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Bangalore
27-02-2021

CERTIFICATE

This is to certify that we have carried out an energy audit and green audit of Andhra Loyola Institute of Engineering and Technology, Vijayawada, Andhra Pradesh during 10th to 12th February 2021 and detailed survey, observations, measurements, and verification were carried out to assess the energy, waste, water, and biodiversity aspects of campus. A detailed report consisting of key parameters, observations and recommendations was submitted to the management on 26-02-2021.

For Bigeta Energy Solutions LLP

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Acknowledgement

Bigeta Energy Solutions is thankful to Andhra Loyola Institute of Engineering and Technology for providing us an opportunity to conduct Energy and Green Audit at their Institution located in Vijayawada, Andhra Pradesh. We are grateful to Fr. Dr. A. Francis Xavier, S. J – Director, Fr. J. Chiranjivi S.J- Assistant Director, Fr. M. Anand S.J- Assistant Director, Dr.O.Mahesh – Principal , Mr. G. Ghantaiah Swamy- Assistant professor and other staffs for showing keen interest and for the help during audit.

We do hope that you will find the recommendations given in this report useful in helping you save energy and improve sustainability. While we have made every attempt to adhere to high quality standards, in both data collection and analysis, as well as in presentation through the report, we would welcome any suggestions from your side as to how we can improve further.

For Bigeta Energy Solutions LLP

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Energy and Green Audit Report

February 2021



**Andhra Loyola Institute of Engineering and Technology
Vijayawada, Andhra Pradesh**

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In case of any suggestions or queries:

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The image is a full-page background photograph with a green color overlay. It depicts a multi-story residential building with balconies, partially obscured by a dense garden of various trees and plants in the foreground. The overall scene is lush and green.

GREEN AUDIT

resources and containers. Avoid unnecessary packaging where-ever possible. Keep the generation of plastic waste to a minimal. Waste from construction debris is found around the campus. So, this waste can be effectively reused for landscaping. Only minimum amount of E-waste is generated inside the campus and they have signed a MOU with Clean Earth Green Earth Solutions for collection and disposal of E-waste. Incinerator is fixed for the safe disposal of sanitary waste. Separate bins should be placed for bio-degradable and non-biodegradable waste disposal. Educate the students on how to use the bins and their purpose. Maintain proper records on type of waste, quantity of waste and the vendor details on daily basis. Establish vermicompost pits for dumping garden and wet waste from campus. Monitoring waste generation is a must to become a zero-waste campus. Paper waste can be reduced by using both the sides before disposal. Yearly target should be set by the college in reducing the waste generation. Nearly 1.87 tonnes of papers are sent to Academy of Gandhian studies for recycling. Awareness programs to be conducted among staffs and students on effective use of resources and contributing to the environment.

3.1.2 Recommendations

- Reduce the absolute amount of waste that is produced from classrooms.
- Keep biodegradable and non-biodegradable waste bins for segregation of waste.
- Establish vermicompost pits for dumping dry leaves, green waste and wet waste.
- Use construction debris waste for landscaping.
- Maintain records for type of waste and amount of waste disposed.
- Use concrete block from civil lab for landscaping application.
- Keep proper record of DG oil replaced and ensure proper disposal.

3.2 Water Management

Water Audit is a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. Water audit is a method of quantifying all the flows of water in a system to understand its usage and improve water conservation. Water audit gives an idea about the amount of water that is consumed in the college for activities like washing hands, drinking, in the laboratories, watering for garden and flushing toilets and urinals. From the results obtained, students and staffs will consider better ways to improve water conservation throughout the building and on college campus. It is therefore essential that any environmentally responsible institution should examine its water use

practices. Water audit provides overview of the water use trends, effectiveness of conservation measures and potential cost and water savings.

3.2.1 Observations

- Three borewells are available in the campus to meet the water requirement.
- Overhead tanks of 2X 5000 liters for fire water, 6 X 2000 liters for raw water and 1X 1000+1 X 750 liters RO water are installed in Main block.
- Overhead tanks of 2X 5000 liters for fire water, 3 X 2000 liters for raw water and 1X 1000 liters RO water are installed in MBA block.
- Exact consumption details are not available as water meters are not installed.
- Rainwater harvesting system is implemented in the campus.
- Rainwater harvesting tank and pits are overflowing as stored water is not used.
- In Block-2 rainwater harvesting pits are not connected to drainpipes.
- In Block-2 overhead main tank is leaking.
- RO water system is provided for drinking water.
- Wastewater from RO plant is reused for flushing and hand washing.
- Found two taps leaking in chemistry lab washrooms.
- The main source of water is from three borewells inside the campus.
- Approximate water consumption is 10000 litres/day.
- Periodic testing of raw water and drinking water is done.
- Open pipe irrigation is used in the campus.
- Around 200 taps are installed in the campus.
- Water flow varies from 5 lpm to 12 lpm.
- Solar panels cleaned once in two weeks using fresh water and approximately 5000 litres.

Table 11. Water testing results

| SI.NO | Parameters | Unit | Drinking Water 1 Result | Drinking Water 2 Result | Bore Well Water Result | IS: 10500-2012 Specification |
|-------|------------|-------|-------------------------|-------------------------|------------------------|------------------------------|
| 1 | Color | Hazen | <1.0 | <1.0 | <1.0 | 5 |
| 2 | Odor | - | Agreeable | Agreeable | Agreeable | Agreeable |
| 3 | Turbidity | NTU | <0.01 | <0.01 | <0.01 | 1 |

| SI.NO | Parameters | Unit | Drinking Water 1 Result | Drinking Water 2 Result | Bore Well Water Result | IS: 10500-2012 Specification |
|-------|------------------|------|-------------------------|-------------------------|------------------------|------------------------------|
| 4 | Ph | - | 7.06 | 6.94 | 7.77 | 6.5-8.5 |
| 5 | TDS | mg/l | 51 | 31 | 742 | 500 |
| 6 | Total Alkalinity | mg/l | 26 | 18 | 424 | 200 |
| 7 | Total Hardness | mg/l | 20 | 17 | 556 | 200 |
| 8 | Calcium as Ca | mg/l | 4 | 2.4 | 60.9 | 75 |
| 9 | Magnesium as Mg | mg/l | 2.43 | 2.67 | 96.7 | 30 |
| 10 | Chlorides | mg/l | 13.1 | 8.25 | 161 | 250 |
| 11 | Fluorides | mg/l | 0.22 | 0.21 | 0.58 | 1 |
| 12 | Nitrates | mg/l | 2.55 | <1.0 | 20.6 | 45 |
| 13 | Sulphates | mg/l | <1.0 | 1.3 | 18.4 | 200 |
| 14 | Iron | mg/l | <0.01 | <0.01 | 0.03 | 0.3 |

3.2.2 Recommendations

- Install water meters (Bore well, RO, irrigation) and monitor overall consumption of water inside the campus and take necessary actions when required.
- Store wastewater from RO in the rainwater harvesting tank and use the water for gardening.
- Connect block-2 drainpipes to the rainwater harvesting pits so as to conserve rainwater.
- Repair leakage taps and tanks to avoid wastage of water.
- Implement automatic on/off pump system to avoid overflowing of overhead tanks.
- Use aerated taps to conserve more water.
- Conduct awareness programs on water conservation for students.
- Adjust the main pipe regulator to reduce the water flow to 5 lpm in hand washing areas.
- Check the option for drip irrigation.
- Planting native trees in place of exotic plants will reduce the water requirement for irrigation.



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