

RANI BIRLA GIRLS' COLLEGE

Affiliated to The University of Calcutta

38, SHAKESPEARE SARANI
KOLKATA: 700017



ENERGY AUDIT REPORT

PERIOD OF ASSESSMENT

APRIL 2022 – MARCH 2024

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(wholly owned by Govt. of W.B.)

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Acknowledgement

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SECTION-1

INTRODUCTION

1.1 Background

Availability and utilization of energy drives the growth of economy and advancement of any country and thus, the demand of energy is increasing day by day. The worldwide mounting energy crisis with galloping cost hike, concern for environmental protection and open market competitive economy possesses serious challenge to Indian College to survive and grow.

One of the easier available options for survival is 'Energy Conservation' thereby saving environment and cost reduction through strategic energy management. It also gives a positive orientation to energy cost reduction, preventive maintenance and quality control programs. This is the translation of conservation ideas into reality by blending techno-economically feasible solutions within a specified time frame.

Energy conservation is a worldwide objective. The energy policy of the Government of India calls for conservation of energy. With the enactment of Energy Conservation Act-2001 amongst others has emphasized upon the power of the appropriate Govt. to enforce efficient use of energy and its conservation.

This study has mapped power system parameters at the source, Distribution Panels and various equipment's. It has also mapped illumination level at various activity areas in the RANI BIRLA GIRLS COLLEGE, where the team was permitted to enter for the study. The study could identify concerned problem areas, barriers towards maintaining right use of available facilities and come out with cost effective solutions. It also recommends cost effective and fast pay back solutions for performance improvement of all the systems.

1.2 Objective of the Study

The objective of the study is to assess overall efficiency of the various systems and defined pacific energy consumption of the public building and make recommendations about potential energy saving opportunities, based on the observation of energy audit.

- Electrical Structural details
- Use & occupancy of the building.

- Energy supply features
- Details of systems/equipment's/appliance etc.
- Quality of power

1.3 Methodology for Energy Audit

Detail energy audit consists of evaluation of the present trend of energy consumption. Energy Audit activities, in general, include.

- The activity starts with collection of basic information and general overview of the - RANI BIRLA GIRLS COLLEGE -Based on the dissections with Dr. Srabanti Bhattacharya, Principal, RANI BIRLA GIRLS COLLEGE, University of Calcutta.
- RANI BIRLA GIRLS COLLEGE was requested to provide the electricity bills for last 2 yrs.
- Identification of energy streams.
- Quantification of energy streams into discrete functions (system/ equipment's/ appliances etc.)
- Identification of energy and cost savings opportunities.
- Establish measurement and verification protocol i.e., objective measurement through meters by identifying measurement points.
- Required data collection, field measurements and analysis of data, etc.

The Deliverables are a report consisting of following:

- a) The main energy-consuming equipment's performance and the suggested energy-saving solutions.
- b) The financial computation of the associated investment and the rate of return.
- c) Assess the building's use and occupancy as well as the state of the structure and the equipment that supports its systems.

1.4 About Rani Birla Girls College, University of Calcutta

Rani Birla Girls' College was established in July 1961 as an undergraduate arts college affiliated to the University of Calcutta by the Hindusthan Charity Trust in the memory of Rani Jogeshwari Devi Birla to serve as a women's educational institution and to impart a comprehensive learning programme to its students within an enlightened, liberal and

progressive milieu. Undergoing a remarkable transformation, this college departed from its initial apparatus of governance (by a private Trust) to function as an aided institution under the Government of West Bengal.

The institution holds the distinction of being the bearer of a teaching and learning legacy of more than six decades and has been relentless in its pursuit of excellence. This college has maintained good academic performance with consistency. Co-curricular training and value-orientation have been equally prioritized within the institutional agenda. The college is very conveniently located on Shakespeare Sarani and is easily accessible from both the A.J.C. Bose Road and Jawaharlal Nehru Road intersections of Shakespeare Sarani. It is adjacent to Bharatiya Bhasha Parishad and Macpherson Square.



1.5. Status of the college building

Rani Birla College comes under the University of Calcutta and it is established in the year 1961, imparting higher education in the field of Arts. It is located in a rented building in the heart of the capital of West Bengal and in prime location i.e. Shakespeare Sarani, Kolkata. The college is running in the rented property with an area of 1 Bigha 4 Katha and 2 Chatak (nearly 32,535 sq. ft). out of the total area, 11,330 sq. ft is built-up. The premise has a playground of 8020 sq. ft area. The College admits students from all social milieus and empowers them through intensive mentoring and counselling to face the challenges of life and become responsible and sensitized citizens of the country. Rani Birla Girls' College provides a caring

and nurturing environment where students come into their own, blossoming into confident young women ready to face the world.

Building Name	Building Square Footage (m ²)	Age of Building (years)	Purpose of Building	Number of Floors	Daily Operational Hours	Days of Use per Week	Average number of occupants
Main Building (Total Campus)	11,330 sq. ft	Nearly 80 years	Academic and Administrative	3	8	6	600
Anex-I Building		Nearly 80 years	Academic and Administrative	2	8	6	120
Anex-II Building		Nearly 80 years	Academic	2	8	6	50

SECTION-2

Electrical Supply & Billings

2.1. Energy Sources

Electricity is the major energy sources of the college. Electricity is supplied by CESC, Kolkata. Diesel oil is being used in the DG sets for in-house generation of electricity during power cut.

2.2. Energy Consumption

For the Unit / college, the applicable CESC electrical tariff is in two parts i.e. a fixed cost (Demand Charges) and unit (kWh) rate. The average monthly unit consumption of the college is 1560.71 kVAh and the average monthly electricity bill amount is around Rs. 15,233/- (April 2022 to March 2023). On the other hand, the average monthly unit consumption of the college is 1726.01 kVAh and the average monthly electricity bill amount is around Rs. 16827/- (April 2023 to March 2024).

2.3. DG Sets

There is a DG set available in the college of capacity 63 kVA for in house generation of electricity. This control panel model of DG has rated voltage of 415v and rated current of 86.8 A. The DG is with rated frequency of 50 Hz. As the power supply is very good in the area so the running hour of DG set is very less. It is advisable to put an energy meter on each DG set then it would be easy to conduct the efficiency of DG set. This way, the operator could also note down the unit generation and oil consumed. The operator may record the operating parameters of the sets in the following manner in future.

The mechanical details like temperature, lube oil etc. should be in addition to the above. From the above data, the management may calculate the offices generated by the DG set in an hour and total diesel consumption. The offices generated per litre of diesel consumed can hence be calculated on an hourly basis. Thereafter, the monthly figures can be calculated in the similar fashion. It may be noted that the efficiency of the DG set depends largely on the operating load factor. The maximum efficiency of the DG set is available at about 80-85% load factor.

Annual average Electricity consumption as per electric bill			Diesel consumption (lit)	Diesel consumption Amount (Rs)	AMC (Rs)	Other Maintenance cost (Rs)
Duration	Electricity (kVA)	Electricity Cost (Rs)				
April 2022 to March 2023	1560.71	15233/-	20 lit	1854/-	10,620/-	3,000/-
Apr 2023 to Feb 2024	1726.01	16827/-			12,213/-	1,770/-

2.4. Air Conditioning

There are three window ACs. One in the Office and two in the ground floor of the main building. Two split Acs are installed in the 2nd Floor. Each one is with 1 ton capacity.

2.5. Computer

There are all together 54 computers used in various departments as well as in college administration. In the main building, in ground floor, Principal's office and Geography Department have 11 desktop computers. Office in the ground floor of Anex-I building has 6 computers. In the first floor of main building, Library has 6 desktop computers, other departments like B.FAD and Zonal have 12 desktop computers. In the second floor, Journalism department has 9 desktop computers. In Anex-2 building, there are 10 desktop computers under C.M.E.V.

2.6. CCTV Cameras

24 hours CCTV surveillance is available in the whole campus of the college. All together 11 active CCTV cameras and 2 surveillance screens are there. CCTV cameras are installed in the

entrance of college. Other places like entrance of office, Principal's office and stairs, lobbies, library are under CCTV surveillance.

SECTION-3

Lights, Fans, Air-condition

3.1 LIGHTING

Building Name	Floor	Light source	Light number	Type of light (Normal / CFL)	Wattage	Number of days institution open	Number of hours lights are left on each day
Main Building	Ground Floor	Tube light	32	CFL-21 Normal-11	40 watt each	6 days / week	8 hrs
	1st Floor	Tube light	49	CFL-43 Normal-06	40 watt each	6 days / week	8 hrs
	2nd Floor	Tube light	19	CFL-13 Normal-06	40 watt each	6 days / week	8 hrs
Annex Building	Anex-1	Tube light	18	CFL-11 Normal-07	40 watt each	6 days / week	8 hrs
	Anex-2	Tube light	8	CFL-04 Normal-04	40 watt each	6 days / week	8 hrs

3.2. FAN

Saving on Replacement of Ceiling Fan with Energy Efficient fans	
Total no. of fan nos.	
Ground Floor	23
1st Floor	28
2nd Floor	22
Anex-1	14
Anex-2	09
running hours per day	8 hrs

3.3. AIR CONDITIONING LOAD

In the Unit/ college, there are 3 window AC of 1 ton capacity in ground floor and office. Two 2 star rated Split AC in the second floor. Air-conditioners to maintain comfort temperature in the Auditorium/ office etc. Package units are installed mainly for the Auditorium. Due to the study being done in winters, the Energy efficiency assessment could not be done for the ACs. It is recommended that whenever new split/ window ACs are being installed, it should be 5 stars rated. Filters of package units were also checked during study which was found very clean. Energy Consumption in star rated split office is given above for information.

Star rated window ACs are also available in the market. It also consumes similar power as there in split office. Proper cleaning of ACs is very important for its output performance. At least, once in two months cleaning of ACs filter is recommended during the season.

AC				
Building Name	Floor	No. of AC	Type of AC	Capacity
Main Building	Ground Floor	2	Window	1 ton
	2nd Floor	2	Split **	1 ton
Annex Building	Anex-1	1	Window	1 ton

3.4. COMPUTERS

Building Name	Floor	Type of Computer	Number of Computer	Usage duration / day	Number of days institution open
Main Building	Ground Floor	Desktop	11	8 hrs	6 days / week
	1st Floor	Desktop	18	8 hrs	6 days / week
	2nd Floor	Desktop	9	8 hrs	6 days / week

Annex Building	Anex-1	Desktop	6	8 hrs	6 days / week
	Anex-2	Desktop	10	8 hrs	6 days / week

3.4. CCTV CAMERAS

Building Name	Floor	Number of CCTV camera
Main Building	Ground Floor	4
	1st Floor	4
	2nd Floor	1
	3rd Floor	2

SECTION – 4

Recommendation

Fans

- Employ fan blades designed like aero foil.
- For continuous or nearly continuous operations, choose an energy-efficient motor.
- Turn off fans when not in use.

Lighting

- Make use of occupancy sensors to control wastage of electricity.
- Install a greater number of energy-saving substitutes for incandescent lights in place of normal tube lights.
- To permit utilising fewer fixtures, think about reducing them.
- Reassess the type, control, and strategy of outside lighting. Take firm control over it.
- Installation of some solar fixtures to reduce energy consumptions.

Buildings

- Take into account new thermal windows, doors, roofing insulation, etc.
- For windows facing the sun, take into account coatings and shades in addition to tinted or reflective glass.


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