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Certificate No: 305022092751Q

CERTIFIED ISO 14001 : 2015 COMPANY

Certificate No: 22EEGQ75

CERTIFICATE

This is to certify that

M/s AMITY UNIVERSITY, MADHYA PRADESH
Gwalior, India 474005

has been assessed by us for the institution's energy management in order to meet the requirement of

Energy Audit

As per the submitted report, the energy management practices of the Institute have been verified and found to be satisfactory.

The administration's efforts towards promoting renewable energy, energy conservation and to comply with ISO 50001:2018, the global energy management systems standard, which specifies requirements for initiating, implementing, maintaining, and improving an EnMS are commendable and noteworthy.

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ENERGY AUDIT REPORT

AMITY UNIVERSITY
MADHYA PRADESH
Established vide Government of Madhya Pradesh Act No. 27 of 2010

Amity University
Madhya Pradesh, Gwalior

Submitted by:

enviraj
CONSULTING

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2021-2022

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Contents

Executive Summary

This energy audit aims to evaluate an institute's energy demand and supply, analyze various energy sources, and assess the institute's energy consumption pattern. The primary objective is to identify areas where energy performance and efficiency can be improved, and recommend solutions for the same.

The audit found that the institute's major energy consumption was electricity, while LPG was used in the canteen/kitchen area through independent contractors. However, since the exact LPG consumption data was not maintained by them, this audit only analyzes electricity data.

The institute's primary electricity supply sources were from the grid, accounting for 70%, followed by solar at 23%, and DG sets at 7% on an annual basis. During FY 2021-22, the institute's electricity consumption was 14,74,906 kWh, which is 52-58% lower than FY 2018-2019 and FY 2019-2020 due to the COVID-19 lockdowns' impacts, resulting in the institute's electrical load not running at full capacity.

The majority of power consumption was attributed to lighting, electric fans, computers, and pumps, with chiller plants alone accounting for 30.9% of the institute's electricity demand.

The audit identified areas where energy performance and efficiency could be improved, and the recommendation section provides solutions for the same.

1. Introduction

The energy demand of India is rising by every year. Approximately 75% of India's electricity grid is still coal-fired. As a result, there is a direct relationship between electricity consumption and the environmental sustainability.

The Amity University, Gwalior, has responsibly carried out clean energy projects in the campus to meet its energy needs and while ensuring environmental sustainability.

The Institution has undergone an Energy Audit to assess its energy performance trends of last five years and further improve its energy use efficiency, as well as to meet NAAC Criteria 7; Institutional Values and Best Practices. Energy auditing is a useful tool for gaining insight into an organization's energy sources, appliance inventory, energy demand, and consumption patterns, which can then be used to reduce energy costs, control pollution, and make decisions about implementing improved energy conservation measures and technology.

About Institute

Amity University Madhya Pradesh was established by Ritnand Balved Education Foundation (RBEF) vide Madhya Pradesh Government Legislature Act of 2010 with the view to promote professional, industry-oriented education in the state of Madhya Pradesh. Amity University Madhya Pradesh, Gwalior located on a sprawling campus of 102 acres of land opposite Gwalior Airport, imparts modern, practical and research-oriented courses which will lead to the development of professionals who are employable and industry ready. This in turn will drive the socio-economic upliftment of the region.

Amity imparts education in almost all areas including management, engineering, architecture, biotechnology, law, communication, behavioural science, fine arts, fashion etc. Amity University Madhya Pradesh was adjudged the “Best Private University of Madhya Pradesh” by CMAI Association of India and has been accredited as “Premier University” by Accreditation Service for International Colleges (ASIC).

The University has one N.S.S. units sanctioned by the university, which are doing tremendous job through organizing activities like blood donations, tree plantations, health check-up, personality development etc. are conducted by this unit.

2. Objectives of the Audit

The key objectives of this audit are:

- To assess institute electricity demand and supply
- To assess the electrical load at various premises of the institute
- To identity the areas where the electricity can be conserved and provide suitable recommendations

3. Methodology

The methodology adopted for this audit was a three-step process comprising of:

1. **Data collection:** In this phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:
    - Site Visit

- Data about the electrical appliances, electricity sources was collected by observation and interview.

2. **Data Analysis** - The collected data analysed and compared with the relevant standards.
3. **Findings & Recommendations** – On the basis data analysis results and site observations, recommended were made for further improving energy performance of the institute.

4. Findings and Recommendations

4.1 Power Profile

Parameter	Value
Sanctioned Load KVA	1600
Released Load KVA	1600
Billing Load KVA	1440
Length of line Km	0.5
Voltage KV	33
Meter No.	XE481822
Meter Make	Secure
Line CT Ratio A	30/5
Line PT Ratio KV/V	33/110
Meter CT Ratio A	-/5
Meter PT Ratio KV/V	33/110
Multiplying Factor (MF)	6
Demand charges	Rs.485 per KVA
Unit Charges	Rs.7.35 per KWh
No Of Transformer	2 Nos 1500 KVA each
No of DG Sets	4 Nos x750 KVA & 1No x250 KVA
Installed Solar Capacity	307 KWp

4.2 Electricity Consumption

Sr. No.	Outlet Name	Block Wise Electricity Consumption in KWH (FY 2021-22)	
		Total KWH	Consumption (%)
1	A- Block + Sports Ground	2,19,983	14.92%
2	B- Block (Pocket-3 & 4)	1,09,129	7.40%
3	Boys-Girls Hostel	80,904	5.49%
4	S1T1C1	1,93,102	13.09%
5	A-Block (AC)	15,083	1.02%
6	Pump House +B-Block (Pocket 1 & 2)	93,331	6.33%
7	Boys-Girls Hostel on MLTP-2	52,180	3.54%
8	Block-C (MLTP 1)	31,999	2.17%
9	Block-C (MLTP 2)	78,279	5.31%
10	S1T2C2	2,62,737	17.81%
11	Hostel No-3 & Hostel No-4	67,342	4.57%
12	A-Block 2nd AC feeder	17,308	1.17%
13	Old STP + New STP	1,37,657	9.33%
14	B & C Block -AIS	62,248	4.22%
15	Admin Block -AIS	10,548	0.72%
16	Multipurpose Hall-AIS	8,795	0.60%
17	Sub-Station Room-AIS	1,411	0.10%
18	Pump Hose-AIS	3,410	0.23%
19	B- Block 2nd Part-AIS	12,552	0.85%
20	Borewell-AIS	11,529	0.78%
21	Cafeteria A Block	52	0.00%
22	Boys Hostel Mess	1,045	0.07%
23	Mess Girls Hostel	573	0.04%

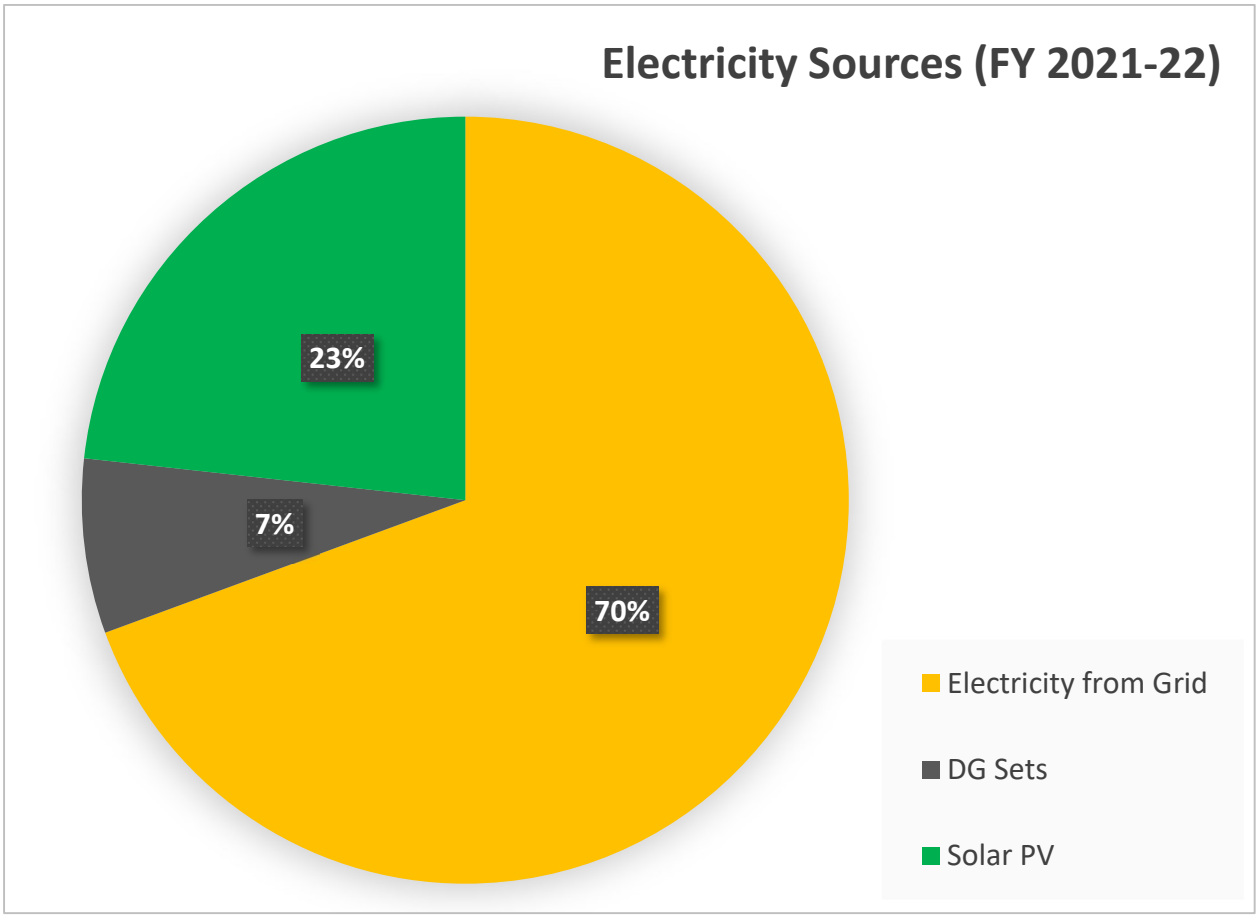
24	Canteen B-Block Ness Café	626	0.04%
25	Canteen C-Block Ness Café	546	0.04%
26	BSNL	929	0.06%
27	Photo Copy M/c	138	0.01%
28	Axis Bank ATM	108	0.01%
29	PS Food	780	0.05%
30	Kamlesh Laundry	232	0.02%
31	Dhobi Ghat	47	0.00%
32	Amul Dairy	303	0.02%
	Total KWH	**14,74,906**	**100.00%**

The total electrical consumption in FY 2021-22 was found to be 14,74,906 kWh. This consumption was 52-58% lower compared to FY 2018-2019 and FY 2019-2020 due to the impacts of COVID-19 lockdowns, during which the institute's electrical load was not running at full capacity.

The primary sources of power usage in the institute are lighting, electric fans, computers, and pumps. However, the chiller plant alone is responsible for 30.9% of the total power consumption.

4.3 Electricity Sources

The campus is powered by three primary electricity sources, consisting of 70% net grid electricity imports, 23% solar energy, and 7% from the diesel generator, as recorded in FY2021-22. However, solar energy's share appeared higher during the period due to reduced energy consumption resulting from COVID-19 lockdowns. Typically, under normal conditions, the solar energy contribution ranges from 15% to 18%.



4.3.1 Net Import from Grid

Month	Units Received kWh	Units Received KVAh	Power Factor	Max Demand KVA
Apr'21	71,700	72,954	0.9828	780
May'21	28,356	29,736	0.9536	115
Jun'21	35,502	36,768	0.9656	576
Jul'21	1,26,828	1,29,120	0.9822	1020
Aug'21	1,67,130	1,68,720	0.9906	1020
Sep'21	1,67,586	1,69,572	0.9883	1068
Oct'21	1,59,156	1,60,638	0.9908	1116
Nov'21	78,984	80,040	0.9868	756
Dec'21	80,297	80,963	0.9918	238

Jan'22	75,174	75,738	0.9926	228
Feb'22	57,084	57,552	0.9919	161
Mar'22	1,10,688	1,11,264	0.9948	1236
Total	**11,58,485**	**11,73,065**	**0.9843**	**1236**

4.3.2 Electricity Generated from DG Sets

The institution has installed five DG Sets as a power backup, among which four units have a capacity of 750KVA and one unit has a 250KVA capacity. The data below displays monthly electricity generation and diesel consumption for all five DG sets.

Month	Units generated kWh	Quantity of Diesel Lts
Apr'21	9017	2995
May'21	7101	2338
Jun'21	4428	1472
Jul'21	13887	4633
Aug'21	23209	7668
Sep'21	28118	9475
Oct'21	17625	5895
Nov'21	3435	1149
Dec'21	5960	2005
Jan'22	2	3
Feb'22	6,639	2,225
Mar'22	3,349	1,115
Total	**1,22,770**	**40,973**

4.3.3 Electricity generated from Solar Power Plant

Month	Solar Generation (kWh)
Apr'21	41,563
May'21	37,535
Jun'21	37,954
Jul'21	32,969
Aug'21	28,906
Sep'21	25,169
Oct'21	33,564
Nov'21	27,202
Dec'21	24,499
Jan'22	23,952
Feb'22	34,158
Mar'22	40,670
Total	**3,88,141**

4.4 Energy Balance

Particulars	Source	Value	Unit
A. Electricity Supply	Net import from the grid	11,58,485	kWh
	DG Sets	1,22,770	kWh
	Solar	3,88,141	kWh
	Total	16,69,396	kWh
B. Electricity Consumption	--	14,74,906	kWh
Non-Technical /Technical Losses (A-B)		**1,94,490**	**kWh**

4.5 Recommendations

- It is recommended to prepare a departmental inventory which includes list of electrical appliances with their corresponding power ratings. This will make it easier to estimate the electrical load and identify areas where energy can be saved. The information gathered from the inventory can also be used for electricity accounting and auditing purposes.

- Department-wise energy audit will be a useful tool for understanding the electrical consumption pattern in the institute's various locations and establishing a baseline. Furthermore, encouraging the various departments to conserve energy.

- The majority of power consumption is attributed to lighting, electric fans, computers, and pumps. Incandescent bulbs and CFL lights should be replaced with LED lights, even lighting distribution system should be ensured and electric fans should be serviced and bearings replaced wherever necessary.

- Obsolete technology in ACs, refrigerators, and freezers used in many departments is causing power loss. Consider replacing them with energy-efficient models to save power.

- Electric water heaters in hostels can be replaced with centralised solar water heaters.

- Installation of a suitable Bio-gas plant to save energy used for heating water in science laboratories.

- When constructing new buildings in the campus, it is important to prioritize natural light and air circulation in order to reduce energy waste.

- Compared to the overall energy demand of the campus, solar power contributes around 15-18% of the total energy demand (under normal conditions). In order to achieve a cost-benefit and reduce the carbon footprint of the institute, the solar power capacity can be increased.

- Encourage energy-efficient behaviour among students, faculty, and staff to reduce overall electricity demand.

- Energy saving signage can be displayed at various locations to encourage staff and students to conserve energy.

- The energy balance suggests that the energy supply has been meeting the demand but there is still room for improvement in terms of accessing data on electrical consumption to reduce both non-technical and technical losses including transmission and distribution losses.

- LPG consumption data can also be used in future energy audits.

Annexure-I (Photographs)

DG Set

LT Panel

Chiller Plant

Solar Power Plant

Transformer

HT Panel