITIES

S.NO.	OBSERVATION/PARAMETERS	YES/NO	RECOMMENDATIONS
1	Are water efficient showers installed in toilets?	Yes	Through concerned members of staff. , Shower timers used by the students for awareness and displaying stickers at regular interval for briefing.
2	Are the taps in hand basins are water efficient?	Yes	The taps are used only for hand washing; There is 1.7 L/min for super efficiency.
3	Do cleaners hose down Amenity areas?	No	There is much better arrangement for this.
4	Does your College have single flush toilets?	Yes	A single flush toilets with 6/3L ,specially being saving potential because through this ,awareness in students can been courage to use low quantity flushing only in case of using W/C as urinal as is the case most time of use of toilet.
5	Does your College have dual Flush toilets?	No	Double Flush system required more energy in comparison to Single Flush System.
6	Do you have a single tank on the wall or urinal flush water system?	Yes	Regular checking of single tank for urinal is being done.
7	Does your College have any cyclic flushing urinals?	No	We have a conventional flushing system.

CANTEEN, MESS, HAND WASH AREA

S.NO.	OBSERVATION/PARAMETERS	YES/NO	RECOMMENDATIONS
1	Are taps in kitchens water efficient?	Yes	There is suitable water system has-been working.
2	Do Kitchens have water efficient dish washers?	No	Consider using water efficient model dish washer. You will save money through water and energy savings.
3	Do staff leave taps running while they are cooking and Cleaning?	No	Still, install stickers to remind staff to turn off taps. Consider installing sensor taps.

OUTDOOR AREAS

1	Has appropriate staff completed the Water Conservation training	No	Ensure appropriate staff completes the Water conservation training.
2	Do campus sub-meter irrigation water supply?	No	There is no need to such equipment in our campus.
3	Are you watering on your allocated watering days?	Yes	Watering is being done on regular basis.
4	Do you improve your soils? Y	Yes	Soil quality is improved by fertilizers.
5	Do you use an alternate water source to irrigate your landscape?	No	Water rejected from RO is stored and used for irrigation purpose but not metered. Meters should be installed. STP treated water is also used for Horticulture application.
6	Do you have Water wise /Water efficient Plants in your garden?	Yes	A lot of native species have been planted there by reducing water requirement.
7	Is your irrigation system Water wise?	No	Only staff is to be educated that they should be careful to ensure that water is not falling on hard cape.
8	Do you have mulch on your Garden beds?	No	Use water wise mulch to reduce Evaporation and save water.
9	Do you have under-utilized areas of lawn in your landscape?	Yes	We are replacing lawn in these areas with water wise gardens to reduce water use.

TRAINING AND AWARENESS

S.NO.	OBSERVATION/PARAMETERS	YES/NO	RECOMMENDATIONS
1	Whether staff in general are aware about importance and Need of water conservation	No	The awareness should be created amongst all maintenance and operation staff.
2	Whether there are training modules/sessions for training of staff on topic of importance of water Conservation.	No	Regular training should be conducted
3	Whether there is a program for sensitizing students through workshop/seminars to educate them regarding scarcity of water and its conservation	No	There should be some program to create awareness amongst students through training
4	Whether there is a program in place to involve students in water conservation targets.	No	There should be active involvement of students; they being helpful in college as well as it shall be useful for them during their lifetime in future.

RECOMMENDATIONS

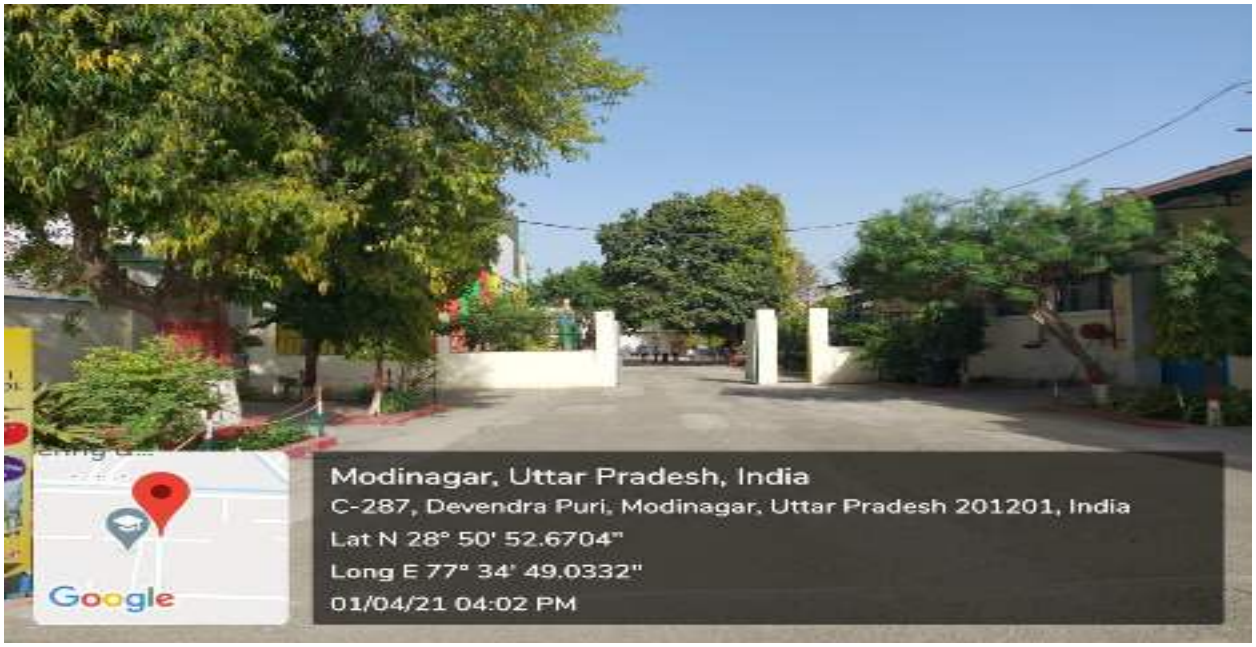
ACTION STEPS –DESIGN AND CONSTRUCTION

1	Reduce water consumption through efficient fixtures and plumbing Design.
2	Efficient plumbing design. Two stack system design
3	Sub metering of water for separate uses.- Bore well ,Land scaping ,Labs
4	Efficient fixtures such as low flow taps, showerheads and toilet sand Waterless urinals as per applicability in Gents Toilet.
5	Efficient appliances for catering and other uses with specified water efficiency standards.
6	Recycle water using Grey Water systems. Being done–recycled water data be maintained
7	Rain water is stored in multiple storage tanks and issued inside premises as per requirement.
8	Landscaping and site layout should avoid run-off by creation of Sustainable Urban Drainage Systems. Design documentation is required for establishing zero run off from premises during rain based on rain fall pattern.
9	Manual shut off of Pump should be done so that there is no wastage of water and Energy.
10	Check Leakage through internal audits-Weekly

IMPORTANCE OF GREEN MEASURES

Today many educational institutes have made an environmental revolution. No more coffee to go, no more plastic bottles to buy on a territory of the campus, the implementation of eco-friendly projects and campaigns – all this now is becoming a sustainable lifestyle for the majority of students. The effects of climate change are dramatically terrifying. In most colleges, the initiative of the activities to make planet safer comes from administration faculties. However, any little action of every student will help to protect our Earth. Green measures help in slow down the climate change, reduce the major environmental health risk, provide shelter to birds and animals, it boots creativity, more self-sufficiency, reduce electric bills, reduce soil and water erosions, save rain water, increase productivity, provide healthy food and improve air quality and many other beneficial things can get by adopting green measures.

DIFFERENT GREEN MEASURE: - Dr. K. N. Modi Institute of engineering & Technology, Modinagar adopts much such green measure in campus to protect environment and earth for future generations. There are some major green measures present in our campus.



RECOMMENDATIONS FOR WATER MANAGEMENT

1. Water management plans must be part of an integrated approach that examines how changes in water use will impact all other areas of operation.
2. Water conservation involves two distinct areas: technical and human. The technical side includes collecting data from water audits and installing water- efficient fixtures and procedures .The human side involves changing behavior and expectations about water usage and "the way things should be done."Both areas must be addressed for a water conservation program to succeed.
3. A water conservation plan depends upon accurate data. Before water saving measures are implemented, a thorough water audit should be conducted to determine where water is being used. Then, water use can be monitored to track conservation progress.
4. A successful water conservation plan follows a logical sequence of events. Implementation should be conducted in phases, starting with the most obvious and lowest-cost options.
5. An effective plan examines not just how much water is being used, but how it is used and by whom. When analyzing a water audit, ask the next question: "Can this process be done as well or better using less water?"
6. The quality of water needed should be matched with the application. Many commercial, institutional, and industrial applications do not require the use of potable water. Whenever possible, substitute recycled water used in one process for use in another.
7. The true cost of water must be considered when conducting a cost analysis. The true cost of water is the amount on the energy PLUS the expense to heat, cool, treats, pump, and dispose of/discharge the water.
8. Life-cycle costing is the key to evaluating water conservation options. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment.

WATER CONSERVATION

Water is the most important part of environment. The ground water level is getting depleted and not enough to supply water to earth ecosystem so it is necessary to save the water and recharge the ground water. . K. N. Modi Institute of engineering & Technology, Modinagar adopts various technologies for reusing the water and recharges the ground water.

RAIN WATER HARVESTING SYSTEM

RAIN WATER HARVESTING:

Water is an important natural resource and is the very basis of our life. We use water for drinking, irrigation, industry, transport and for the production of hydro-electricity. Water is a cyclic resource which can be used again and again after cleaning. The best way to conserve water is its judicious use.

A large quantity of water is used for irrigation and there is an urgent need for proper water management in irrigation sector. The overdraft by tube-wells has resulted in lowering of water table in a number of villages in western Uttar Pradesh.

Construction of Pit For Artificial Recharge Project

ENERGY AUDIT

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also it can be said as "the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems". Energy cannot be seen, but we know it is there because we can see its effects in the forms of heat, light and power. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and thus, requires no explanation for its inclusion in the assessment. The energy audit is the key to a systematic approach for decision making in the area of energy

management. It attempt to balance the total energy inputs with its use, and serve to identify all the energy streams in a facility. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is, therefore, essential that any environmentally responsible institution examines its energy use practices. LED use also has a peculiar advantage towards environment instead of CFL and Fluorescent tubes.

LED LIGHT

PREVENTIVE MEASURES:

- Institute has many areas where lighting is not required at all times. Installing sensor based lighting in such areas can generate massive rewards. This is one of the easiest ways to save energy at Institute.
- If most systems in computer laboratory and instrumentation laboratory are based on old technology, they might be consuming more power than new technology.
- Replacing old computers and instruments with ones having energy efficiency certifications is the easiest way to conserve energy at Institute.
- By installing more solar energy panels generate more electricity and minimize their electricity bill. In the hostels increases use of solar water heater is already installed. Investment in solar lights for outdoor lighting can generate long term benefits.
- A huge amount of energy is wasted because no one really cares about switching off the fans and lights when not required. Hence, planning workshops on energy conservation to educate students, faculty and staff can generate huge results.
- Unplug overhead projectors, computers, and smart boards when not in use. This simple way to conserve energy can help save large amount of power and money in the long run.

ENERGY CONSERVATION PRACTICES IMPLEMENTED AT DR. K. N.MODI INSTITUTE:

The administration of Dr. K. N. Modi Institute is very keen on saving electricity and fuel which is been used on the campus. The Institute has implemented some unique ideas like, "No Vehicle Day", electrical vehicles on campus, LED lights on campus and installation.. The various departments also conducted energy conservation awareness programmes, motivation of students, staff and faculty to use public vehicles and programmes like PUC are conducted by various departments.

RENEWABLE ENERGY:

There is a plan to install 500 kWp Solar PV systems. The system can generate energy on-site through Green Energy route. Only improvement that can be considered is utilizing generated energy in case grid is not available. Depending upon requirement of load, through the use of PLC, the number of inverters can be made operational as per requirement of load at site.

SOLAR PV SYSTEM INSTALLED IN HOSTEL

SOLAR WATER HEATING SYSTEM:

There is solar water heating systems installed for use in hostels. There is already Solar Water heating system installed. It is recommended that during summer months or holidays time, an action may be initiated for utilization of hot water for alternative use if possible.

SOLAR WATER HEATING SYSTEM

BEST PRACTICES FOLLOWED ON THE CAMPUS TO CONSERVE ENERGY AND FUEL.

NO VEHICLE DAY :

No Vehicle day is one of the activities conducted by Institute on every 2nd Saturday of the Month, which is helpful for the fuel conservation practices. The Institute needs to continue this activity

SOLAR ELECTRICITY GENERATION :

The Institute has two electric cars for internal transportation. This activity also conserves the fuel and implements the use of non-conventional energy resources. Institute need to purchase more electric vehicles for internal transport in the Institute campus.

USE OF LED LIGHTS

Institute uses LEDs instead of use of CFL and fluorescent tubes in campus.

LED LIGHT

ENERGY CONSERVATION PROGRAMMES:

The Institute needs to arrange the energy conservation program for the purpose of awareness of fuel energy conservation and motivation of students for use of non-conventional energy devices.

WASTE MANAGEMENT AUDIT

GENERAL WASTE AND HAZARDOUS WASTE

General wastes include what is usually thrown away in homes and schools such as garbage, paper, tins and glass bottles. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals and petrol. Unscientific landfills may contain harmful contaminants that leaching to soil and water supplies, and produce green house gases contributing to global climate change.

Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Thus, the minimization of solid waste is essential to a sustainable campus. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. It is therefore essential that any environmentally responsible institution examine its waste processing practices.

E-WASTE: The old computers are sold back to vendor which is again put to beneficial use by repairing and it is good sustainable practice.

KEY BOARDS AND MOUSE: Computer parts which become un-serviceable are also disposed off. It is required to be ensured that vendor dealing with E-waste is authorized to collect E-waste.

HAZARDOUS WASTE: Lead Acid Cell Batteries are returned to Vendors for re-cycling of lead and other constituents.

FLUORESCENT TUBES: Fluorescent tubes are handed over to Junk dealer who in turn should send them to local re-cycling units. Storage of fluorescent tubes in college should be as per recommended practice.

TYPES OF WASTE GENERATED

For safe handling and management of hazardous waste in an environmentally sound manner, Govt .of India has notified the Hazardous Waste (Management Handling) Rules, 1989, under the Environment (Protection) Act, 1986. However, these Rules were suppressed with re notification of the Hazardous Wastes (Management, Handling and Trans boundary Movement) Rules, 2008. Under the said Rules, hazardous waste has been defined as those wastes which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances, and shall include wastes as specified in Schedules of the Rules.

SOLID WASTE- Extra waste is removed weekly through truck and disposed in municipal waste collection points

DRY LEAVES-Used form a king manure/compost

CANTEEN WASTE -Used for Compost

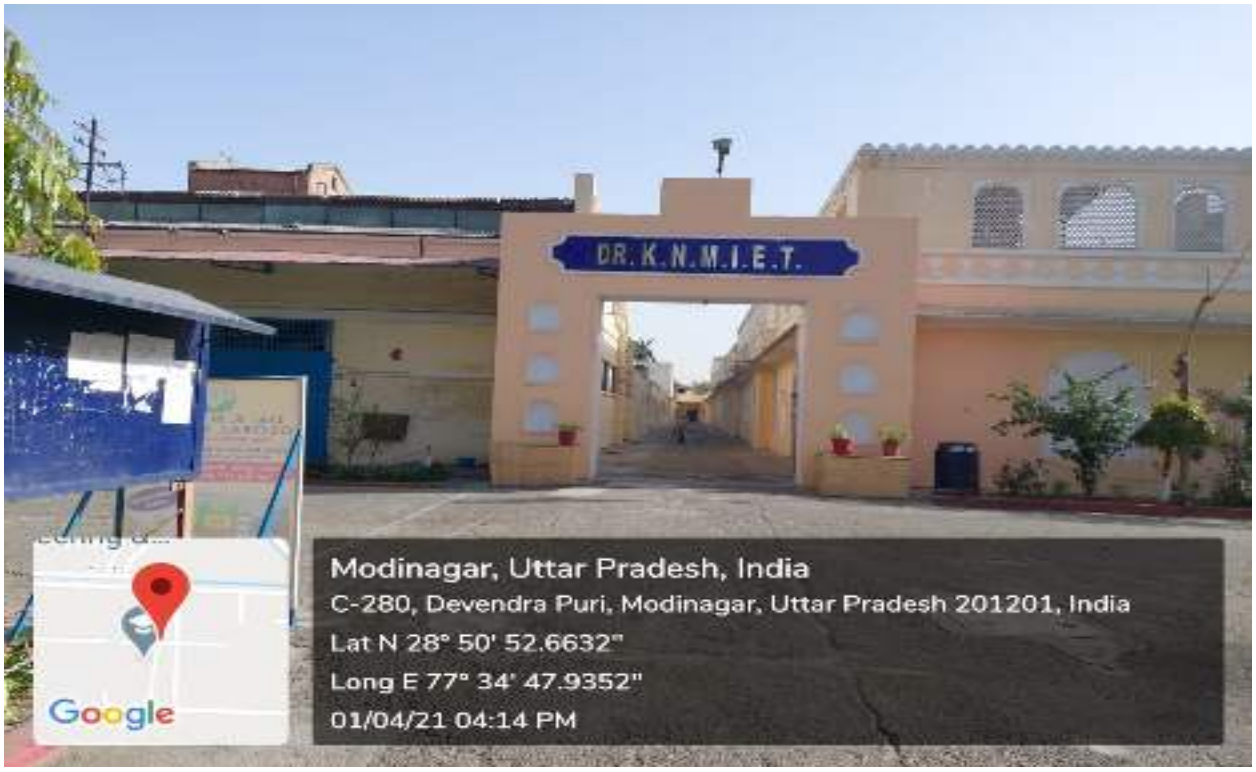
LIQUID WASTE –Preserved and used

GLASS - Handling not established

UN USED EQUIPMENT –Returned to vendors through sale

NAPKINS-Handling not established

PLASTIC WASTE- Segregated and removed



PERMEABLE PATHWAY WITH HEDGE:-The main path of Institute was constructed with stone bricks and green hedge planted both side of the path which provides beauty and greenery.

ALTERNATIVE OF PLASTIC OR NO PLASTIC:-We're coming to realize that the plastics we use for mere seconds may linger in the environment for centuries. In addition, they are not

only harming marine creatures, they are getting everywhere, in the water, we drink and the air we breathe. The problem of plastics is not distant; it is all around us, all the time.

METHODS OF MANAGING WASTE GENERATED ON CAMPUS

1. Composting
2. Recycling
3. Reusing

PREVENTIVE MEASURES BY THE INSTITUTE:

1) Paper waste is generated by all departments. Especially, Examination cell is using more one side papers for printing and writing which is good practice.
2) Answer sheets, old bills and confidential reports are sent for shredding, pulping and recycling after completion of their preservation period.
3) Institute has banned signal use plastic for any administrative as well as other purpose and therefore every less amount of plastic waste is generated in the Institute.
4) Metals scrapes segregated separately by respective department sand sent for recycling.
5) Biodegradable waste is a major solid waste generated in campus is mostly from canteen, hostels and guest house kitchens. Canteen waste is collected and some biodegradable waste is treated by composting process.
6) Glass waste is generated from laboratory mainly in the form of bottles; Many times bottles are re used for storing of other chemicals.
7) The Institute has approximately saved 1,348,914 paper sheets per year through .paperless convocation application, photocopy of answer sheet, circulars, interaction with colleges etc. online with Institute and it is very effective.
8) Building Engineering block has maximum e waste due to Computer laboratory, MCA and other courses. E-waste generated at the Institute is sent to recycle and reuse.

SOLID WASTE MANAGEMENT

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduces or eliminates the adverse impact on the environment and human health. A number of processes are involved inefficiently managing waste for a organization. It is necessary to manage the solid waste properly to reduce the load on waste management

system.

Solid waste generation and its management is a burning issue in current days. The rate of generation of solid waste is very high and yet we do not have adequate technology to manage the generated waste. Unscientific handling of solid waste can create threats to public health and environmental safety issues. Thus, it is necessary to manage the solid waste properly to reduce the load on waste management system. The purpose of this audit is to find out the quantity, volume, type and current management practice of solid waste generation in the Institute campus. This report will help for further solid waste management and to go for green campus development

FIG: COLLECTION OF WASTE PRODUCTS

Fig: AWARENESS FOR WASTE MANAGEMENT

Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Plastic bags and discarded ropes and strings can be very dangerous to birds and other animals.

Environmental Health and Safety management, the disposal of effluent/sewage water, rain water and biological waste from Institute campus, in accordance with federal, state and local regulations. There are specific procedures for handling, storage and disposal for different types of waste and different areas of the Institute.

AMBIENT AIR QUALITY STATUS

The air pollution sources in the Institute campus are due to the natural process like wind, pollen grains and natural dust. There are also anthropogenic activities like vehicular activity, generators, fires and laboratory fumes and construction activity are causing air pollution in the Institute campus. The Institute campus is a green campus. Institute campus observed minimum air pollution as compared to other National Ambient Air Pollution Centers.

NATIONAL AMBIENT AIR QUALITY PROGRAM (NAAQM)

Central Pollution Control Board, New Delhi initiated National Ambient Air Quality Monitoring (NAAQM) programmed in the year 1984 to get spatial and temporal variation of ambient air concentrations for a wide range of pollutants that are considered relevant for evolving strategic management plan. The program was subsequently renamed as NAMP (National Air Quality Monitoring Program). Under NAMP, three air pollutants viz., Sulphurdioxide (SO_2), Nitrogen dioxides (NO_2) and Particulate Matter have been identified for regular monitoring. Central Pollution Control Board, New Delhi has set guidelines to monitor and analyze the air pollution quality parameters of Modinagar. The reason being the tree cover on campus leading to absorb CO_2 and releasing $O_2$to becomes lung of Modinagar Result shows that the Institute Campus air quality status is good as compared to other locations.

PRECAUTIONARY MEASURES:

1. Ban on open solid waste burning on the Institute campus.
2. Ban on grass burning in summer season.
3. Use of bicycles for transportation in the campus.
4. Avoid using diesel generators.
5. Use of BS-IV vehicles.

NOISE POLLUTION:

1. Sounds of Normal Conversations:
   Sound Intensity: 40-60 dB Health Hazard: Sound less than 80 dB is safe for the ear.
2. Sounds emanating from Tape recorders or an Orchestra: Sound Intensity: 70 dB
   Health Hazard: It is safe for ear.
   Sounds of Heavy Traffic: Sound Intensity: 90 dB
3. Health Hazard: Constant exposure to sound greater than 80 dB causes temporary hearing loss and if they are not treated immediately, causes permanent impairment.
4. Sounds of Pneumatic drills and other machines: Sound Intensity: 100 dB
5. Health Hazard: Constant exposure causes temporary hearing loss and if they are not treated immediately, causes permanent impairment.
6. Sounds of Aircraft engine: Sound Intensity: 100-200 dB
7. Health Hazard: Higher noise level of 160 dB cause total deafness, rupturing eardrums, damaging inner ear. It also causes high blood pressure, ulcer in stomach, palpitation, nervous problems, irritation, anger, and affects pregnant women's embryo.
8. Sounds of Rockets during take-off: Sound Intensity: 200 dB
9. Health Hazard: It is dangerously causing total deafness by rupturing the eardrums and damaging the inner ear. It also causes high blood pressure, ulcer in stomach, palpitation, nervous problems, irritation, anger, and affects pregnant women's embryo.

Sound/Decibel level measured is satisfactory and there is no adverse impact of the same on occupants. The major source of noise on Institute is automobile noise. The human communication and transportation is producing high level sound. Building construction

and excavation work can also cause considerable noise emissions. A variety of sound come from welding, hammering, boring and other work processes going on the campus.

PRECAUTIONARY MEASURES

1. Use acoustic rooms for heavy printing machines.
2. Proper maintenance of machines installed impress.
3. Use rubber mats for machine vibration and sound.

CARBON FOOTPRINTS

In today's world one of the biggest issues faced by all of us is global warming. Global warming refers to an increase in average global temperature of mother Earth. The main cause of global warming is increase in the concentration of greenhouse gases (GHGs) in the atmosphere due to anthropogenic activities and their level is determined with the help of global warming potential(GWP) and expressed as Carbon Footprint(CF).Carbon Footprint is another phenomenon used for GHGs or carbon dioxide emission in terms of CO_2 equivalents. “The Carbon footprint is the measure of carbon dioxide emissions directly or indirectly caused by inactivity or accumulate Dover the life stages of a product.”In other words, “A carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly ban individual, organization, event or product.”

As the Institute considered as institutional organization, the various energy resources like electricity, fuels, Liquefied petroleum gas (LPG) is used. It is necessary to calculate the carbon footprint of the Institute to upgrading the Clean Developmental Mechanism (CDM) in various processes. All the data from the various sources were collected from all the sectors where energy resources are used. The collected data is calculated by using standard emission factors.

REDUCING THE CARBON FOOTPRINTS:

- Installation of solar panels or solar energy generation devices should be enhanced to reduce the electricity footprint of the campus. Terrace of each building can be utilized to produce electricity from solar modules.
- The food waste generated from Institute hostel mess, guest house, canteens and staff quarters should be converted into the biogas which can be further utilized for hostel kitchens.
- The solar battery operated vehicles should be used on the campus to overcome the vehicle footprint.
- The Green computing or E- work is helping the organization to reduce footprint very effectively.
- The solar energy based street lamps on campus will reduce carbon footprint. The awareness should be made among the faculty, students and other employee's regarding Clean Development Mechanism (CDM) to reduce the consumption of electricity and natural resources.

GREEN INITIATIVES

Dr. K.N Modi Institute is situated at highway. The major portion is covered with vegetation. The aims to protect and conserve its biodiversity, fresh and clean ambience through many initiatives.

It has taken following green initiatives:

1. Jalashay

2. RO plant

.3.Wastewater (Sewage) Treatment Plant (STP)

4. Carbon Sequestration on the Institute Campus

5. Plantation and Nurturing Programme.

6. Green computing practice

7. Plastic free campus

8. Solar Electricity Generation

9. Fuel Conservation

10. Conferences and workshops on Environmental Sustainability.

FOOD PROCUREMENT AND DISPOSAL

Food is prepared in Canteen/Mess and any food waste that is generated is filled in compost pits for preparation of natural manure.

CUSTODIAL CHEMICAL USE:-

Chemicals for one-year requirement are used in labs and stored in a separate store. The store requires to be ventilated and hazard analysis should be done through Material Specification Datasheet and record should be maintained. Proper ventilation withholds should be designed.

TRANSPORTATION:-

Most of students are using shared transport which is sustainable. Students are using Buses, Shared auto. Teaching and Non-Teaching faculty is also sensitized for using pooled transportation for working towards sustainability and reducing resource use and encouragement of resource conservation.

ENERGY CONSERVATION MEASURES:-

Energy conservation measures (ECMs) in buildings of the Institute reduce the need for energy services and can result in increased environmental quality, national security, personal financial security and higher savings. It is at the top of the sustainable energy hierarchy. It also lowers energy costs by preventing future resource depletion.

SOLAR WATER HEATER:-

SWH is an alternative solution to traditional heating to the hot water demand of Dr. K.N.M.I.E.T Hostels. Water is commonly heated using electricity from the grid, powered largely by coal, which is dirty and harmful to the environment. Solar thermal is one of the ideal solutions to lower a building's carbon footprint and help protect the environment. Dr. K.N.M.I.E.T established solar water heater on each hostel building.

LED LIGHT:

-Renewable energy and power efficiency management are rightfully seen as important factors for environment conservation. A light source that requires less energy for the same glow is naturally better for the environment. It is estimate that the country will reduce its CO2 emissions by 80 million tons on a year on year basis by adoption of LED bulbs alone. Dr. K.N.M.I.E.T took an initiative to replace all ordinary lights with LED light in all building of the campus. LED is quietly making a phenomenal impact on so many aspects of our lives – from domestic electricity bills, to national economies, and to the very air that we breathe.

WASTE LAND UTILIZATION:-

There was some piece of land in campus which is not suitable for cultivation of crops, on this land we start the to construct a lake for fish farming. The water channel also formed for collecting rainwater from field.

EDUCATION AND AWARENESS – GREEN CLUB

The aim of green club is making campus more greener and eco-friendly in a world of declining environmental awareness.

PROCUREMENT PROCESS

Procurement team is required to be made aware regarding procurement of goods and services that are sustainable. The sensitization is required for all purchases in a way that optimized utilization of natural resources is possible.

Paper with recycled content

AC's with Zero ODP Refrigerant

Environment-friendly housekeeping chemicals

Paints, adhesives, sealants with recommended percentage of volatile organic compound.

E-LIBRARY

Present E-Library books –Total no of volume- 97539

Total e-Books: Title 6960

Despite fewer in number, the e-books have advantage of being used by multiple students/ faculty simultaneously and thus create better impact on sustainability in contrary to hard copies that can be read by only one person at a time.

The following recommendations are made:

Use of E-books is promoted for students and faculty members especially in present COVID situation.

No of E-books made available should be increased continuously.

Training on sustainability should be provided.

TRAINING AND AWARENESS

The Institute is regularly conducting awareness program for students and faculty members.

GOVERNANCE

Through enactment of Environmental and Green Policy and its circulation to all stake holders, sustainability can be achieved. The results are regularly required to be verified at annual intervals. These can be managed through internal or external audits.

PLANTATION POLICY OF THE INSTITUTE

We at the Institute are committed for continual improvement of Environment. As Trees planted contribute towards improvement of the environment, Institute has enacted the policy of plantation for the benefit of people and society. Tree plantation air pollution is reduced and residents are benefited.

Planting a tree has long been a suggestion to better the earth, whether it is outcry and warning of global warming, water crisis or something else. Trees of ferment environmental as well as there is economical and social benefits.

The Institute, with strategic vision of top management and active participation of students, faculty members, non-teaching staff and others staff shall solemnly promise to always work and participate in betterment of environment through continual plantation programs.

There shall be regular awareness program and through face to face in their action, all stake holders shall be apprised of the benefits of plantation.

The students of Dr. K.N. MODI INSTITUTE OF ENGINEERING & TECHNOLOGY very well understand the importance of trees in our life and have taken a pledge to contribute their bit in making cities, nation and world a better place to live. They all pledged to plant more and more trees with the time and take care of the plants and to provide with basic needs as and when needed.

The Institute has a policy to celebrate Tree Plantation week in Institute premises twice annually and commits to set a target to add 1% to the existing plantation annually.

Through these plantations of trees, life shall improve and essential needs of mankind will also be easily managed. Besides absorption of Carbon Dioxide, trees also support life by providing habitat to different species such as squirrels, bees and birds. Trees cleanse the climate by absorbing carbon dioxide from the environment and releasing oxygen. The trees cool the environment and also effects of global warming are mitigated.

We at the Institute, once again vow to plant trees as per policy, as sure survival of trees by adequate maintenance and watering practices and species selected for plantation shall be such that have very minimal water requirement. We also shall decide optimally to have turf (Grass area) as per barest requirement for reduction of water footprint for horticulture use in Institute premises.

Tree plantation: **PRAYATNA- Fikar Kal Ki (2020)** planted thousands of samplings to make green & clean Modinagar.

Tree Plantation: Our institute every year organizes Tree Plantation.

DISPOSAL OF FLUORESCENT TUBES

CONSUMER LEVEL:

As per the present observed practice at consumer level in the society at large, often, the used lamps are collected by the kabari from the households and collectively handed over to the glass recyclers for the recovery of glass material.

This is all operative in a highly unorganized sector. It has, also, been observed that, the used lamps are thrown in the garbage bins and finally into the municipal garbage dump sites, contaminating air, water and soil. Most of the used lamps are broken either at transit solid waste bins (provided by local civic authority) or broken during the transport to the final disposal site. A portion of the mercury, in vapor form, is released into the air; whereas rest of the mercury is released on to the soil with further possibility of getting in to the surface and/or groundwater bodies through the leachate from soil.

CONSUMER AWARENESS

The consumers, individual domestic consumers and bulk consumers (offices, institutions, large residential complexes, etc) should get fully aware about the potential health impact of mercury-bearing lamps, through audio-visual media and the product leaflets. The precautions, to be taken while cleaning up the broken FLs should, also, are known to the consumers. As a part of such awareness programs, the consumers, even at individual level, are expected to participate actively with constructive suggestions and provide the feedback, for the overall success of mercury management in fluorescent lamp.

COLLECTION: The collection of used lamps may be done mainly by two ways: (i) Collection of used lamp (FLs) from bulk consumers may either be arranged by the management of above set up (institutions, etc.) for direct disposal to LRUor by the LRU which may arrange to pick up used lamps from such collection sites through an identified collection agency.(ii) Collection of used lamps (FLs) from individual domestic consumer may be arranged by the LRU, either through koraris (individuals appointed for the purpose by LRU) or an identified collection agency for door to door pickup.

TRANSPORTATION :(i) The Handler (e.g. Kabari or representative of LRU) of used FLs in transitshouldtakecareofselectionofpropervehicleandcarriagesoastominimizebreakageofusedFLs. (ii) There should not be any intermediate transfer of materials in the transit stage. The collected used FLs should be straight transported to the LRF for further processing. (iii) The Handler should be trained to take care of mercury spills, if any, that takes place enroute the journey to LRU.

REFRIGERANT USED IN AIR CONDITIONERS

Refrigerant	Global warming Potential	Ozone Depletion Potential
R 22	1810	Medium
R 410 A	2088	NIL
R32	675	NIL
R134 A	1430	NIL
R 290	3	NIL
R 600 A	3	NIL

It is observed that recently procured Air conditioners have been procured which have high global warming and ozone depletion potential (withR-22) refrigerant. In future; care should be taken to purchase Air conditioners with refrigerants for which GWP is low and ODP is nil.

Life cycle cost should be considered for making decision about purchase of Air Conditioners.

AllAC's that were procured more than 8 years ago should be replaced with be setup in class energy efficient Air Conditioners after taking in to consideration Life Cycle Cost.

ECO FRIENDLY HOUSEKEEPING MATERIALS

Eliminate exposure to prohibited substances that can lead to long term health effects either through respiration/ direct contact.

Mandatory Requirement Manufacturer to provide Material Safety Data Sheet (MSDS) for the products.

The MSDS should have the following details:

- Chemical Identify
- Manufacturer's information
- Hazardous ingredients/Identify information
- Physical, Chemical characteristics
- Fire and explosion hazard data
- Reactivity data
- Health hazard data
- Precautions of safe handling and use
- Control measures
- Emergency and first aid procedures

GENERAL PURPOSE CLEANERS

Presently there is no practice for procurement to eco-friendly chemicals.

Eco friendly housekeeping materials are recommended to be used for all cleaning applications. Any Indian standard should be procured in future and records of such procurement should be documented for future references.

The cleaning material may be required for following applications and also may be some other in addition to these.

- Glass Cleaners
- Bathroom Cleaners
- Disinfectants and Sanitizers
- Cleaner/Degreasers
- Carpet and Upholstery Cleaners
- Floor Cleaners
- Liquid Hand Soap
- Furniture Polish

FIRE SAFETY

- No halogen-based fire extinguishers have been used. It is recommended that if fire suppression system is to be used for any fire extinguishing system, only clean agents with minimum environmental impact should be installed.

SUSTAINABLE DEVELOPMENT

- Sustainable development should always be practiced in all activities of Institute.
- For design of any new future construction the following points should be given consideration and weight age.
- Sitting, form and design of building
- External Development and Landscape
- Envelope optimization
- Shading of Building
- Cool Roof practices
- Sustainable Material
- Water and Waste management
- Building Services Optimization
- The following construction practices should be followed forfutureconstructionTheframeworkforsustainableconstructionpracticesincludesthefollowingissues:
- Pre-construction pre-requisites;
- Planning for sustainable construction, demolition.
- Planning, monitoring and control of environmental descriptors;
- Sustainable work execution procedures;
- Effective use of water;
- Construction waste management;
- Post-construction closeout;
- Alternative use, de-construction, dismantling
- Procurement Policy
- Contractual Obligations towards Sustainable Construction
- Identification of Sustainability Issues during Construction
- Construction methods review and impact on sustainability
- Consideration to environmental impact assessment
- Considerations to social impact assessment
- Prevention and management of construction accidents

- Establishing Energy Consumption Data
- Collection, Analysis, Documentation System and
- Creating Benchmarks
- Monitoring of performance of management systems and
- Location of Infrastructure for Laborers
- Providing fire and life safety measures during construction

SUMMARY AND CONCLUSION

- Green Audit is one of the important tools to check the balance of natural resources and its judicial use. Green auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area.
- The main objective to carry out green audit is to check the green practices followed by Institute and to conduct a well-defined audit report to understand whether the Institute is on the track of sustainable development.
- After completing the audit procedure of Institute for green practices, there are following conclusions, recommendations and Environmental Management Plan (EMP) which can be followed by Institute in future for keeping campus environment friendly.

CONCLUSION

From the green audit following are some of the conclusions which can be taken for improvement in the campus.

1. Institute takes efforts to dispose majority waste by proper methods. The Green computing i.e. online payment system, online circulars and examination procedures (SRPD) are helpful for reducing the use of papers and ultimately reducing carbon footprint.

2. Reducing the use of one time use plastic bottles, cups, folders, pens, bouquets, de curative items will be useful to solve the problem of plastic pollution to some extent.
3. Biodegradable waste is used efficiently for composting and vermin composting. There is a scope to utilize the organic matter for biogas generation or manure production.
4. Installation of solar panels provides ample amount of electricity. Such solar modules should be installed wherever possible in the campus.
5. Use of LED lamps and Tube Lights is minimum and is too been courage.
6. Jalashay in the campus proved to be one of the best watershed management programs for making the Institute self-reliant in water.
7. A continuous counter trench (CCT) has given good results on percolation of water and for filling up of lakes on campus. Rooftop rain water harvesting has proved beneficial.
8. Toilets and bathrooms are consuming more water in the departments. The replacement of old taps can be beneficial for solving this issue
9. RO drinking water has solved the major problem of safe drinking water in all departments, Hostels, Guest house, Quarters, etc.
10. No Vehicle Day proves to be one of the good practices to save the fuel and help for green and clean environment on the campus. The use of electrical cars is good initiative to saves fuel.
11. The overall ambient air quality on the campus is good while some air quality issues may arise due to developmental activities on the campus should be addressed.
12. Thesoundlevelsonthecampusaregoodexceptduetosometransportationandconstruction activities.
13. E-waste and biomedical waste segregation, handling and disposal are properly done as per rules.
14. Science departments are following the principles of Green Chemistry to reduce chemical wastes.

SUGGESTIONS

Following are some of the key suggestions for improving campus environment:

- An environmental policy document has to be prepared with all the recommendations and current practice carried by Institute.
- A frequent visit should be conducted to ensure that the generated waste is measured monitored and recorded regularly and information should be made available to administration.
- The Institute should develop internal procedures to ensure its compliances with environmental legislation and responsibility should be fixed to carryout it in practice.
- The solid waste should be reused or recycled at maximum possible places. The

biodegradable waste is generated in more amounts in hostels which should be properly utilized for manure preparation or bio gas generation.

- Reuse of glass bottles for storage of chemicals should be encouraged or the bottles should be sent to again suppliers for reuse.
- Electrification of streetlights by solar power should been couraged.
- Installation of sensor based electrification items like fans, lights, etc. can save electricity.
- Installation of solar panels and rain water harvesting system to every terrace of building will be useful in conserving the natural resources.
- Regular checkups and maintenance of pipes, overhead tanks and plumbing system should be done by engineering section to reduce over flow, leakages and corrosions.
- In Science laboratories large amount of water goes waste during the process of making distilled water; the system should developed to re use this water for other purposes. the solar distillate on unit to be installed at the earliest

ENVIRONMENT MANAGEMENT PLAN (EMP)

By understanding the dynamics of present situation of resource utilization and current practices of waste disposal, the Institute has prepared an "Environment Management Plan". This plan will reveal the strengths and weaknesses and suggests remedies to develop green and clean campus. The EMP also gives suggestion for the priority of work to carry out.

ENVIRONMENT MANAGEMENT PLAN

SOLID WASTE				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
1.Paper	• Use of green computing practices • Pulping of major portion of papers I.e. answer sheets, bills and other administrative papers. • Use of one sided papers in main building and many departments. • The examination department use SRPD system for paper distribution. • The convocation process also involves online system. • The administration use emails and online payment.	• Multiple numbers of copies required for office work. • More number of departments and affiliated colleges where circulars to be set.	• Towards paperless office: more use of e-mails, e-money transfer and advance IT technology for communication.	Medium

2.Plastic	• Total Plastic ban on campus. • Recycling and reuse of plastic at some departments. • In all functions the plastic mineral water bottles, teacups, straws, bouquets and gifts with plastic covering, decorations, etc. unnecessary plastic use is avoided.	• Sometimes plastic items are thrown with general waste. • The plastic covering of dispatched laboratory equipment boxes and other items are unavoidable. • Sometimes plastic bottle sand bags are required for water and soil sampling which is unavoidable as per the protocol. • Distribution of RO water through plastic Cans.	• Segregation of waste at the source and sending plastic waste for incineration process.	Medium
3.Biodegradable -waste	• Composting of bio-degradable waste at canteen and mess	• Burning of dry bio-degradable waste at some places.	• Composting of all bio-degradable waste at various places by Garden section and using it for nursery, plantation and gardening. • The kitchen waste generated in hostel Kitchens should	Medium

			be utilized for compost production or biogas Generation**.**	
4.Glasswaste	• Reuse of bottles at some departments for storage of chemicals.	. • Sometimes the glasses of windows and doors crack suddenly which produce glass waste.	• Maximum reuse of bottles. • Sending the broking glass for recycling.	High
5.Biomedical waste	• Biomedical was to sent to incineration plant for disposal.	• No separate containers for storage of biomedical waste.	• Separate containers for glass, Liquid and body wastes should be Maintained.	High

ENERGY				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
6.Electricity	• Use of LED lamps in	• Insufficient use of solar energy for electricity generation. • Un -necessary use of lights, fans and computers at some places when no one is using.	• Electrification of street lights by solar power.	Medium

	Institute main building. • Use of CFLs at some places • Most of the buildings are well constructed considering the need of illumination and ventilation which reduces the use of electricity. • The air conditioners are used only inessential conditions in the laboratories. • Energy Conservation programmes are conducted in some departments	• Sometimes ignorance by the staff and students wastes electricity in classrooms.	• Use of electricity efficient equipments for laboratory and office use. • Installation of solar panels on the top of the building can reduce the use of conventional energy. • General awareness about electricity saving among all the staff and students should be enhanced.	
7.Fuel	• No Vehicle Day on first Saturday of every month which saves fuel. • Use of Electrical vehicles on Institute campus is use for internal transportation.	• Hostels using high quantity of LPG fuel for their kitchens.	– Cycle on rent service for students will be beneficial. – The biogas generation plant can be helpful to the hostel kitchens. – General awareness about efficient use of fuel.	Medium

WATER				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
8.Water Utilization	• RO on campus to filter water. • Maximum water self-sufficiency by watershed management through Jalashay on the campus • RO water system provides pure water to all Institute departments ,administrative buildings, hostels, guest house, etc.	• Overflowing of tanks at some places • Excess use of water at bathrooms and toilets. • Fitting of old taps in bathrooms and toilets wastes water. • Leakages not repaired on time.	• Water guards or sensors at overhead water tanks to avoid overflowing losses. • Proper and timely maintenance of plumbing. • Installation of rain water harvesting assembly at every department.	Medium
9.Wastewater	• Sewage Treatment Plant on campus	• Laboratory effluent and other wastewater drain off untreated and it percolates in to soil. • Wastage of large amount of good quality water by distilled water plants at various science departments.	Water distillation should be done.	High

HAZARDOUS WASTE				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
10.Chemical waste	• The practical protocols are set to use minimum quantity of chemicals for the routine practicals. • Microbial waste thrown out after proper disinfection measures at every departments dealing with Microorganisms.	• No proper disposal method for hazardous chemicals wastes.	• Hazardous chemical waste should be transferred to disposal facility centre.	High
11.E-waste	• Regular disposal of e-waste through certified E-waste collection agency.	• E-waste is thrown along with regular waste, some material in e-waste can be hazardous and most of it can be recycled.	• There must be segregation of e-waste from regular waste at source. • Precious metal recovery can be possible by Institute laboratories.	High

AIR				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
12.Air	• Institute has ample amount of green cover for maintaining fresh atmosphere.	• The construction activities and burning of waste on the Institute campus are adding contamination of ambient air quality.	• The precautions like water sprinkling or use of enclosures should be made to reduce the particulate matter in air during construction Activity.	Low

NOISE				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
13.Noise	• Institute is located from noisy area of city. • The tree cover absorbs the noise of highway traffic.	• The construction activities like excavation, digging, hammering, welding, transportation, loading and unloading operations. Are responsible for ambient noise which disturbs the routine classes and research Activities.	• Silent zone rules are followed. • The noise producing activities should be done during the holidays or after the office hours. • The contractor should be advised to useless noisy machines.	Low

TREE CENSUS				
Sector	**Strengths**	**Weakness**	**Suggestions**	**Priority**
14.Tree Vegetation	• There is lots of space for plantation. • 99 tree species on campus. • 13,473 total full grown trees on campus. • Lead Botanical garden • Plantation activity by Institute and all departments. • Institute tree authority to look after campus garden and Plantation.	• Fewer plantations on campus. • Plantation on campus of some exotic plants. • More growth of trees like Gliricidia and subabhool.	• Avoid monoculture; variety of species should be planted in campus area. • Plantation only on slope areas of campus. • No permission to other organization for plantation. • Campus plantation plan be prepared. • Guidance of Botany department for plantation activity.	Medium

Trees: There are various types of trees and plants which make the whole campus airy, free from carbon dioxide, soothing as well campus seems decorated. Plantation is also done every year in campus. These plants are 388 which maintain the biodiversity and healthy surroundings.

S.N.	COMMON NAME	BOTANICAL NAME	FAMILY	NO. OF NAME PLATE
1.	False ashoka	*Polyalthialongifolia*	Annonaceae	20
2.	Lipstick	*Bixa orellana*	Bixaceae	25
3.	Mango	*Mangifera indica*	Anacardiaceae	05
4.	fiekas	*Ficus racemosa*	Moraceae	20
5.	sagwan	*Tectona grandis*	Lamiaceae	50
6.	jamun	*Syzygium cumini L*	Myrtaceae	03
7.	gular	*Ficus racemosa*	Moraceae	05
8.	Pepal	*Ficusreligiosa*	Moraceae	10
9.	Ashoka tree (ashapal)	*Saracaasoca*	Fabaceae	50
10.	Neem	*Azadirachtaindica*	Meliaceae	04
11.	Bottlebrush	*Callistemon spp.*	Myrtaceae	05
12.	common guava	*Psidium guajava*	Myrtaceae	10
13.	White Mulberry	*Morus alba*	Moraceae (Mulberry family)	04
14.	tulsi	*Ocimum sanctum L.*	Lamiaceae	15
15.	Carandas	*Carissa carandas*	Apocynaceae	50
16.	Flower Plants	Magnoliophyta	Plantae	112
			Total	**388**

Fruit Trees:

SR. NO.	PLANT NAME	BOTANICAL NAME	VARIETY	TOTAL NO. OF PLANTS
1.	Mango	*Mangifera indica*	Anacardiaceae	05
2.	jamun	*Syzygium cumini L*	Myrtaceae	03
3.	common guava	*Psidium guajava*	Myrtaceae	10
4.	White Mulberry	*Morus alba*	Moraceae (Mulberry family)	04
			Total plants	**22**

FLOWER PLANTS:

Sr. No.	Plant Name	Botanical Name	Family
1.	Gudhal Red	Hibiscus acetosella	Malvaceae
2.	Gudhal White	Hibiscus rosa-sinensis	Malvaceae
3.	Rose	Rosa	Rosaceae
4.	Marigold	Tagetes	Asteraceae
5.	yellow oleander	Cascabela thevetia	Apocynaceae
6.	Nerium oleander	Nerium	Apocynaceae
7.	Marigold	Calendula	Asteraceae
8.	Harshringar	Nyctanthes arbortristis	Oleaceae
9.	crape jasmine	Tabernaemontana divaricata	Apocynaceae
10.	night-scented jessamine	Cestrum nocturnum	Solanaceae
11.	Mongra	Jasminum sambac	Oleaceae
12.	Kena	Commelina bengalensis	Commelinaceae
13.	Guldavari yellow	Hibiscus rosa-sinensis	Malvaceae
14.	Jasmine	Jasmine	Oleaceae
15.	Common chicory	(Cichorium intybus)	Asteraceae
16	S plant		
17	Jafri	Tagetes Marigolds	Asteraceae
18	Bogan beliya	Bougainvillea	Nyctaginaceae
19	Cactus	Cactus	Cactaceae

ENERGY AUDIT REPORT

2020-21

AT

Dr. K. N. Modi Institute of Engineering and Technology

Modi Nagar, Ghaziabad (Uttar Pradesh)

By: -

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ENERGY AUDIT

This is a brief report covering all energy consumingequipment's used in the Institute campus. It has been prepared with the objective of investigating the energy saving potential with the least payback period. This provide the information on monthly energy consumption and list of block wise inventories suchas fluorescent tube lights, ceiling fans , air conditioners , and other IT equipment's. We wanted to arrive at the total month wise energy consumption of all the connected inventories. The hours of working were collected after discussion with the staff. Based upon the same, we worked out annul energy consumption. Then we co-related it with actual and applied suitable factor like 75 % and 85%. On the basis of this energy consumption, we calculated savingpotential.

Dr.K .N. Modi Institute of Engineering and Technology, Modi Nagar , a State Private Institute, situated on a sprawling 10.1 acres campus with sylvan surroundings is situated at Modi Nagar in the Ghaziabad district of Uttar Pradesh. It is being managed by Dr K N Modi Foundation, whose Founder Dr Kedar Nath Modi was a doyen in contributing to the cause of the Society and a pioneer in establishing educational institutions to offer quality and value based education – primary to higher levels of professional education – in the background of his committed belief, "Education Builds Nation" to the members of the learners community belonging to diverse economic and economic strata's of the society.

Institute has following Faculties:-

- **Faculty of Science, Engineeringand Technology**
- **Faculty of Management and Business Studies**

Summary of Electrical Energy saving potential

CH NO	Narration	Saving Potentials			PBP
		Saving inKWH /month	Amount saved in Lacs /month	Expenditure Lacs	
1	**Power factor improvement**				
	Improving power factor from 0.85 to0.93	519	0.44203 Lacs	0.40 Lacs	1
2	**Lighting**				
	Replacing 1847 no of fluorescent Tube (each 40 Watt) with same number of LED (each 18Watt)	8127	0.79 Lacs	3.70Lacs	7.1
	Total Electrical saving	8646	1.23Lacs	4.1 Lacs	

Contents

1. INTRODUCTION
    1.1. Objectives

2. INTERPRETATION

3. HISTORICAL DATA ANALYSIS

Appendix A: Monthly Power Consumption and Billing Data

Appendix B: Block wise inventories of Lightings, Ceiling Fans, Air Conditioners and other IT equipment's.

Appendix C – Additional photos

4. FINDINGS AND RECOMMENDATIONS

    4.1. Findings
    4.2. Recommendations

1. INTRODUCTION

1.1. **Objectives:** The Energy Audit was undertaken for meeting the following objectives

(i) Conduct as imple Walk- Through audit for observing the energy consumption of various electrical appliances within the different blocks in the College Campus.

(ii) Determine what can be done for reducing energy consumption throughout the buildings/ blocks and help in achieving green energy status.

2. INTERPRETATION

Energy Conservation means steps taken to consume as much energy as required through changing energy consumption behaviour, e.g. Switching off the equipment's when not in use.

Energy Efficiency means consuming less energy to provide the same service/ output, e.g. Replacing in efficient light bulbs with efficient ones

Faulty means equipment not working or made correctly, having defects.

Potential savings means the actual reduction in operating expenses from the improved energy efficiency generated by an energy conservation or efficiency activity.

Retro fitting means upgrading an existing system to improve energy efficiency. Tariff means the amount of money charge by the supplier (utility) per kWh for the use of electrical energy.

Vampire Load means the way power is consumed by electronic and electrical appliances while they are switched off or in standby mode (consuming electricity at a cost but not doing any work)

3. HISTORICAL DATA ANALYSIS

Appendix A: Monthly Power Consumption and Billing Data
Appendix B: Floor wise inventories of Lightings, Ceiling Fans, Air Conditioners and other IT equipment's.

4. FINDINGS AND RECOMMENDATIONS

4.1 Findings:

4.1.1. Vampire Loads Findings

Electronics appliances (computer, printer, etc.) are still ON even though they are turned off.

Appliances on STANBY MODE are draining power even though they are not doing any use full task.

- Faulty light fittings which are left without bulb and faulty bulb which is intact are also vampire loads.

All the ceiling Fans are running at full speed without regulator. Beside this, no reflector has been used for improving the illumination level caused by the fluorescent Tube light. Both of these two points are adding to extra energy loss.

About Electrical Supply equipments installed in Dr. K .N. Modi Institute of Engineering and Technology, Modinagar:

Particulars	Fy. Yr. 19-20
Supply voltage- KV	11KV
No of transformers- 11/0.433KV, 500KVA	1
Contract Demand -KVA	300KVA
Total D. G. sets- 180 KVA, 320KVA	2
Major loads – Nos	
` Light (**Fluorescent Tube, LED, Cancild**)	1847no's, Power Consumption / month= 11,229 KWh
Ceiling Fans(50 Watt average)	962nos,Power Consumption/month9620KWh
Air Conditioners	37 Nos, Power Consumption/ month =16, 539 KWh

Fig: 300KVA Transformer, 11/ 0.433 KV

Fig: DG sets and control panel

About Electricity Consuming equipments installed in Dr. K .N. Modi Institute of Engineering and Technology, Modinagar:

Fig: Window AC,1.5 Ton

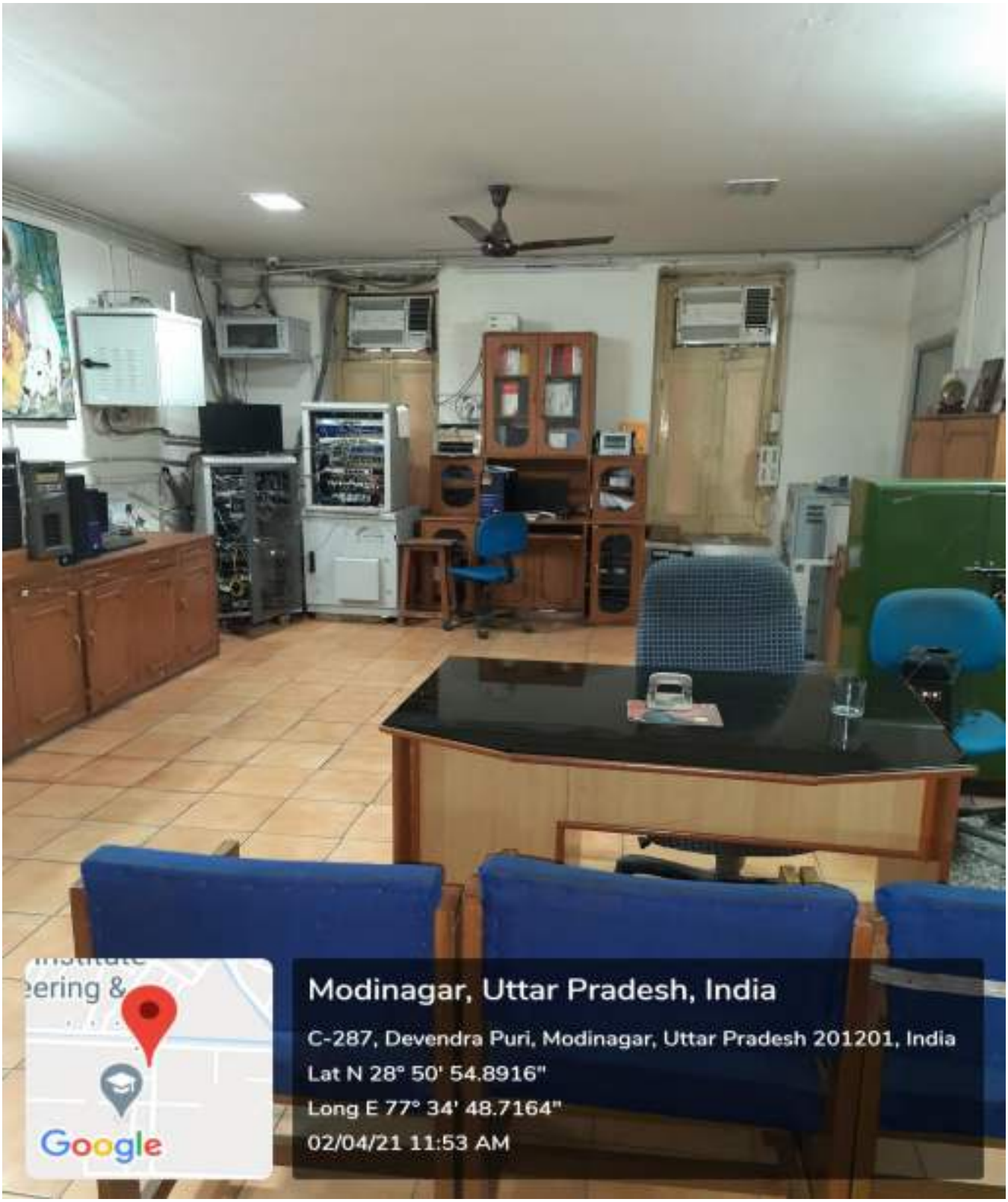

Fig: Server Room

Google
Modinagar, Uttar Pradesh, India
Kapda Mill, opposite SBI Main Branch, Modinagar, Uttar Pradesh 201204, India
Lat N 28° 50' 51.8316"
Long E 77° 34' 47.5176"
02/04/21 11:41 AM

Fig: Heat transformation Lab

In some areas, especially in one study room and stack area inside the central library, illumination level is lower than the required level.

Fig: In this photo, no regulator is found.

In many class rooms, number of Tube lights and Ceiling Fans are found to be more than required; this is causing additional energy loss.

Appendix: A

MONTH	(KNMIET)					
	UNIT	BILL	UNIT	BILL	UNIT	BILL
	2017-18		2018-19		2019-20	
APRIL	115195	1,078,630.00	51744	588,948.00	44,860.00	525,928.00
MAY	135887	1,380,311.00	57990	636,404.00	52,647.00	589,443.00
JUNE	49191	549,362.00	43595	508,720.00	37,798.00	421,838.00
JULY	36114	549,362.00	31125	399,347.00	26,182.00	360,287.00
AUGUST	63392	675,458.00	55558	621,548.00	48,559.00	558,723.00
SEP	96535	967,159.00	60811	661,171.00	RDF Bill	470,683.00
OCT	16998	218,569.00	43518	509,233.00	9,762.00	787,206.00
NOV	30277	380,972.00	31686	409,129.00	16,600.00	255,545.00
DEC	32088	415,083.00	35655	444,304.00	21,055.00	299,516.00
JAN	31183	404,629.00	34067	426,193.00	26,130.00	354,087.00
FEB	29908	397,740.00	46122	532,113.00	27,056.00	357,669.00
MARCH	33002	420,761.00	28529	381,089.00	19,617.00	
TOTAL	669769	7,438,036.00	520400	6,118,199.00	330266	4,980,925.00
	IN LAC	74.38	IN LAC	61.18		49.81

Appendix: B

a). Academic Block :

FLOOR	Fluorescent Tube, 8hrs/day		Ceiling Fan (50W), 8hrs/day	TFT-PC (48 W), 8hr/day	Printer (5 W)	Scanner (10W), 5hr/day	Projector (280W)	Air Conditioner (1490 W), 8hr/day	Other loads
	18 w	36w							
Ground	202	824	413	370	07	02	07	08	Water cooler-04
First	1	112	292	nil	04	nil	04	01(C.A)	Water cooler-02
Second	nil	nil	nil	nil	nil	nil	nil	nil	nil
Total	203	936	705	370	11	02	11	09	06

b). Director's Wing:

FLOOR	Fluorescent Tube, 8hrs/day		Ceiling Fan (50W), 8hrs/day	TFT-PC (48 Watt), 8hr/day	Printer (5 Watt)	Scanner (10W), 5hr/day	Projector (280W)	Air Conditioner (1490 Watt), 8hr/day	Other loads
	18 w	36w							
Ground	105	72	45	120	6	nil	07	09	Water cooler-01
Total	105	72	45	120	6	nil	07	09	01

C). Administrative Block

FLOOR	Fluorescent Tube , 8hrs/day		Ceiling Fan (50W), 8hrs/day	TFT-PC (48W), 8hr/day	Printer(5 W)	Scanner (10W), 5hr/day	Projector (280W)	Air Conditioner (1490W), 8hr/day	Other loads
	18 w	36w							
Ground	45	12	27	07	08	03	nil	02	Water cooler-01
Total	45	12	27	07	08	03	nil	02	01

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d). Workshop:

FLOOR	Fluorescent Tube 8hrs/day		Ceiling Fan(50W), 8hrs/day	TFT-PC (48 W), 8hr/day	Printer (5 W)	Scanner (10W), 5hr/day	Projector (280W)	Air Conditioner (1490W), 8hr/day	Other loads
	18 w	36w							
Ground	nil	56	27	1	nil	nil	nil	nil	
Total	nil	56	27	1	nil	nil	nil	nil	

e). Admission Cell:

FLOOR	Fluorescent Tube (36 w), 8hrs/day	Ceiling Fan (50W), 8hrs/day	TFT-PC (48 W), 8hr/day	Printer (5 W)	Scanner (10W), 5hr/day	Projector (280W)	Air Conditioner (1490 W), 8hr/day	Other loads
Ground	69	10	03	01	nil	nil	04	Water cooler-01
Total	69	10	03	01	nil	nil	04	

f). Exam cell:

FLOOR	Fluorescent Tube (36 w) , 8hrs/day	Ceiling Fan (50W), 8hrs/day	TFT-PC (48 W), 8hr/day	Printer (5 W)	Scanner (10W), 5hr/day	Projector (280W)	Air Conditioner (1490 W), 8hr/day	Other loads
Ground	10	09	03	01	01	nil	nil	
Total	10	09	03	01	01	nil	nil	

g). Gyan Niwas Hostel:

FLOOR	Fluorescent Tube 8hrs/day		Ceiling Fan (50Watt), 8hrs/day	TFT-PC (48W), 8hr/day	Printer (5 W)	Scanner(10W), 5hr/day	Projector (280W)	Air Conditioner (1490 W), 8hr/day	Other loads
	18 w	36 w							
Ground	222	117	139	nil	nil	nil	nil	13	Water cooler-01
Total	222	117	139	nil	nil	nil	nil	13	Sodium Light-04

Appendix-C

Fig: Solar Geyser

Fig: Solar Panel

4.2 **Recommendations:**

(i) Power factor should be maintained very near to unity or at least 0.96. This will bring down the monthly energy bill significantly.

(ii) There is an only one distributions transformer:

500KVA with connected load of 175 KVA

(iii) We know that any machine gives maximum efficiency at or near full load condition. From the power ratings of the transformers, it is apparent that the 500KVA transformer is under loaded. It is suggested to consider this condition.

(iv)All the fluorescent tube lights should be replaced by energy efficient LED bulb of 18 Watt each.

(v). Air conditioners should be set at 26 ^{0}C Temp and Ceiling Fans should be kept on running .This combination will enable saving in electricity.

(vi) At present condition, number of Tube light sand Fans per room is more than student's occupancy. So there is provision of reducing the number of Tube lights and Fans per room.

(vii) At present, all the ceiling Fans are running without regulator, this practice should be avoided and it is suggested to run the fans with proper regulators or use star rated energy efficient Ceiling Fans.

(viii)All Electronic appliances should always be 'unplugged' or turned from the power sockets, after office hours, it is suggested to avoid putting appliances on 'STANBY MODE'

(ix) It is good to see that the Institute authority is putting their best effort in making the campus green through adopting various measures such as using direct solar water heater (Appendix-C), and installing PV based solar systems.