



Pave the Green Way



Green Audit Report – 2019-20

PES/2019-20/17

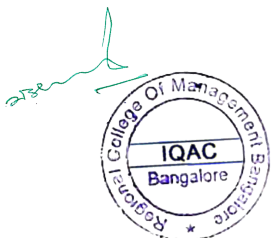
Submitted to

Regional College of Management, Bangalore

M/s. Paradigm Environmental Strategies Pvt. Ltd.

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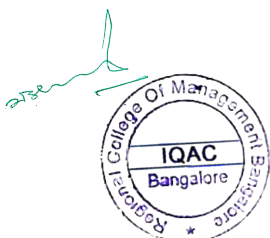

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A handwritten signature in green ink is positioned above the printed name "DIRECTOR REGIONAL COLLEGE OF MANAGEMENT BANGALORE" and "Devanahalli, Bangalore".

GREEN AUDIT REPORT

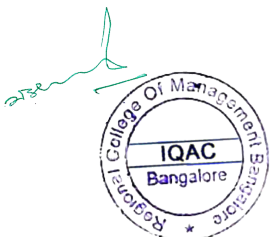
For

Regional College of Management, Bangalore

Survey No. 34/4, 34/5, Mudugurki, Venkatagiri Kote Post, Devanahalli, Bangalore-562 164.

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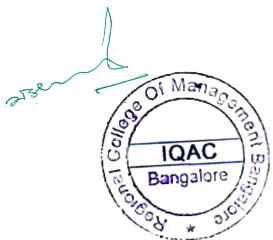
2019-20




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1. ABOUT THE INSTITUTE

Regional College of Management Bangalore (RCMB) is one of the socially conscious business schools that aims to mainstream talents from rural and remote parts of the India in the broader economic, social and industrial eco-system. Since its' inception in year 2016, the institution has consistently proven its philosophy through practice oriented education along with the high placement rate of its graduates. Within a short-span of less than eight years, RCMB today is known for the career success. With high student diversity of more than 90% students from outside Karnataka and nearly 2-3 employment offers for every graduates. RCM Bangalore is in the Premiere Institutions list of State Bank of India (SBI) along with IITs & IIMs where collateral free education loans are given to the admitted students. Promoted by former IITians and MNC executives, the institution has created a unique model of management education that shapes the graduates to be industry ready. With a team of senior faculty members combining practioners from prestigious MNC and organizations as well as senior members from academia (both international and national), RCMB is an institution for affordable, transformative and career oriented management education. Integration of project and experiential learning; continuous industry engagement opportunities; career mentoring; international exposure and holistic personality development opportunities are some of the factors that make us distinct in our approach to impact oriented management education.

2. INTRODUCTION TO GREEN AUDIT

Green audit serves to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene, and safety, reduce liabilities, and save money and achieve values of virtue. Environmental audits can be a highly valuable tool for college in a wide range of ways to improve their environmental and economic performance and reputation, while reducing wastages and operating costs. Once a baseline data is prepared after the auditing process, the data can serve as a point of departure for further action in campus greening. It will also help the college to compare its programs and activities with another peer institutions, identify areas for improvement and prioritize the implementation of future projects. The data will also provide a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs. Simple but effective system was devised and applied to prepare a baseline data and monitor the environmental performance of Regional College of Management, Bangalore. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It aims to analyze



environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values, and ethics. It provides staff and students better understanding of green impact on 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. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. 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.

The specific objectives are:

- 1) To prepare a checklist of flora and fauna diversity in and around the college campus.
- 2) To suggest measures to improve biodiversity within the college campus.
- 3) To assess the quantity of water usage within the college campus.
- 4) To suggest sustainable energy usage and water conservation practices.
- 5) To find out various sources of organic and solid waste generation and mitigation possibilities.
- 6) To inculcate values of sustainable development practices through green audit mechanism.

Target areas of green auditing

WATER AUDIT

This indicator addresses water consumption, water sources, irrigation, storm water, appliances, and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

BIODIVERSITY AUDIT

All plant and animal species - including humans - are linked together in a complex web of life; we depend upon biodiversity for our survival. Biodiversity is the key to healthy ecosystems and ultimately a healthy planet. It keeps the air and water clean, regulates our climate and provides



us food, shelter, clothing, medicine, and other useful products. Each part within this complex web diminishes a little when one part weakens or disappears.

BIODEGRADABLE AND HAZARDOUS WASTE AUDIT

This indicator addresses biodegradable waste from college and hostel canteen, paper waste to Hazardous wastes of laboratories and worn-out electric & electronic goods, and plastic wastes. Hazardous materials represent significant risks to human health and ecological integrity. Hazardous wastes are also leached out through the e-waste generated in the campus.

3. OBJECTIVE AND SCOPE OF THE GREEN AUDIT

The purpose of this Green Audit study is to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values, and ethics. It provides staff and students better understanding of green impact on 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. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. 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.

The scope of this study is as under.

- a) To conduct a baseline survey to know the reality status of green practices.
- b) To identify strength and weakness in green practices conducted in college campus
Performance comparison with relevant benchmarks.
- c) To analyze and suggest solution for problems identified from Audit Report.
- d) To increase environmental consciousness throughout the campus among all the stakeholders.
- e) To identify and assess if some environmental risks inside the college campus.
- f) To motivate staff as well as students for optimized sustainable use of available natural resources.
- g) To give the direction to work on some local environmental issues.



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3.1 Methodology

The audit exercise was carried out as briefed below,

- a. Define the time line and existing resources for audit.
- b. Systematic and comprehensive data collection required for green audit.
- c. Collection and reading of documentation with physical evidence.
- d. Independent periodic evaluation with regulatory requirements and appropriate standards.
- e. Systematic review of existing environmental policy.

4. WATER AUDIT

Introduction

Table 1 Water usage details	
Water cooler installed for drinking water	3 Water coolers
Number of toilets	03
Number of toilet flushes	03
Number of urinals for boys	02
Number of water taps	11
Number of wash basins	05
Number of wells	01
Corporation tank (5000 liters)	01
Quantity of water pumped per day	10,500 liters

Water audit is conducted periodically to determine water supplied in the distribution system as well as water lost and/or used within a distribution system. It aims to establish the water consumption pattern in individual sections, to realize the consumption levels with respect to exploring various pollution prevention and wastewater minimization opportunities. Water audit also helps to establish the existing water distribution system as well as wastewater collection and recycling, if any. The water is supplied in the college by municipal supply as well as by the ground water supply.

Existing water management methods installed in the campus

- Reservoir of 2775 m² area for rainwater harvesting.
- Water conservation and green awareness campaigns have been conducted. Rainwater collection pits are dug to recharge ground water.



- More greenery has been added consistently to improve ground water resource

5. WASTE MANAGEMENT

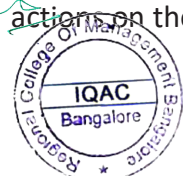
- Total Stakeholders – 350
- Classrooms – 12
- Other rooms – 02
- Number of Garbage dumps – 01
- Number of toilets - 05
- E-wastes- computers, electrical and electronic parts – Disposal by selling
- Plastic waste- Burning, dumping pit
- Solid wastes – Damaged furniture, paper waste, paper plates, food wastes
- Chemical wastes – Laboratory waste
- Wastewater – Washing, urinals
- Waste treatments

A composting pit is highly essential for the treatment of biodegradable waste generated from the canteen, hostels, food leftover by students and staff, office, vegetable garden and from the college campus cleaning process. Different methods such as pit composting, vermi- composting, bacterial composting using bacterial consortium, may be used to treat the biodegradable waste. Hazardous waste such as chemical waste from laboratories, E-waste, plastic, glass, tin waste etc. generated from the college can be collected properly and may be handed over to the local self-governments treatment yards or else college should install proper chemical disposing unit. E-waste, plastic and glass bottles, other plastic wastes, cans, broken glass wares, tins etc., may be recycled or sold out.

The College has missed few major recycling opportunities, except for food waste from the dining halls. Installation of sanitary napkin incinerator at ladies waiting room and increasing the capacity of existing incinerator in girl's hostel. Different coloured bins maybe placed to collect and segregate various types of waste. Training and campaigns in cotton bag making for students and staff will reduce use of throw away plastic carry bags. Periodical training in health & hygiene, waste management and disposal, green healthy practices may inculcate a positive attitude for a clean and healthy living.

6. CONSOLIDATION OF AUDIT FINDINGS

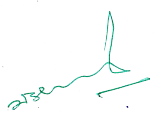
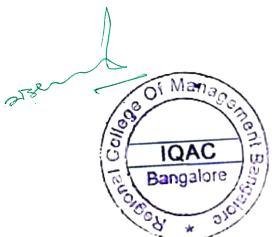
Green Audit will create a greater appreciation and under- standing of the impact of college's actions on the environment. Regional College of Management Bangalore have successfully been



able to identify the impacts on the environment through the various auditing exercises. The green auditing exercise have brainstormed and provide insights on practical ways to reduce negative impact on the environment. Participating in this green auditing procedure have gained knowledge about the need of sustainability of the college campus. It will create awareness around the use of the Earth's resources in your home, college, local community and beyond. Regional College of Management should adopt an Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions. Many computers hardware and electrical supply companies now cooperate with customers to reclaim old or damaged parts.

7. Recommendations

- 1) Installation Biogas plant and Compost units.
- 2) Installation of Solar panels to generate electricity.
- 3) Installation of Incinerators to dispose sanitary napkins.
- 4) Installation of rainwater harvest methods on roof top and ground.
- 5) Dig sufficient rainwater pits in the 10-acre campus wherever possible and maintain it regularly.
- 6) Set up water recycling unit where the recycled water can be used for gardening in college and hostels.
- 7) Grow up vegetable garden and medicinal garden and gradually develop it as a nursery.
- 8) Develop a butterfly garden that arouse appreciation towards flora and fauna diversity.
- 9) Cut down 'acacia trees' and 'rubber trees' which is abundant in campus and grow up diversity and let it become a natural laboratory for students, researchers, and scholars.
- 10) Name all the trees and plants with its common name and scientific name.
- 11) Display boards of fauna diversity to generate enthusiasm for learners.
- 12) Layout 'Green Chemistry' that reduces or eliminates the use or generation of hazardous substances in the design, manufacture, and application of chemical products.
- 13) Organize earn while learn eco-friendly programs.



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ENERGY AUDIT REPORT

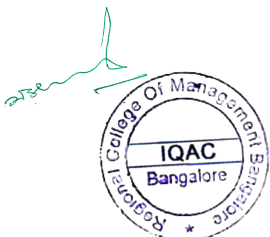
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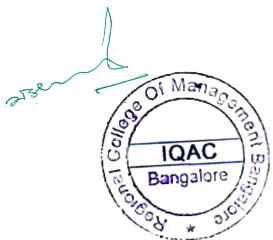
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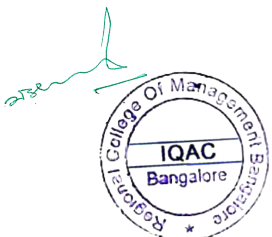
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2. OBJECTIVE AND SCOPE OF ENERGY AUDIT

The purpose of this Energy Audit study is to investigate the energy consumption pattern and explore possibilities of energy conservation measures on account of load distribution, technology advancement, equipment aging and general maintenance requirements. The scope of this study is as under.

- a) Analysis of the electricity bills of the institute.
- b) Detailed survey of connected electrical load in the premises of the institute.
- c) Study of performance of various energy consuming equipment.
- d) Performance comparison with relevant benchmarks.
- e) Identification of Energy Conservation Opportunities (ECOs).
- f) First order cost-benefit analysis of identified ECOs.
- g) Preparation of a Single Line Diagram (SLD) of the electrical distribution of the institute premises



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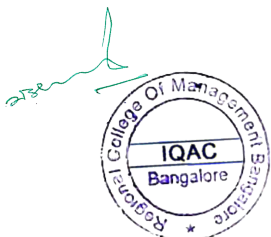
Methodology

The audit exercise was carried out as briefed below:

- Walk-through audit of the entire facility and meetings with various departments to understand the working of the facility and collection of electricity bill data, manuals, and datasheets of various electrical equipment.
- Field study to measure and assess the performance of various electrical equipment.
- Analysis of the collected data and comparison thereof with the benchmarks as per the BEE guidelines.
- Identification of Energy Conservation opportunities.
- Evaluation and prioritization of the ECOs based on savings and investment.
- Preparation of the energy audit report.

Sl. No.	Instrument	Make	Specifications
1	3 Phase Power analyzer	METREL	Full compliance with power quality standard IEC 61000-4-30 Class S.
2	Digital clamp-on Multimeter	MECO	AC- 600 V, CAT-III
3	Infrared thermometer	Fluke	0-3500 C.
4	Flue Gas Analyzer	Testo	O2 and CO sensors
5	Thermo Hygrometer	Testo	Measurement of relative humidity, dry and wet bulb temperature.
6	Vane Anemometer	Testo	Measurement of air velocity, volume, temperature.

Table 1: Instruments used in Electrical audit



Electricity Consumer Details

Consumer Details

		Remarks
Consumer Name	Regional College of Management, Bangalore	-
Consumer No	364189006400	
Meter No	055-X1092744	
TARIF DETAILS		
Billing Period		June 19 to May 20
Connected Load	KW	150
Contract Demand	KVA	213
Feeder Voltage	KV	11
Energy Charges	Rs/KVAH(KWH)	9.19
Monthly Demand charges	Rs/KVA	427
Excess Demand Charges	Rs/KVA	Applicable
TOD tariff Applicable	Y/N	Y
PF Incentive Applicable	Y/N	N

Table 2: Primary Billing Information

Remark:

Although financially no consequential, a discrepancy in connected load has been observed. While the connected load is mentioned as 150 KW on the bill, it is observed to be in the order of 245.73 KW.

Lights and Fans

Summary of Lights & Fans				
Category	Type	Quantity	Total KW	Aggregate KW
Fl Tubes & Lamps	T5	25	2.09	2.16
	T8	2	0.07	
	T12	0	0.00	
	Incandescent Lamp	0	0.00	
CFL	12 W	11	0.11	0.11
	7W	0	0.00	



	40W	0	0.00	
LED Lights & Tubes	20W	0	0.00	1.72
	18W	13	1.13	
	12W	13	0.29	
	8W	09	0.27	
	4W	3	0.03	
Fans	Ceiling Fan (CF)	23	14.50	14.81
	Wall Fan(WF)	04	0.12	
	Exhaust Fan (EF)	02	0.09	
	Pedestal Fan (PF)	1	0.10	

Remarks:

1. Out of the connected load of Lights & Fans, total of 25 fluorescent tubes which contributes about 2.09 KW of connected load may be replaced by LED lights to reduce consumption.
2. Further the total of 23 fans can be considered for replacement by the energy efficient fans in a gradual and phased manner to get net savings through reduced energy consumption.

Office Equipment

Summary of Office Equipment				
Category	Type	Quantity	Total KW	Aggregate KW
Office Equipment	PC	110	12.1	25.1
	Printer	11	5.00	
	Projector	12	5.00	
	CCTV Monitor	09	3.00	

Remark:

Detailed survey of the connected load yields an estimated connected load. Majority of load equipment and gadgets have been replaced with state-of-the-art energy efficient substitutes while a few need replacements.



HVAC

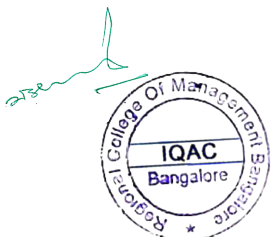
Summary of HVAC and Pump Load				
Category	Type	Quantity	Total KW	Aggregate KW
Air Conditioners	1 Star	2500W	0	27.28
	2 Star	2392W	0	
	3 Star	1857W	0	
	4 Star	1576W	18.73	
	5 Star	1040W	8.55	

Remark

- 1) There are total of 21 Air conditioners in the premises. Out of which only 15 are found to be 4-Star and 6 are found to be 5-Star.

ECO 1: Installation of 100KW Grid Connected Rooftop Solar System

Saving calculation for ECO 1		
	UoM	
A. Existing System	-	Electricity is sourced. No Renewable energy generation plant.
B. Proposed system capacity KW	-	100




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ACTION PLAN:

Step 1. Understand your energy use.

Identify the major areas of energy consumption. Check the condition and operation of equipment and monitor the power consumption over one week to obtain a base figure against which energy improvements can be measured.

Step 2. Identify your opportunities.

Compile an energy checklist. Walk round you are building and complete the checklist at different times of day and night to identify where energy savings can be made.

Step 3. Prioritize your actions.

Draw up an action plan detailing a schedule of improvements that need to be made and when, along with whom will be responsible for them.

Step 4. Seek specialist help.

It may be possible to implement some energy saving measures in-house, but others may require

Specialist help. Discuss the more complex or expensive options with a qualified technician.

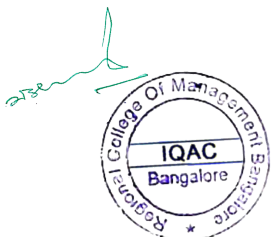
Step 5. Make the changes and measure the savings.

Implement your energy saving actions and measure against original consumption figures. This Will assist future management decisions regarding your energy priorities.

Step 6. Continue managing your business for energy efficiency.

Enforce policies, systems, and procedures to ensure that your business operates efficiently

.....1 UNIT SAVED IS 3 UNITS GENERATED.....



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