Index:

7.1.6- Quality Audit on Environment and Energy

QRO Certification LLP., India

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AUDIT NOTES

(ISO 50001:2018)

Name of the Organization	Tula's Institute Dehradun		
Address	Mehra ka Gaon, PO Selaqui Dhoolkot Dehradun Uttarakhand 248011		
Site Address (If any)	www.tulas.edu.in		
E mail id	Director@tulas.edu.in		
Unit Head. Name / Contact Person	Dr. Nishant Saxena Dean Academics		
Telephone/Fax	01352699300		
Audit Scope	An energy audit is a study of an organization or facility to discover how and where energy is utilized, as well as to find potential energy savings. There is now general consensus that new technologies, as well as increased usage of existing ones, offer the most promising prospects for the future. The prospects are in the use of existing renewable energy technology, increased efforts at energy efficiency, and the spread of these technologies and options.		
Audit standard	**ISO 50001:2018**		
No. of Skilled workers(Required)	5		
No. of unskilled workers(Required)	2		
No. of contract workers	Nil		
No. of part time workers	Nil		
Shift details	1		
Audit Team	Audit Team Leader:	Audit Duration: Man day(s) :	2
Date of Audit	24-03-2023- 27-03-2023		
Audit Criteria	*Organization's guidelines, and applicable legal & other requirements related to Applicable Standard.*		
Purpose of Audit	The energy audit would provide a favorable orientation toward energy cost reduction, preventive maintenance, and quarterly Central Programs, all of which are critical for production and utility activities. Such an audit plan will assist in maintaining emphasis on fluctuations in energy costs, availability and dependability of energy supply, determining an estimated energy mix, identifying energy saving technology, retrofitting for energy conservation equipment, and so on.		
This report is based on random samples of energy usage and therefore not every aspect of the organization's activities has necessarily been assessed. Hence where no non-conformities are reported it does not follow that none exist.			
Legal, Statutory & Regulatory Requirements	Applicability of Air Pollution Act, Enviornment Pollution Act, Water Pollution Act and the organization is a small organization also working on contract basis-legal requirements are fulfilled by the company employees.		

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Summary of Audit & Observations

General Details

The Tula's Institute Dehradun entrusted the responsibility of completing a complete Energy Audit of campus, with the major objectives being as below:

- To study the present pattern of energy consumption
- To identify potential areas for energy optimization
- To recommend energy conservation proposals with cost benefit analysis.

- Scope of Work, Methodology and Approach:

Scope of work and methodology were as per the proposal. While undertaking data collection, field trials and their analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility.

- Approach to Energy Audit:

We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipments. The key to such performance evaluation lies in the sound knowledge of performance of equipments and system as a whole.

- Energy Audit:

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused attention to energy cost and cost involved in achieving higher performance with technical and financial analysis. The best alternative is selected on financial analysis basis.

Energy Audit Methodology: Energy Audit Study is divided into following steps

1. Historical Data Analysis:

The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

2. Actual measurement and data analysis:

This step involves actual site measurement and field trials using various portable measurement instruments. It also involves input to output analysis to establish actual operating equipment efficiency and finding out losses in the system.

3. Identification and evaluation of Energy Conservation Opportunities:

This step involves evaluation of energy conservation opportunities identified during the energy audit. It gives potential of energy saving and investment required to implement the proposed modifications with payback period.

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Energy Consumption Profile- NC*

The salient observations and recommendations are given below.

1. Tula's Institute- Engineering & Management college uses energy in the following forms:

   a. Electricity from Uttarakhand power corporation limited – Connection type- RTS-2 Other non- domestic 25kW

   b. D-G set (320 kVA+ 250kVA+125kVA)

   c. Solar water heaters in hostels- 8000 litre (Water tube type)

Major electrical energy is used for various applications, like:

- Computers
- Lighting
- Air-Conditioning
- Fans
- Other Lab Equipment
- Printers
- Xerox machines
- CCTV
- UPS
- LCD Projector
- Router system
- Flood light
- Pumping motor

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NC*- *No changes*

Historical Data Analysis

Study of Variation of Monthly Units consumption & Power Factor:

Variation in Units Consumption & Power Factor (PF)

S.No	Month	No. Units (kWh)	Power Factor
1	September 22	47396	0.95
2	October 22	44126	0.95
3	November 22	39170	0.95
4	December 22	48664	0.96
5	January 23	51056	0.97
6	February 23	39610	0.95
7	March 23	42610	0.94
8	April 23	47396	0.95
9	May 23	52210	0.94
10	June 23	62928	0.94
11	July 23	22128	0.95
12	August 23	45437	0.94

Month- wise Unit Consumption

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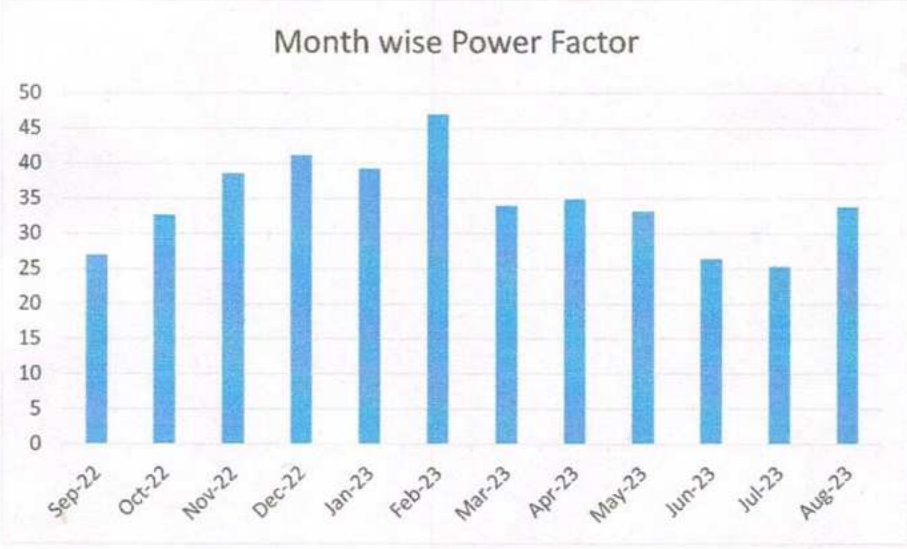
Power Factor Variation



Study of Month wise Electricity Bill Variation:

S.No	Month	Electricity Bill Amount (Rs.)
1	September 22	321928
2	October 22	332193
3	November 22	39170
4	December 22	361622
5	January 23	373079
6	February 23	242077
7	March 23	281768
8	April 23	325358
9	May 23	425796
10	June 23	496301

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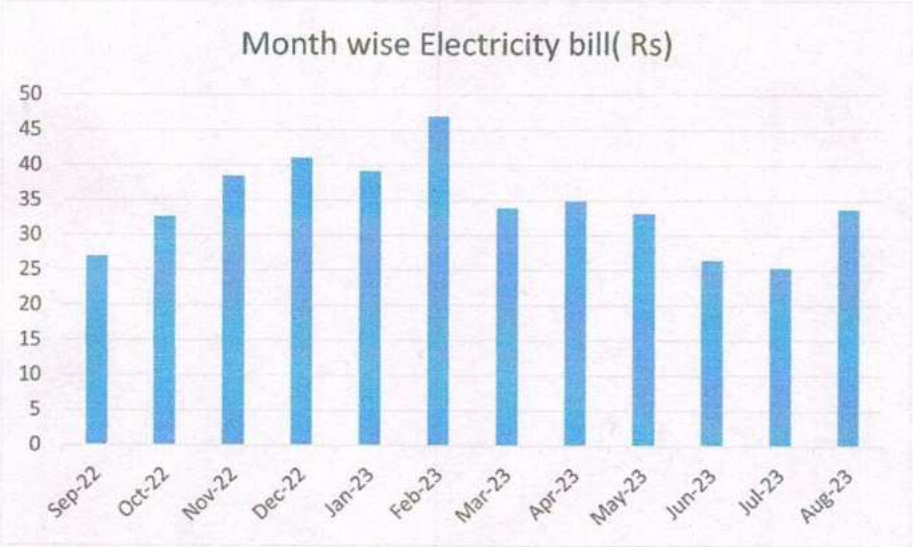
11	July 23	287953
12	August 23	494827



Month-wise Maximum demand

Study of Month wise Load Factor Variation

Load Factor = KWh/ (KW/hours in the period/ number of days in the billing cycle)

S.No	Month	Load Factor
1	September 22	26.99
2	October 22	32.68
3	November 22	38.59
4	December 22	41.16
5	January 23	39.27
6	February 23	47
7	March 23	34
8	April 23	35

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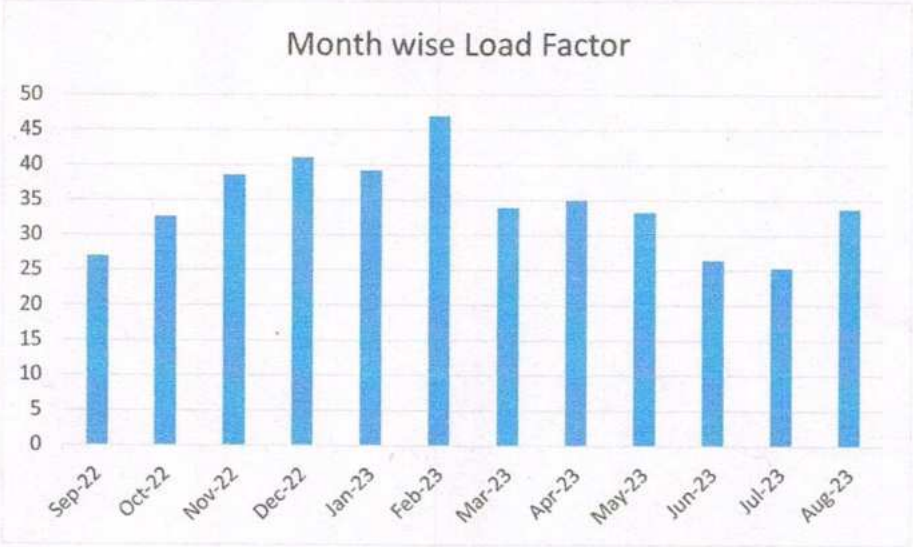
9	May 23	33.24
10	June 23	26.45
11	July 23	25.38
12	August 23	33.80

Load Factor Variation



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Approximate Energy Measurements and its Analysis

Block A

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	30	1230	2	2460
2	Ceiling Fans	70	20	1400	5	7000
3	Desktop Computers	200	22	4400	4	17600
4	Air Conditioner	3500	16	56000	2.5	140000
5	Printers	30	15	450	1	450
6	Xerox Machine	200	2	400	0.5	200
7	Exhaust Fans	50	8	400	3	1200
8	LED Lights	15	15	225	2	450

Block B

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	LED Lights	10	840	8400	1	8400
2	Air Conditioner	5250	5	26250	1	26250
3	Ceiling Fans	70	10	700	6	4200
4	Printer	40	4	160	0.25	40
5	Centralised AC	3500	42.5	148750	0.5	74375
6	Music System	4000	1	4000	1	4000

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	with console					

Block C

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	75	3075	3	9225
2	Ceiling Fans	70	69	4830	5	24150
3	Desktop Computers	200	15	3000	2	6000
4	Air Conditioner	3500	5	17500	2	35000
5	Printers	30	3	90	1	90
6	Xerox Machine	200	1	200	1	200
7	Exhaust Fans	50	2	100	4	400
8	Water Cooler with RO	500	1	500	5	2500
9	LED lights	18	25	450	2	900

Block D

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	85	3485	2.5	8712
2	Ceiling Fans	70	77	5390	4	21560
3	Desktop Computers	200	5	1000	2	2000
4	Air Conditioner	3500	6	17500	2	42000
5	Printers	30	3	90	1	90
6	Exhaust Fans	50	4	200	3	600
7	LED Lights	18	40	720	2	1440

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Block E

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	70	2870	2	5740
2	Ceiling Fans	70	47	3290	4	13160
3	Desktop Computers	200	10	2000	2	4000
4	Air Conditioner	3500	3	10500	1	10500
5	Printers	30	5	150	1	150
6	Exhaust Fans	50	6	300	4	1200
7	LED Lights	18	15	270	2	540

Block F

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	80	3280	2	6560
2	Ceiling Fans	70	51	3570	4	14280
3	Desktop Computers	200	4	800	2	1600
4	Air Conditioner	3500	0	0	0	0
5	Printers	30	2	60	1	60
6	Exhaust Fans	50	2	100	4	400
7	LED Lights	18	20	360	2	720

Block H

S.No	Name of Appliance	Power Rating	Quantity	Power Consumption	Average Usage	Energy Consumption/day

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		(Watt)		(Watt)	per Day Hr.	(Wh)
1	Florescent Lamps	41	95	3895	2	7790
2	Ceiling Fans	70	81	5670	4	22680
3	Desktop Computers	200	48	9600	2	19200
4	Air Conditioner	3500	6	21000	1	21000
5	Printers	30	8	240	1	240
6	Exhaust Fans	50	4	200	4	800
7	LED Lights	15	60	900	2	1800

Block G

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	25	1025	2	2050
2	Ceiling Fans	70	43	3010	4	12040
3	Desktop Computers	200	5	1000	2	2000
4	Water Cooler with RO	500	1	500	5	2500
5	Printers	30	8	240	1	240
6	Exhaust Fans	50	4	200	4	800
7	LED Lights	10	32	320	2	640
8	Air Conditioner	3500	2	7000	1	7000

Block I

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	50	2050	2	4100
2	Ceiling Fans	70	49	3430	4	13720

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3	Desktop Computers	200	462	92400	3	277200
4	Water Cooler with RO	500	1	500	5	2500
5	Printers	30	4	120	1	120
6	Exhaust Fans	50	6	300	4	1200
7	LED Lights	10	40	400	2	800
8	Air Conditioner	3500	10	35000	2	70000

Block J

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Florescent Lamps	41	40	1640	2	3280
2	Ceiling Fans	70	58	4060	4	16240
3	Desktop Computers	200	5	1000	3	3000
4	Water Cooler with RO	500	1	500	5	2500
5	Printers	30	4	120	1	120
6	Exhaust Fans	50	4	200	4	800
7	LED Lights	10	20	200	4	800

Boys Hostel (BH1- BH4) & Girls Hostel

S.No	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Average Usage per Day Hr.	Energy Consumption/day (Wh)
1	Connected Load per room	110	50	5500	5	27500* 5
2	Air Conditioner	3500	4	14000	3	42000*5
3	Load Washrooms	120	4	480	6	2880*5
4	Common Room	370	2	740	3	2220*5

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5	Miscellaneous (Water cooler & lobby lights & street lights)	340	2	680	6	4080*5

Miscellaneous Load Centres

Building names	Total Connected Load	Average Usage per Day Hr.	Energy Consumption/day (Wh)
Tula' s Guest House	52190	2	104380
Faculty Quarters	43550	2	87100
Central Mess	10600	4	42400
Cafetaria & Street Lights	7100	5	35500

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Total Energy Consumption of the college premises

S.no	Block	Energy Consumption per day(kWh)	Energy Consumption per Month	Tariff per unit	Total Cost of Electricity
1	A	169.36	5080		
2	B	117.265	3518		
3	C	78.465	2354		
4	D	76.402	2292		
5	E	35.290	1058		
6	F	23.620	708	Rs 6	Rs 298754
7	G	27.20	816		
8	H	73.510	2205		
9	I	369.64	11070		
10	J	26.740	802		
11	Hostels	393.40	11790		
12	Miscellaneous Load centres	269.38	8100		
Total Units per month			49793 +-(5%)		

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Energy Saving Proposals

Energy saving proposal -1- Use of Energy efficient lightings

Lighting load before replacement

S. NO	LOCATION/ LIGHTING	TOTAL NUMBERS	Power Rating (watts)	Energy Consumption per Day(kWh)
1.	Tube lights	550	41	43.9
2.	Street Light High pressure sodium lamps	8	400	16
3.	LED Street light with out sensors	20	100	18

Calculations: - Replacement of Florescent lamps with LED tube lights (18 Watts each)

Energy consumption per month before replacement = 550*41*1.95*30 kWh

= 1317 kWh (units)

After replacement = 550*18*1.95*30 kWh

= 579 kWh (units)

Saving in units per month = 1317- 579 units

= 738 units

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Cost savings = 738* 6 = 4428 Rs

Investment made in Led tube lighting. = 550 *250= Rs 137500

Payback period of Led-tube light = 137500/4428

= 31.18 months

= 2.5 year

Average lifecycle of 18 Watt LED tube light = 4-5 Years

Replacement of Street light -Sodium vapour/ Mercury/ Halogen with LED street light (100 Watts each)

Energy consumption per month before replacement = 8*400*5 *30 kWh

= 480 kWh (units)

After replacement = 8*100 *5*30 kWh

= 120 kWh (units)

Saving in units per month= 480- 120 units

= 360 units

Cost savings = 360* 5.6 = 2016 Rs

Investment made in Led street lighting = 8 *600= Rs 4800

Payback period of Led street light = 4800/360

= 13.33 months

= 1.11 year

Average lifecycle of 100 Watt LED street light= 2-3 Years

Replacement of Normal LED Street light with day light sensors

Energy consumption per month before replacement = 20*100*9 *30 kWh

= 540 kWh (units)

After replacement = 8*100 *6*30 kWh

= 144 kWh (units)

Saving in units per month = 540- 144 units

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= 396 units

Cost saving = 396* 5.6 = 2218 Rs

Investment made in Led light sensors = 20 *215= Rs 4300

Payback period of Led light sensors = 4300/2218

= 1.93 months

= 0.16 year

Average lifecycle of 100 watt LED day light sensors= 4.5 Years

ENERGY SAVING PROPOSAL NO. 2- Use of Turbo Vents

Calculations

No of exhaust fans currently running= 40

Power consumption of one exhaust fan = 200 W

Energy consumption per month of 40 exhaust fans = 40 *200*4*30 = 960 kWh

Electricity bill per month = Rs. 960*5.6 = Rs 5376

Cost of one turbo vent with installation = Rs 8000

Cost of 40 turbo vents with installation = Rs. 320000

Payback period = 320000/5376= 59.52 months = 4.96 years

PARAMETER(PER Month)	BEFORE TURBO VENTS	AFTER Replacing TURBO VENTS
Energy consumption	960 (24 exhaust)	0
Electricity bill	5376	0

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General Recommendations:

1. All Class Rooms and labs to have Display Messages regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. Display the stickers of save electricity, save nature everywhere in the campus. So that all stakeholders encouraged to save the electricity.
2. All projectors to be kept OFF or in idle mode if there will be no presentation slides.
3. All computers to have power saving settings to turn off monitors and hard discs, say after10 minutes/30 minutes.
4. The comfort/Default air conditioning temperature to be set between 24˚C to26˚C.
5. Lights in toilet area may be kept OFF during daytime
6. Use AUTOMATIC POWER FACTOR CORRECTION (APFC) Panel FOR PF, need to use power saver circuits for AC.
7. Need to replace FTL by smart LED Tube
8. Need to replace ordinary refrigerator by BEE power saver refrigerator if possible.
9. Out of total electricity bill paid, 53 percentage are actual energy utilized charges and remaining expense belongs to additional taxes on energy consumption
10. Recently govt. has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible.

Executive Recommendations:

1. There has to be Institute level student community that keeps track of the energy consumption parameters of the various departments, class rooms, halls, areas, meters, etc

2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.

3. Need to Create energy efficiency/ renewable energy awareness among the college campus i.e. solar, wind, Biogas energy. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff for general awareness.

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AUDIT RESULT

Date : 30-03-2023	
Report Submitted	**Acceptance from : Quality Research Organisation**
Name of Auditor : QRO	Name: QRO

	Designation: Signature & Seal

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AUDIT NOTES
(ISO 14001:2015)

Name of the Organization	Tula's Institute Dehradun		
Address	Mehra ka Gaon, PO Selaqui Dhoolkot Dehradun Uttarakhand 248011		
Site Address (If any)	www.tulas.edu.in		
E mail id	Director@tulas.edu.in		
Unit Head. Name / Contact Person	Dr. Ranit Kishor Dean Agriculture & Management		
Telephone/Fax	01352699300		
Audit Scope	Green and environmental auditing is a management system instrument used methodically to safeguard and conserve the environment. It is also utilized to sustain the environment. The audit recommends many standard standards, methodologies, and projects for environmental protection. A green audit can be a useful tool for a college to determine and ensure compliance with relevant rules and regulations, to improve procedures in order to reduce costs and resources, and then to consider how to implement changes and save money. It can also be used to determine the type and volume of garbage, which can then be used in a recycling project or to improve a waste minimization strategy. It can raise health consciousness while also promoting environmental awareness, morals, and ethics. It gives staff and students a greater knowledge of the Green impact on campus. If self-enquiry is a natural and necessary outgrowth of quality education, then institutional self-enquiry is also a natural and necessary outgrowth of a quality educational institution. Thus, it is critical that the college assesses its own contributions to a sustainable future. As environmental sustainability becomes a more pressing concern for the country, higher education institutions play an increasingly vital role in addressing it.		
Audit standard	**ISO 14001:2015**		
No. of Skilled workers(Required)	3		
No. of unskilled workers(Required)	1		
No. of contract workers	Nil		
No. of part time workers	Nil		
Shift details	1		
Audit Team	Audit Team Leader:	Audit Duration: Man day(s) :	2
Date of Audit	27-03-2023- 28-03-2023		
Audit Criteria	*Organization's guidelines, and applicable legal & other requirements related to Applicable Standard.*		
Purpose of Audit	Green auditing and environment refers to the systematic identification, quantification, recording, reporting, and analysis of environmental diversity		

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	components. The Green Audit seeks to examine environmental practices on and off the college campus that have an impact on the eco-friendly atmosphere. It was founded with the goal of inspecting the work done within organizations whose activities could endanger the health of residents and the environment.

This report is based on random samples and therefore not every aspect of the organization's activities has necessarily been assessed. Hence where no non-conformities are reported it does not follow that none exist.

Legal, Statutory & Regulatory Requirements	Applicability of Air Pollution Act, Enviornment Pollution Act, Water Pollution Act and the organization is a small organization also working on contract basis-legal requirements are fulfilled by the company employees.

Summary of Audit & Observations

Target areas of Green Audit

Target areas included in this green auditing are water, waste, green campus and carbon footprint.

1. **Auditing for Water Management**
   This indicator covers water use, water sources, irrigation, stormwater, appliances, and fixtures. Water is an extremely valuable resource that should be handled wisely. As the availability of potable water decreases by the day, efficient water use with no or minimal waste is essential. Along with this, the possibilities of rainwater gathering, purification, and reuse of water is being explored. The audit includes a status study of these factors. Aquifer depletion and water poisoning are occurring at unprecedented rates. It is consequently critical that any environmentally conscious organization examines its water consumption policies.

2. **Auditing for Waste Management**
   This is an essential area for educational institutions. This indicator focuses on trash generation and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of negative environmental consequences, the most of which are well documented and do not require more explanation. Solid trash is separated into two categories: ordinary waste and hazardous garbage. General garbage includes items commonly discarded in homes and schools, such as paper, plastic tins, and glass bottles. Hazardous waste refers to waste that poses a risk to one's health or the environment, such as cleaning chemicals and gasoline.
   Unscientific landfills may contain toxic chemicals that leak into soil and water systems and emit greenhouse gasses, leading to global climate change. Furthermore, solid garbage.

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3. **Auditing for Green Campus Management**
   All plant and animal species, including humans, are interconnected in a complex web of life; we rely on biodiversity for survival. Biodiversity is the cornerstone to healthy ecosystems, and thus a healthy planet. It cleans the air and water, regulates the climate, and provides us with food, housing, clothing, medicine, and other essential items. When one section of this complicated web weakens or disappears, it affects all of the others.

The trees work hard to ensure that the air we breathe is pure and healthy. They're like sponges. Their leaves absorb much of the deadly undesired carbon dioxide in the air, replacing it with the oxygen required for healthy existence. Photosynthesis is the process by which all plants obtain their sustenance through the absorption of gasses. In this process, plants convert carbon dioxide into food for themselves using sunshine, water, minerals, and the green substance known as chlorophyll found in the leaves.

When they do this, they release oxygen into the atmosphere, which is necessary for all life on Earth. When there is no sunshine at night, the plant stops producing food and so does not produce the same amount of oxygen. It is generally advised not to sleep with plants in one's room since they will consume all of the oxygen. However, although photosynthesis occurs at night, the plants also rest, absorbing little oxygen from the air and causing minimal harm to the sleeper.

4. **Auditing for carbon footprint**

Carbon foot print is the total amount of Green House Gases (GHGs)emitted in terms of carbon dioxide by a person, institute, company, state or country. Carbon footprint is typically given in tons of CO2 equivalent per year. For calculation of carbon foot print the basic data regarding direct and indirect sources of emission of Green House Gases is needed. How we get around and commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels (such as petrol).

The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth' s atmosphere through human activities is commonly known as carbon emissions.

5. **Energy Audit**

Consumption of energy is an indicator towards green environment. Lesser the consumption of energy, more the contribution to environment is. Energy audit of the college is done separately by the energy audit team of this college and does not included in this report.

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1. Water Management:

The college campus possesses many water outlets. There is an overhead water tank of capacity of 200000 Litre (approx.) capacity which is connected to 950 taps & 8 water- coolers There are four Rain water harvesting plants worth 20000 litres and a well. The different items monitored under this category are tabulated below.

Water Uses	General Details
Number of water treatment system in place	Nil
Water cooler with drinking water filtration is installed	12
Number of water taps	1020
Number of wells	1
Number of Bored wells	3
Quantity of water pumped	40000 Litre/Day(approx.)

2. Waste Management

Biodegradable waste = 40 kg/day; Non-biodegradable waste = 3.5 kg/day

Number of Garbage dumps & Storage points (Separate for Biodegradable & Non-biodegradable wastes)	14
Number of toilets	205
E-wastes- computers, electrical and electronic parts	Disposal by auction
Plastic waste	Disposal to Municipal corporation waste collection centers
Waste water -washing, urinals, bathrooms	Disposal to pits
Food wastes	Some disposed to biogas plant & some are distributed to the cattle shelter nearby college
Glass waste-Broken glass wares from the labs	Disposal to Municipal corporation waste collection centers

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Quantity of waste generated:-

Bio degradable	3.5 kg/day (office)
Non bio degradable	1.75 kg/day (office)
Bio degradable	1.5 kg/day (labs)
Non-bio-degradable	0.1 kg/day (labs)

Canteen, Mess & Hostel wastes

Bio degradable	40 kg/day
Non bio degradable	3 kg/day

Existing waste management methods in the campus

- Waste bins are placed at several points in the college to collect bio-degradable & non bio degradable wastes
- Waste segregation is done regularly
- Installation of biogas plant for the biodegradable wastes
- Vermicompost system for the manure production

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3. Green Campus

S.no	Context	Details
1	Total lawn & garden area(Excluding Sports field)	12648 sq m
2	Total number of plants	135
3	Total number of shrubs	1500

List Flora and Fauna (Existing in the campus)

List of Herbs/Shrubs/Trees

S. No.	Common Name	Botanical Name	Hindi name
1	Cuban Royal Palm	*Roystonea regia*	रॉयल पाम
2	Curry Tree	*Murrayakoenigii*	कड़ी पत्ता
3	Periwinkle	*Catharanthus roseus*	सदाबहार
4	Ficus	*Ficus benjamina*	पुकर
5	Century plant	*Agave americana*	कमल कैक्टस
6	Chir Pine	*Pinus roxburghii*	चिर
7	Junipers	*Junipers osteosperma*	हौबेरा
8	Pygmy Palm	*Phoenix roebelenii*	पिग्मी पाम
9	Lemon	*Citrus lemon*	छोटा नींबू
10	Jasmine	*Jasminum Officinal*	चमेली
11	Paper Flower	*Bougainbillea glabra*	कागज के फूल
12	Guava	*Psidium guajava*	अमरूद
13	Tulsi	*Ocimumtenuiflorum*	तुलसी
14	Monkey Puzzle Tree	*Araucaria araucana*	बंदर पहेली पेड़
15	Mango	*Mangifera Indica*	आम
16	Tala Palm	*Borassus flabellifer*	पामीरा पाम
17	Litchi	*Lichichinenesis*	लिंची
18	Sky Flower	*Durant aerecta*	नीलकांत
19	Tea Plant	*Camellia Sinensis*	चाय
20	China Rose	*Hibiscus rosa-sinensis*	गुड़हल
21	Wild Plumeria	*Plumeria Iudica*	चमेली
22	Chinese fan palm	*Livistonia chinensis*	फाउंटेन पाम
23	Indian Lamburnum	*Cassai fistula*	अमलतास
24	Cycas	*Cycas revoluta*	साइकस पाम
25	Gulmohar	*Delonix regia*	गुलमोहर
26	Black Plum	*Syzygium cumini*	जामुन
27	Orchid Tree	*Bauhinia variegata*	कूर्याल
28	Pride of India	*Lagerstroemia speciosa*	अरूल

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29	Burflower Tree	*Neolamarckiacadamba*	कदंब
30	Pomegranate	*Punicagranatum*	अनार
31	Bottle Brush	*Callistemon L*	बॉटल ब्रश
32	Indian Gooseberry	*Phyllanthus emblica*	आंवला
33	Camphor Tree	*Cinnamomum camphora*	कपूर
34	Gardenia	*Gardenia Jasminoides*	जसमीन
35	North Indian Rose Wood	*Dalbergia sissoo*	शीशम
36	Oleander	*Neriun oleander*	सफेद कनेर
37	Indian Wild Date	*Phoenix sylbestris*	खजूरी
38	Papaya	*Carica papaya*	पपीता
39	Cliff date palm	*Phoenix rupicola*	ताड़
40	Rose	*Rosa rubiginosa*	गुलाब
41	Peach	*Prunus persica*	आड़ू
42	Garden dahlia	*Dahlia pinnata*	दहेलिया
43	Aloe vera	*Aloe barbadensis*	एलो वेरा
44	White frangipani	*Plumeria obtusa*	छीर चंपा
45	Black tea tree	*Melaleuca bracteata*	काली चाय
46	Winter creeper	*Euonymus fortunei*	घुरी
47	Manaca	*Brunfelsia uniflora*	पॉल
48	Buddha's Palm	*Alocasia cucullata*	बुद्धा हाथ
49	Crane flower	*Strelitzia reginae*	क्रेन फूल
50	Foxtail Fern	*Asparagus densiflorus*	अस्पर्गस फर्न
51	Day lily	*Hemerocallis fulva*	लिली
52	Dragon tree	*Dracaena marginata*	ड्रैगन ट्री
53	The corn plant	*Dracaena fragrans*	मेडागास्कर ड्रैगन ट्र
54	Zigzag Plant	*Euphorbia tithymaloides*	एजिया
55	Cabbage tree	*Cordyline australis*	कैब्बेज ट्री
56	Fishbone fern	*Nephrolepis cordifolia*	बटन फर्न
57	Rainbow tree	*Dracaena reflexa*	इन्द्रधनुष प्लांट
58	Scarlet firespike	*Odontonema cuspidatum*	नीस
59	Broadleaf palm lily	*Cordyline fruticosa*	पाम लिली
60	Areca palm	*Dypsis lutecens*	अरेका पाम
61	Chinese croton	*Excoecaria cochinchinensis*	चीनी क्रोट
62	Dwarf lily turf	*Ophiopogon japonicus*	बच नाग
63	Ponytail palm	*Beaucarnea recurvata*	हाथी पाव
64	Weevil lily	*Molineria capitulata*	काली मूसली
65	Spanish dagger	*Yucca gloriosa*	बचनाग
66	Mistletoe fig	*Ficus deltoidea*	मिसल टोए रबर प्लांट
67	Golden ficus plant	*Ficus mirocarpa*	कामरूप
68	Zebra plant	*Calathea zebrina*	[illegible] प्लांट
69	Arrowhead plant	*Syngonium podophyllum*	[illegible]
70	Dwarf umbrella tree	*Schefflera arboricola*	छाता पौधा

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71	Ti plant	*Cordyline Terminalis*	पाम लिली
72	Table palm	*Livistona rotundifolia*	टेबल पाम
73	Lady palm	*Rhapis excelsa*	लेडी पाम
74	Greater tussock sedge	*Carex paniculata*	कामिनी
75	Rangpoon creeper	*Combretum indicum*	मधु मालती
76	Crown imperial	*Fritillaria imperialis*	केसर ताज
77	Mexican heather	*Cuphea hyssopifolia*	मैक्सिकन हीथ
78	Golden duranta	*Duranta erecta*	आकाश फूल
79	Yellow elder	*Tecoma stans*	घंटी फ्लॉवर
80	Mauritius hemp	*Furcraea foetida*	ग्रीन मुसब्बर
81	Mexican petunia	*Ruellia simplex*	जंगली पेटुनीस
82	mint	*Mentha spicata*	पुदीना
83	chilli	*Capsicum annum*	मिर्च
84	Indian gooseberry	*Phyllanthus emblica*	आंवला
85	Pear	*Pyrus communis*	नाशपाती
86	Jackfruit	*Artocarpus hetrophyllus*	कटहल
87	Golden shower	*Cassia fistula*	अमलतास
88	Apple	*Malus domestica*	सेब
89	Pomegranate	*Punica granatum*	अनार
90	Hibiscus	*Hibiscus Rosa-sinensis*	गुड़हल
91	Crown of thorns	*Euphorbia milii*	कांटो का ताज
92	Jamun	*Syzygium cumini*	जामुन
93	Burflower tree	*Neolamarckia cadamba*	कदंब
94	oleander	*Nerium indicum*	कनेर
95	Orchid tree	*Bauhinia variegata*	कुरयाल
96	Blue jacaranda	*Jacaranda mimosifolia*	नीली गुलमोहर
97	Mountain cidar	*Toona ciliata*	तूंन
98	Indian soapberry	*Sapindus mukorossi*	रीठा
99	Chrysanth	*Chrysanthemum grandiflorum*	गुलदाउदी

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List of Birds Species identified inside the campus

S. No.	Common Name
1	Blue Rock Pigeon
2	Rose Ring Parakeet
3	Slaty Heded Parakeet
4	Plum Heded Parakeet
5	Himalayan Bulbul
6	Red Vented Bulbul
7	Great Tit
8	Orintal Magpierobin
9	Rufous Treepi
10	Common Sparrow
11	Common Mina
12	Kingfisher
13	Hooplo
14	Catle Egret
15	Babbler
16	Kite
17	Scally Brested Munia
18	Black Drongo
19	Barn Owl
20	Common Crow
21	Wag Tail
22	Lap Wing
23	Fan Tail

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4. Carbon footprints

Carbon footprint analysis is done by combining data collected with respective emission factor of the each of the selected emission

S. No.	Emission factor	CO2 emitted
1	Human factor	1.14kg/person/day
2	Petrol	2.3kg/liter
3	Diesel	2.7kg/liter
4	Hydro-electricity	0.68956kg/kwh
5	Solar-based electricity	0.05kg/kwh
6	Food	1.7kg/kg
7	Solid waste	0.125kg/kg
8	LPG	1.5kg/kg
9	Buildings	0.1867kg/sq.mt./year

Burning of fossil fuels is the main source and cause of carbon dioxide release to the atmosphere. Carbon dioxide release for the stakeholders to reach the college is very high. It is contributing to the global warming and increasing the pace of climate change. The cost of using the cars is very high and therefore discourages stakeholders from using them. If a College bus is servicing for the staff and students, carbon dioxide released for the stakeholders can be reduced. More trees may be planted in the campus to make a source of sink for the carbon dioxide and for other green-house gases.

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Recommendations & Conclusion

The green and environment auditing exercise have come up with and implemented practical ways to reduce our negative impact on the environment to create awareness around the use of the Earth's resources in your home, college, local community and beyond. There is scope for further improvement, particularly in relation to waste, and water management. The college in recent years considers the environmental impacts of most of its actions and makes a concerted effort to act in an environmentally responsible manner. Even though the college does perform fairly well, the recommendations in this report highlight many ways in which the college can work to improve its actions and become a more sustainable institution.

Suggestions
Some of the important suggestions are summarized below:-

a) Increase Awareness of Environmentally Sustainable Development- Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future.

b) Educate for Environmentally Responsible Citizenship- Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens.
c) Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.
d) Collaborate for Interdisciplinary Approaches- Convene university faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
g) Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.

Recommendations

1. Set up water recycling unit where the recycled water can be used for gardening in the college.
2. Grow up vegetable garden and medicinal garden and gradually develop it as a nursery.
3. Arrange training programmes on environmental management system and nature conservation.
4. Establish an e-waste collection centre in campus.
5. Ensure participation of students and teachers in local environmental issues.

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AUDIT RESULT

Date :	
Report Submitted	**Acceptance from**
Name of Auditor :	Name: Designation: Signature & Seal

For QRO Certification LLP
Authorised Signatory

Director
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