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GREEN
&
ENERGY AUDIT

MBB University

By

ARPAN SOCIETY
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UNDERSTANDING

As awareness grows around environmental sustainability, organizations across every sector are recognizing the need to minimize their ecological footprint and operate responsibly within planetary boundaries. To accomplish this goal, green audits have become essential tools for cataloging the impacts an entity generates and then developing informed roadmaps for improvement. Comprehensive green audits quantify metrics like energy and water usage, materials procurement streams, waste handling practices, transportation logistics impacts, supply chain ripple effects, and building performance benchmarks. They paint detailed pictures of the end-to-end influence on sustainability arising from operational choices and process efficiencies. We target to refashion our lifestyle and emerge as GREEN citizens.

ACKNOWLEDGEMENT

ARPAN Society expresses its gratitude to Maharaja Bir Bikram University authority for offering the opportunity to conduct Green Audit on the campus. While admitting the limitation on our part so far as study period and resource mobilizations are concerned, we intend to put it on record that the dedicated Audit team headed by subject specialists and executives of the Society has all tried their best to estimate the green value of the University campus.

The Society is indebted to each one of them to enable it to complete the benchmark auditing of green components within the specific and target oriented framework.

The support and cooperation of the officials of Maharaja Bir Bikram University in general and Dr. Runu Dhar for his cooperation and support extended to the audit team.

ARPAN Society is thankful to Honorable Vice Chancellor Prof. Satyadeo Poddar and Registrar Dr. Sumanta Chakrabarti for reposing faith and trust on the Society and audit team as well for such a mega job.

Secretary
ARPAN Society

LIMITATION

The audit is targeted to evaluate the eco-status of the campus with the available scientific parameters of green components. Despite sincere effort and discourse, the audit could not verify each and every component of the study due to paucity of time and dearth of resources like round the year observation as well as monitoring full activities in the campus in a scale of full length research.

However, with limited resources and time, ARPAN Society conducted Green Audit of basic components by its experienced research team comprises of qualified group of engineers, environmental specialists, meteorologists and consultants in relevant fields. Though the auditing is not extensive and exponential, it portrays a holistic dimension of Green character of the campus and provides a basic corrective framework for necessary intervention.

Considering the dynamics of the issues involved, this audit report can't be considered as final and absolute. It demands a detailed audit (extensive) with the observation of the components for a year. The comparative analysis of Green issues at end of the year would provide a statistically valid conclusion over environmental status estimation.

ABSTRACT

In the present setting Maharaja Bir Bikram University is facing numerous challenges, issues and risks. The biggest one is the onslaught of energy and underutilization of the natural energy potential which results in environmental changes, depletion of natural resources. A flexible, secure, dynamic infrastructure has to be devised to help the University to address the critical energy and power costs. Perhaps the time has come when it has become immensely essential to unearth up to what extent the University is contributing towards environmental sustainability by way of adoption of techniques like Green Audit.

Green Audit emphasizes the role of methods and practices that reduce an organization's environmental impact. Green audit advantage enables and empowers an organization to meet all the Global warming related challenges and at the same time help to contribute back so that at the end, an organization can participate and contribute towards environmental corporate responsibility. The present estimation study is an endeavor to analyze green audit from all relevant perspectives and finally reaching some specific conclusions.

INTRODUCTION

The practice of auditing, a noble pursuit embraced by organizations across all levels, is a concerted effort to attain efficiencies. It not only revolves around the optimization of economic costs but extends its focus to various dimensions, including environmental considerations. Environmental conservation has emerged as a paramount concern globally, prompting both governments and institutions to redirect their attention towards sustainable practices.

A particularly crucial facet of this endeavor lies in conducting green audits for the buildings and campus areas of educational institutes. The significance of this arises from the substantial space occupied by these structures and the extensive utilization of natural resources in their construction. The intertwining of infrastructure development with environmental impact necessitates a meticulous examination to ensure responsible resource management.

In light of our nation's burgeoning economic growth, the demand for proficient and capable workforce has surged. Consequently, there has been a proliferation in the number of educational institutes. The imperative nature of incorporating green audits in these establishments becomes evident as they guide us in rectifying erroneous practices and propel us towards creating cleaner and greener educational campuses. Such audits serve as a compass, steering us towards a future where sustainability and efficiency coexist harmoniously.

OBJECTIVES OF GREEN AUDIT

- To assess the Natural Resources;
- To evaluate Infrastructure;
- To analyze the steps taken to become Energy Efficient;
- To see the scale of efficiency Natural Resource uses;
- To identify initiation of Recycling ideas
- To imbibe Green IT Culture;
- To ensure continuous improvement in Green IT posture;
- To realize Branding Goals in Green parameters.

SCOPE

The scope of an audit and the methodologies used to uncover objective evidence, includes -

- Measuring key environmental parameters
- Analyzing raw and test data
- Reviewing purchase orders and invoices
- Inspecting facilities
- Interacting employees, managers and executives
- Examining policies, internal records, reports relating to environment
- Suggesting measures to improve the status.

STRUCTURAL STATUS

After inspection of the Campus followings are observed, which needs a sustainable attention of the management to keep it impressive and become a reference point for others.

Name of the Block	No. of the Rooms/Facilities	Year of Construction	Remarks
Administrative Block	Plinth Area: 1345.00 sq.m Total Area: 5380.00 sq.m (Three floors + Ground floor) Total number of rooms:58	2016	Building is in good condition, clean and well maintained.
Academic Block	Plinth Area: 939.27 sq.m Total Area: 3100.00 sq.m (Three floors + ground floor) Total number of rooms:35	2012 (Phase I) 2014(Phase I)	Building is well maintained and found to be in a good condition.

MBB UNIVERSITY CAMPUS GREEN AUDIT

Nested in the Northern fringes of Agartala city, MBB University finds its home in an area historically known as College Tilla, owing to the significant presence of Maharaja Bir Bikram College (MBB College), one of the Northeast region's inaugural higher educational institute of repute. This academic enclave, encompassing institutions like Bir Bikram Memorial College, Tripura Law College and MBB University, derives its nomenclature, because of the presence of these entire educational institutions.

College Tilla, with its rich historical legacy, is a tapestry of diverse elements. The area boasts a delightful blend of greenery, featuring several water bodies and is intricately connected to a nearby Howrah river, enhancing its scenic allure. The land use is characterized by its diversity, influenced by the varied establishments present, each contributing to a unique usage pattern. Spanning an extensive area, the university is a hive of activity, with the majority of the land actively utilized for gardening or occupied by physical infrastructure. The campus itself is strategically divided into two distinctive portions: the administrative building, serving as the operational nerve center and the academic block, where the pursuit of knowledge takes center stage. In essence, MBB University's location encapsulates not only a confluence of educational institutions but also a harmonious interplay of natural elements, contributing to a multifaceted land use scenario that adds to the distinctive charm of this educational enclave.

Administrative Block

Constructed in the year 2016, the three-story building at MBBU stands as a testament to architectural prowess and functionality. Boasting more than 50 rooms, the edifice includes a thoughtful distribution of amenities, featuring nine attached toilets and eight common toilets to cater to the diverse needs of its occupants.

A distinctive feature of this architectural gem is the integration of modern technology. All chambers of officials and various administrative section offices are equipped with displays, streamlining communication and enhancing efficiency. Moreover, the building serves as a versatile space, accommodating classes for the evening shift, fostering a dynamic and inclusive learning environment.

However, despite its many merits, the design of the building reveals a notable shortfall. The layout does not adhere to the fundamental principles of maximizing natural lighting. In the daytime, the building grapples with darkness in areas where lights are not in use, even amid the brilliance of natural daylight. This issue is particularly pronounced in the corridors and lobby areas, affecting the overall ambiance.

A critical evaluation of the connecting corridors, situated between rooms, reveals disconnection from external openings. The central roof over the lobby, instead of being a source of natural illumination, is a concrete dome. A missed opportunity, it could have been envisioned as a glass dome, allowing abundant natural light to permeate the building's interiors. This architectural modification would not only alleviate the darkness concern but also contribute to a more sustainable and aesthetically pleasing design.

In essence, while the MBB University building stands tall as a functional hub, there exists untapped potential for enhancing its architectural features to embrace both modernity and Eco-conscious design principles.

Figure 1: Dome of Admin building

Academic Block

Nestled within the MBB University campus, the three-story building stands as a multi-functional hub, hosting a myriad of essential spaces, including a library, reading room, classrooms, labs and faculty rooms. Meticulously designed, the building has provisions of eight toilets, two on each level, equipped with facilities catering to individuals with disabilities.

Classrooms have proper ventilation, thanks to an abundance of well-placed windows that usher in refreshing natural air. The staircases and entry lobby, too, are well lit with natural light, fostering a bright and welcoming connecting passage.

The architectural finesse, despite challenges like the glass structure impacting temperature regulation,remains a visual marvel that contributes to the overall appeal of the MBB University campus. In essence, the academic building is not merely a place for education but a testament to

inclusivity, efficiency and architectural excellence, creating an environment where both students and faculty can thrive academically and personally.

Figure 2: Academic Block of MBB University

GREEN CAMPUS MANAGEMENT

The campus area at MBB University lacks a well-defined boundary and is primarily characterized by the garden area in front of the administrative and academic buildings, parking spaces, and walkways. To prevent intrusion from stray animals, these gardens are enclosed with nets or in the case of the administrative block, walls. The horticulture department under annual maintenance contract manages the gardens, overseeing activities carried out by designated personnel. While the gardens both at Administrative and Academic Block are meticulously maintained, more native lands like Belli, Palash etc. can be planted in an around in the MBB University Campus.

More systematic efforts to be given for managing organic waste and University to start in-house composting for effective solid waste management. Endeavor should be to reduce use of Chemical fertilizers for better up keeping of garden and promote bio-fertilizer for protection of environment at large. Within the audit area, there is an absence of trees or plants with medicinal value, but a good number of unidentified trees are present, which helps to maintain eco-balance including the housing facilities of birds and other fauna species.

The water usage pattern for the gardens fluctuates between 200 to 300 liters every two days, according to climate conditions. The water extraction from underground is the primary source for gardening and toileting with no dedicated water harvesting structures in place. It’s not impossible or unbearable for the Government to set up adequate structure for holding run-off rain water in both the blocks to minimize the stress on ground water table.

Students at MBB University actively engage in activity groups and awareness campaigns to bring about tangible changes. Weekends witness dedicated efforts for campus area cleaning, and forums are organized, providing a platform for discussions on contemporary issues and initiatives. These student-driven endeavors reflect a commitment to raise consciousness and campus improvement in holistic manner. However, addressing water management, waste disposal, and enhancing biodiversity with native plants could further elevate the sustainability profile of the campus especially towards Green Campus initiative.

Figure 3: Total area leased to Maharaja Bir Bikram University

Figure 4: Area surveyed, Administrative Block

Figure 5: Area surveyed, Academic Block

Recognizing the finite nature of usable water, MBB University, nestled near the Howrah River and boasting a campus lake, undertakes a diligent water usage management audit. The campus relies on water sources from both municipal connections and groundwater extraction, with water supply estimates based on AMC bills and internal data collection. The annual payment to AMC for water connection stands at Rs.7200.

Although the amount is very minimum for an University yet, has scope to make it Zero paisa.

Admin Block

The administrative hub, with a water storage capacity of 12,000 liters, features six tanks, each holding 2000 liters, complemented by an underground reservoir. Out of the eight common toilets, only two on the third floor remain inactive. Attempt should be made by the MBB University to minimize the per capita water consumption and stop water leakage etc. in the University campus. Alternative to pipe water sources for garden watering need to be think of though the frequency of garden watering once in 2 (two) days. The open tank in front of the Administrative Block can be used as water reservoir and some water pants can be planted for beautification and proper use of this open water tank. Rain water harvesting can be think of in the University premises to supplement the water requirements for gardening and other purpose. Despite a total employee count and outsourced personnel, the per-capita water consumption does not aligns with the norms for Indian day schools, indicating an excess water storage capacity. Notably, the garden's watering frequency, every two days using water from unspecified sources, prompts a reevaluation of sustainable practices.An open tank within the admin block's garden area, though present, remains unused and poses health risks, evidenced by the presence of dead frogs and mosquito larva.

Figure 6: Open Tank in the Admin Block of MBB University

Academic Block

The academic block, equipped with 8000 liters of storage across eight overhead tanks, demonstrates efficient water management.The ratio of toilet to number of students and faculty stands at 1:50, which shows efficient usage of water and per capita water usage is also with in the safe limits.

The academic block's meticulous approach extends to cleanliness, with no reported leakages or damages in the rooftop pipes connecting tanks. The operation of pumps is tailored to seasonal fluctuations and occupancy needs, showcasing a dynamic response to water demand.

Despite commendable efforts in water management, both blocks lack rainwater harvesting structures or groundwater recharging systems, representing untapped potential for achieving gold standards in water conservation. Addressing these gaps could position MBB University as a pioneer in sustainable water practices, aligning with global standards and fostering environmental stewardship within the academic community.

ENERGY AUDIT

Electricity consumption stands as a tangible indicator of organizational activity, often paralleled by scientists to gauge societal progress. Despite increasing emphasis on non-conventional energy initiatives, the environmental impact persists. A closer look at MBB University's energy dynamics reveals distinctive patterns in the admin and academic blocks.

Admin Block

Within the admin block, houses offices and numerous electrical appliances, the per capita energy consumption peaks at 75 units per person per month, particularly during the summer months. Notably, the pervasive use of tubelights, even in well-ventilated rooms during daylight, underscores a reliance on artificial lighting. The entrance lobby's dome inadequately harnesses daylight, necessitating excessive artificial lighting across all floors. A minimal intervention solution involves installing reflective mirrors and smart LED surface lights strategically spaced to optimize illumination. Remarkably, the topmost floor exhibits minimal electricity consumption, emphasizing the potential for energy-efficient practices. It has been observed that the MBB University took the initiative to change the conventional lighting system and upgrade to LED lighting which not only reduce the electricity bill but also save the environment to a great extent. An upgrade to LED tube lights, phased out gradually, is recommended for long-term sustainability in the 58 similarly sized rooms.

Figure 7: Corridor in the Admin Block of MBB University

Academic Block

The academic block, a hive of student activities, maintains a more conservative per capita electricity consumption of approximately 5 units per person per month during the summer season. The strategic positioning of classrooms in the front portion ensures excellent natural lighting and fresh wind flow, while the overall building is well-ventilated and the design enhances energy efficiency.

In both blocks, a notable aspect deserving attention is the transition to LED lighting, given its energy efficiency and longevity. Moreover, promoting awareness about energy conservation practices, including turning off lights in unoccupied spaces, could further contribute to sustainable energy consumption.

To improve the aesthetic look of the library and for better illumination through natural light, the book stacks need to be realigned.

This energy audit sheds light on areas for improvement, emphasizing the need for strategic interventions and technological upgrades to align MBB University with energy-efficient practices and environmental stewardship.

Figure 8: Class Room of MBB University

Figure 9: Library of MBB University

CARBON FOOTPRINT AUDIT

Snuggled within a serene and green campus adorned with lush greenery and water bodies, MBB University radiates tranquility. Yet, even in this idyllic setting, the university recognizes the importance of a carbon footprint audit to assess and mitigate its environmental impact.

Currently utilizing three vehicles, two of which are outsourced, the university's annual fuel consumption equates to emitting 8-9 tonnes of CO_2 into the atmosphere. Despite the absence of a canteen at the time of the audit, university officials demonstrate a commitment to eco-friendly practices by planning to exclusively use LPG for cooking when the facility is established.

With approximately 80% of the teaching and non-teaching staff relying on personal transport and 20% of students utilizing private transportation due to the lack of public transport options, passive emissions are incurred and contributing to the Green House Gas bucket. Notably, the majority of students resort to walking within and to the campus, contributing positively to the university's carbon footprint.

The audit team observed traces of garbage and burning near food stalls, signaling challenges in solid waste disposal and the release of harmful gases. Addressing these concerns through proper waste management practices will be instrumental in reducing the university's environmental impact.

In contrast, the campus's green cover, including some very old trees, contributes to overall well-being and maintains a favorable micro climate. These natural features underscore the university's commitment to sustainability and provide an opportunity to further enhance environmental conservation efforts.

The Audit Team also observed that the MBB University declared the entire campus as a “Plastic Free Campus” and banned the use of plastic carry bags and other plastic materials.

In conclusion, while MBB University's green campus fosters a peaceful atmosphere, the carbon footprint audit identifies areas for improvement. By addressing vehicular emissions, waste management practices, and promoting sustainable transport options, the university can continue its journey toward environmental stewardship and ecological balance.

Green initiatives taken by the university is commendable and all the members and students are active in awareness campaign. University has adopted a village, named Dighliya Gram Panchayat and there also, university is trying to make people aware about the good practices regarding environment. University offers courses in the academic curriculum and also planning to include more in coming sessions.

CONCLUSION

In undertaking the green audit of MBB University, it is evident that the institution has made strides in embracing environmental sustainability, yet there are areas where further improvements can be made as usual. The audit recorded a number of commendable practices, which continues to help the University in fulfilling its commitment for reducing the institution's environmental impact.

In conclusion, the green audit serves as a valuable tool for MBB University to identify areas for improvement and set the course for a more sustainable future. By implementing the recommended measures and fostering a culture of environmental consciousness, the institution can not only reduce its environmental impact but also contribute to the broader global effort towards a more sustainable and resilient future for the country.

As India is envisaging to become a carbon neutral nation by 2070 and sustainable goals of 2030, there is no other better place than an educational institute to start journey towards the target. MBB University can be the pioneer for many other academic institutions for a *Model Green Campus.*

RECOMMENDATIONS

- As MB University is the apex body governing almost all the institutes present in College Tilla, it has to play a pivotal role in the promotion of green practices among all stakeholders by undertaking a schedule of Green activities over the year.
- Since the university has adopted a village, it should focus more on the College Tilla campus. Teachers and student bodies have been found to be very active and supportive of the green cause, which needs to be encouraged further to pass on to the society.
- All future development programs should undergo individual environmental impact assessments during the planning phase.
- Both buildings have enough space on their rooftops for the installation of solar panels. If utilized properly, the university will be able to produce more than half of its energy consumption.
- As a plastic-free campus, vendors doing business within the campus and the whole University administration must be made aware of the ill-effects of plastic burning, and they must not use any disposable plastic items. Instead, adopt a practice '*Say No To Single Use Plastic.'*
- University can invest more in eco infrastructure like solar power plant and soke pits for recharging ground water levels.
- Erect more signage to promote efficient electricity usage and also discouraging artificial lighting during Sun Shining Hours in bright days.