



# Miranda House

## UNIVERSITY OF DELHI



# ENERGY AUDIT REPORT

PREPARED BY  
EHS ALLIANCE SERVICES



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## CERTIFICATE



CERTIFICATE NO. EHSAC50C

# CERTIFICATE

PRESENTED TO

## M/S MIRANDA HOUSE

GC Narang Road, University Enclave, New Delhi, Delhi 110007

Has been assessed by EHS Alliance Services for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

## ENERGY AUDIT

The energy-saving initiatives carried out by the College have been verified in the report submitted and were found to be satisfactory.

The efforts taken by management and faculty towards all types of energy used in the College and sustainability are highly appreciated and noteworthy.

SIGNATURE



12.01.2021

DATE OF AUDIT

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## ACKNOWLEDGEMENT

EHS Alliance Services would like to thank the management of Miranda House for assigning this important work of Green Audit. We appreciate the co-operation to the teams for completion of assessment.

We would also like to thank **Dr. Nisha Vashishta** – IQAC convener, for her continuous support and guidance, without which the completion of the project will not be possible. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

We are also thankful to

***Dr. Mallika Verma – Convener, Academic Committee***

***Dr. Amrita T. Sheikh – Convener, MH Vatavaran***

***Dr. Saloni Bahari – IQAC member***

***Dr. Namrata Singh – IQAC member***

***Dr. Monika Tomar – IQAC member***

***Mr. Jyoti Prakash – Section Officer, Admin***

***Mr. Sudhir Aggarwal – Section Officer, Accounts***

***Mr. Shiv Kumar – Site Engineer***

Last but not the least, we would like to thank **Dr. Bijayalaxmi Nanda** – Principal, Miranda House for giving us an opportunity to evaluate the environmental performance of the campus





## DISCLAIMER

EHS Alliance Services Energy Audit Team has prepared this Energy Audit Report for Miranda House based on input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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**Vijay Singh**  
Lead Auditor EMS & Energy



**Dr. Uday Pratap**  
Co-Auditor EMS & Energy



## **ABBREVIATION**

<b>A</b>	<b>Amps</b>
<b>AC</b>	<b>Air Conditioner</b>
<b>AC</b>	<b>Alternating Current</b>
<b>AMET</b>	<b>Academy of Maritime Education and Training</b>
<b>CFL</b>	<b>Compact fluorescent lamp</b>
<b>CIP</b>	<b>Comprehensive Inspection Programme</b>
<b>DC</b>	<b>Direct Current</b>
<b>HSD</b>	<b>High Speed Diesel</b>
<b>Hz</b>	<b>Hertz</b>
<b>kg</b>	<b>Kilogram</b>
<b>kVA</b>	<b>kilo-volt-ampere</b>
<b>kW</b>	<b>kilo Watts</b>
<b>kWh</b>	<b>kilowatt hour</b>
<b>kWp</b>	<b>Kilowatt peak</b>
<b>LED</b>	<b>Light Emitting Diode</b>
<b>LPG</b>	<b>Liquefied Petroleum Gas</b>
<b>MMS</b>	<b>Module mounting structure</b>
<b>MPPT</b>	<b>Maximum Power Point Tracker</b>
<b>NAAC</b>	<b>The National Assessment and Accreditation Council</b>
<b>SEC</b>	<b>Specific Energy Consumption</b>
<b>SPV</b>	<b>Solar Photovoltaic</b>
<b>STC</b>	<b>Standard Test Condition</b>
<b>TV</b>	<b>Television</b>
<b>V</b>	<b>Volts</b>
<b>W</b>	<b>Watts</b>
<b>W/m<sup>2</sup></b>	<b>watt per square metre</b>



## INTRODUCTION OF COLLEGE

Miranda House, college for women, located in the University of Delhi campus, is a premier women's institution. It was established in 1948 by the then Vice Chancellor, Sir Maurice Gwyer. Lady Edwina Mountbatten laid its foundation stone on March 7 in the same year. Originally designed by renowned architect Walter George, Miranda House is built in warm red brick with cool and spacious corridors. The College shares an architectural affinity with other colonial educational institutions of the country. In the past six decades, as the College has grown, several other buildings have been added in consonance with its original design. Special efforts are on to preserve the heritage of its pristine architectural glory.



Miranda House offers liberal education in social sciences, humanities and basic sciences to more than 4000 students. The faculty, renowned for its meritorious profile and versatile talent, is dedicated to the cause of liberal education. Through their three years at Miranda, our students develop a sense of social responsibility, intellectual rigour, and practical knowledge. They develop communication, analytical and problem-solving skills, and a demonstrated ability to apply their education to our complex and diverse world.

The College has always maintained high academic standards. More significantly, it has provided students an enabling and creative environment to freely develop and express views that help them respond to changes in society. Being on the University campus, its proximity to other colleges facilitates the participation of Miranda students in several



inter-college events, both academic and cultural. Those who will make the College hostel their home for the next three years have the privilege of residing in one of the most beautiful residential buildings on the University campus. The institution's philosophy is guided by a pedagogy that encourages the students to explore new domains, to critically examine the world around them and to question stereotypes.



### **The Legacy... traditions and institutional values**

MH has a rich legacy. Established at dawn of independence it provided a unique opportunity to young women for quality higher education. They set for themselves high goals and ideals. They worked for a new society in which women would enjoy equal opportunity with men in professional and public fields. In this, they were abetted by the founding faculty who were independent minded, and belonged to the select group of highly educated women in independent India with a deep concern for quality of education they imparted. They were also charged with a spirit of adventure, steeped in idealism, and committed to women empowerment and the task of building a nation. Proud of their mission as early pioneers, they worked with single-minded devotion in setting the Miranda traditions. These attributes of total dedication have contributed in a large measure to the position of distinction occupied by the college. Over near seven decades of its existence, the college has grown from strength to strength, continuing to provide an atmosphere of high academic excellence and rich cultural activities to its students. The college has established a niche for itself amongst the globally recognized premiere institutions of higher learning.

Being a college established and maintained by the University, Miranda House has a special place among the women's colleges of the University of Delhi. Its location in the heart of the University Campus, and its close interaction with the various Departments of the University and other campus colleges gives it a unique advantage. Although a women's college, it is not a cloister. It welcomes interaction with other colleges and



educational organizations across the country, actively engaging both men and women in all its extramural activities, competing with the best on equal terms.

The extremely distinguished list of alumnae imparts a sense of confidence and immense pride in students. They view themselves as torchbearers of great traditions. All this propels them to often explore uncharted territory, think unfettered, and bend traditions in a bid to create a better world, especially for women.



### ***Vision***

Swadhyayann pramaditavyam steer students towards introspection and self-learning the Upanishadic maxim in the college logo enshrines its understanding of what education must accomplish.

MH envisions a world where women have their rightful place and are given due recognition as leaders to reach the top positions in all sectors of human endeavor. To give shape to this vision, Miranda House continually reaffirms and embraces its responsibility to build on its historic legacy of leadership in education of women. It remains strongly committed to addressing issues of gender in all their complexity and preparing the young women to lead professionally successful lives enriched by the love of learning build personally fulfilling lives radiating integrity and strength of character sustain purposeful engagement with the world with an open mind and balanced perspective meet with confidence the challenges they will encounter in their lives flourish in different cultural milieus in an increasingly interconnected world uphold the core institutional values of respect for diversity, inclusiveness and humanism emerge as leaders charged with new ideas and capacity to make a difference

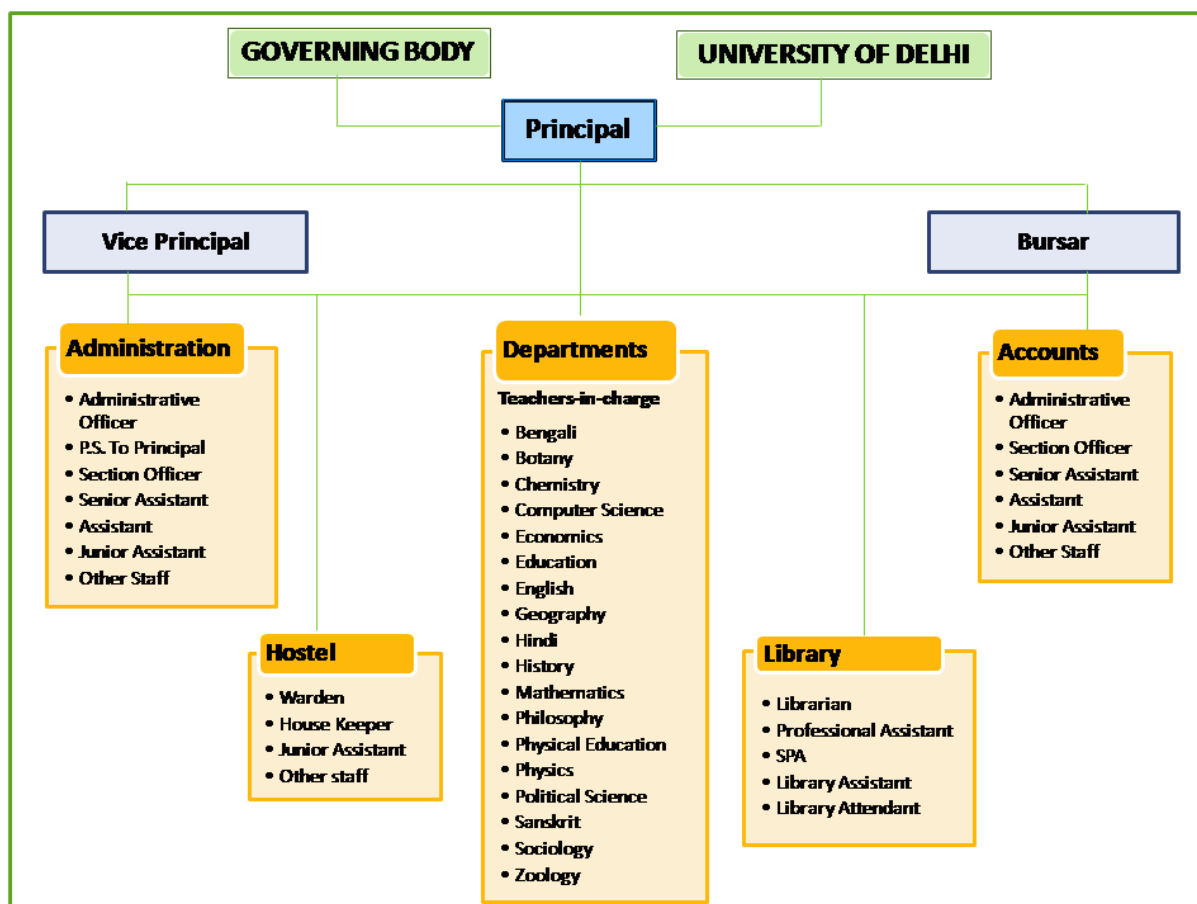


### Mission

The stated mission of the college is to provide

- a stimulating active learning environment attracting young women with exceptional desire to make a difference to the world
- highest quality liberal arts and basic science education through distinctive academic programmes that instill rigour in the pursuit of knowledge
- culturally sensitive inclusive environment upholding core values of respect for diversity
- enriching co-curricular activities linking education to the world of work and communities
- dedicated and responsive faculty of scholars to assist each student fulfill aspirations and reach milestones
- competencies for new domains of knowledge and the future of work in a globally connected world
- early mentoring for leadership instilling capacity to explore new ideas, take intellectual risk, and usher paradigm change

The college recognizes that there are no shortcuts and what it takes to change the world. This report delineates the multiple ways in which the college ensures mission accomplishment.





## Audit Participants

On behalf of College

### Name - Designation

**Dr. Bijayalaxmi Nanda** - Principal, Miranda House  
**Dr. Mallika Verma** – Convener, Academic Committee  
**Dr. Amrita T. Sheikh** – Convener, MH Vatavaran  
**Dr. Nisha Vashishta** – IQAC, Coordinator  
**Dr. Saloni Bahari** – IQAC member  
**Dr. Namrata Singh** – IQAC member  
**Dr. Monika Tomar**, IQAC member  
**Mr. Jyoti Prakash** – Section Officer, Admin  
**Mr. Sudhir Aggarwal** – Section Officer, Accounts  
**Mr. Shiv Kumar** – Site Engineer

On behalf of EHS Alliance Services

Name	Position	Qualifications
Mr. Vijay Singh	Lead Auditor	M.Sc. M. Tech (Environment Science & Engineering), Energy Auditor, Post Diploma in Industrial Safety Management
Dr. Uday Pratap	Co-Auditor	Ph.D., EMS: Lead Auditor ISO14001:2015, QCI-WASH





## EXECUTIVE SUMMARY

The purpose of this Energy Audit was to seek opportunities to improve the energy efficiency of the Miranda House. Reducing the energy consumption despite improving the human comfort, health and safety were of primary concern.

Beyond just identifying the energy consumption pattern, this audit sought to detect and categorize the most energy efficient appliances. Additionally, some daily practices relating common appliances have been shared which may help reducing the energy consumption. Data collection for energy audit of the college was carried out by the EHS Alliance Team. The Energy Audit Report accounts for the energy consumption patterns of the college on actual survey and detailed analysis during the audit.

The work comprehends the area wise consumption traced using suitable equipment. The analysis was carried out by our team with the support of the staff members from Miranda House. The report provides a list of possible actions to preserve and efficiently access the available source, resources and their saving potential was also identified. We look forward towards optimization that the authorities, students and staff members would follow the recommendations in the best possible way. The report is based on certain generalizations including the approximations wherever necessary. The views conveyed may not reveal the general opinion. They merely represent the opinion of the team guided by the interviews of clients. We are happy to submit this Energy audit report to the Miranda House.

## ENERGY AUDIT ANALYSIS

### 1. ENERGY CONSUMPTION

To understand the Energy Consumption trends and for analyzing the average monthly consumption we have collected electricity energy bills from Jan 2020 to Dec 2020

The details of “**Meter Connection**” at “**Miranda House**” are as follows-

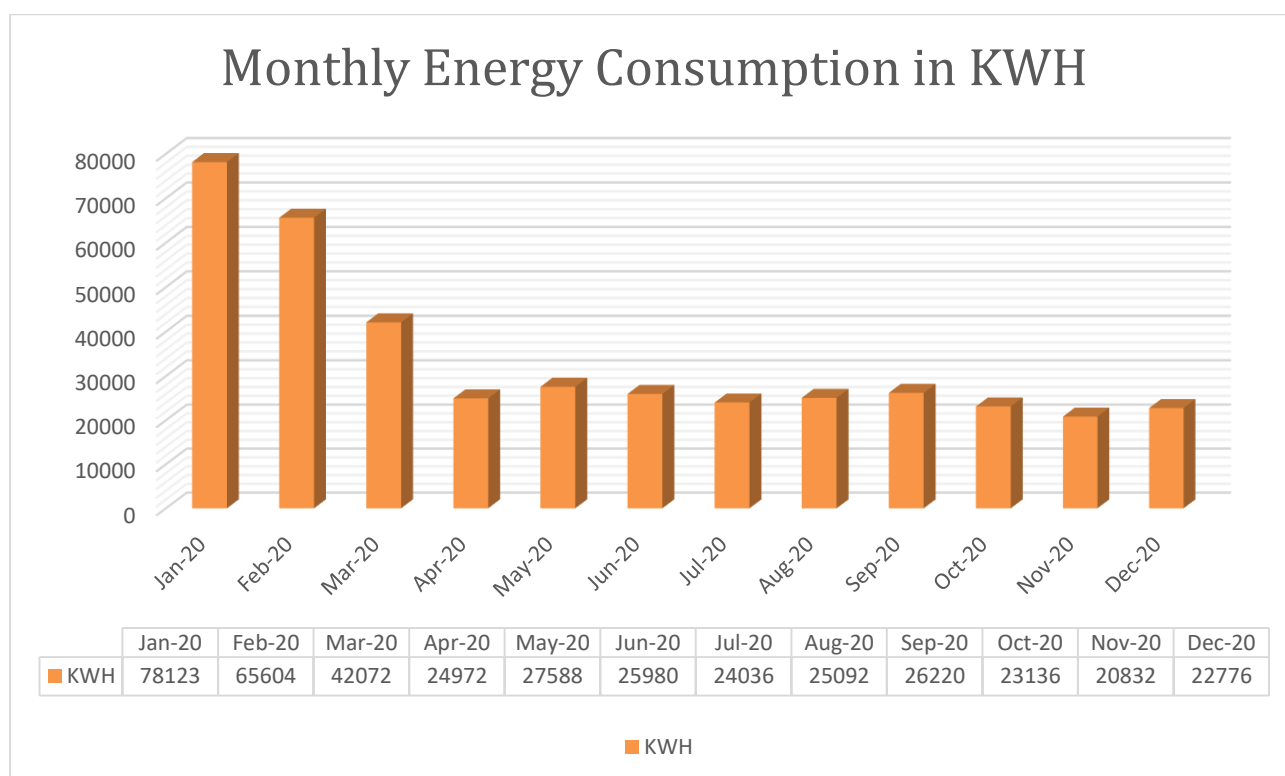
Name	-	The Principal
CA No.	-	60000002711

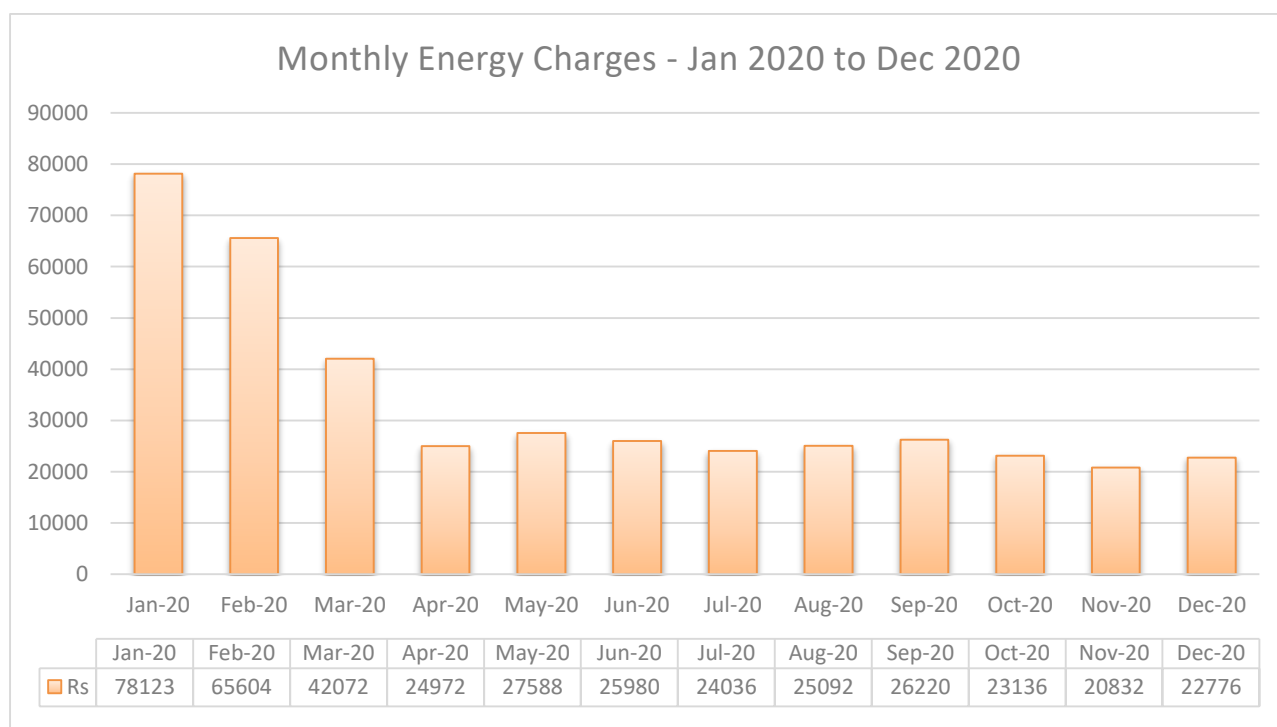


### 1.1 Summary of Monthly Electricity Consumption and Total Bill Amount

To understand the Energy consumption trend and for developing the baseline parameter we have collected monthly energy bill for the 12 months i.e. from Jan 2020 to Dec 2020

Month	Units (KWH)	Amount (INR)
Jan-20	78123	624984
Feb-20	65604	524832
Mar-20	42072	336576
Apr-20	24972	199776
May-20	27588	220704
Jun-20	25980	207840
Jul-20	24036	192288
Aug-20	25092	200736
Sep-20	26220	209760
Oct-20	23136	185088
Nov-20	20832	166656
Dec-20	22776	182208
<b>Total</b>	<b>406431</b>	<b>3251448</b>





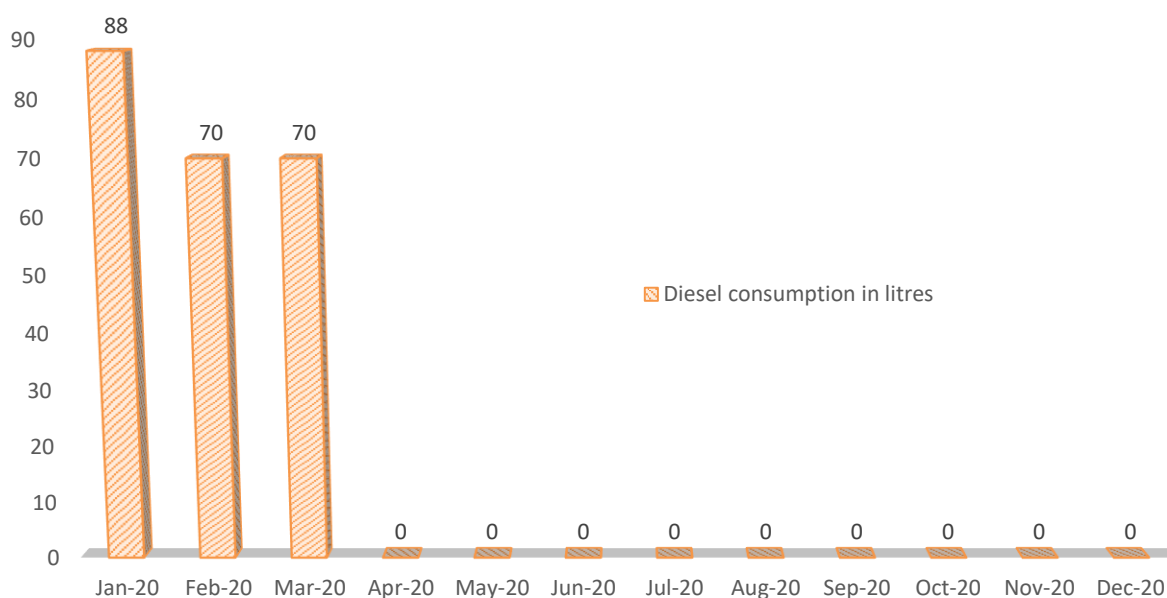
## 2. DIESEL CONSUMPTION

Below is the diesel consumption details in litres from Jan 2020 to Dec 2020.

Period	Diesel consumption (in litres)
Jan-20	88
Feb-20	70
Mar-20	70
Apr-20	0
May-20	0
Jun-20	0
Jul-20	0
Aug-20	0
Sep-20	0
Oct-20	0
Nov-20	0
Dec-20	0
<b>Total</b>	<b>228*</b>

\*The total consumption of the diesel is very low because of COVID-19 situation

## DIESEL CONSUMPTION (LITRES) JAN. 2021 TO DEC. 2021



### 3. ANALYSIS OF DG SETS

In the college, there is one Diesel Generator (DG) sets for its electrical power needs in case of Grid power failure. Total installed DG sets capacity is 250 kVA.

DG Set Design Details		
Description	Unit	DG at Station
Rated capacity	kVA	320 KVA
Hz		50
Sl No.		
Make		Sudhir
Volts	Volts	400 Volts
PF		0.8
Phase		3 Phase
RPM		1200
Amps	Amps	445.2
Mfg.		2011



DG Set Operation details		
Operating hours during testing	Hours	0.50
% Loading	%	68.58
Energy Generation	kWh	36.35
Load	KVA	98.4
Fuel consumption during testing	Litre	10
Specific energy generation	kWh/litre	3.14

**Observation and Suggestions:-** As per the trial taken during the energy audit the percentage loading of DG set is 62.38% which is ok and specific energy consumption of DG Sets 3.14 KWH/Litre which is satisfactory because as per manufacturer recommendation, best practices for SEC in DG sets range from 3.0 to 3.5 kWh/litre and above.

Diesel generator is more than 10 years old, College should opt for periodic maintenance and pollution compliances

## 4. AC SYSTEM

*Energy Efficiency Ratio (EER):* Performance of smaller chillers and rooftop units is frequently measured in EER rather than kW/ton. EER is calculated by dividing a chiller's cooling

Capacity (in Btu/h) by its power input (in watts) at full-load conditions. The higher the EER, the More efficient the unit. The cooling effect produced is quantified as tons of refrigeration (TR). The above TR is also called as air-conditioning tonnage.

There are Split ACs installed in Miranda House in various areas of various capacity which detail is given below:-

S. No.	Location	Type of AC (Split – S, Window – W)	Quantity	Rated capacity (TR)	Room Temp. (°C)	AC-Tout (°C)	AC-Tin (°C)	Room-RH (%)	Area (m <sup>2</sup> )	Air velocity (m/s)	Enthalpy Hout	Enthalpy Hin	Heat Load in TR	KW supplied	(Eff.) Power per Ton (KW/TON)	EER
1	Principal Room	S	2	1.5	23	12	20	52	0.03	2.3	25	38	0.33	0.55	1.67	2.11



2	P.A. ROOM	S	1	1.5	23	11	19	52	0.03	2	22	37	0.33	0.58	1.74	2.02
3	Committ ee Room	S	2	1.5	23	13	20	52	0.03	2.3	26	38	0.31	0.53	1.74	2.02
4	Lobby	S	1	1.5	23	12	20	52	0.03	2.2	25	38	0.32	0.55	1.74	2.03
5	Bursar Room	S	1	1.5	23	12	19	52	0.03	2.3	24	37	0.33	0.58	1.74	2.02
6	Vice Principal Room	S	1	1.5	24	11	20	52	0.03	2.3	22	38	0.38	0.65	1.69	2.08
7	Administ ration Office	S	4	1.5	24	12	20	53	0.03	2.5	25	38	0.34	0.6	1.79	1.97
8	Accounts Branch	S	3	1.5	24	12	20	53	0.03	2.4	25	38	0.33	0.58	1.78	1.98
9	Web Lab.	S	1	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
10	Near Web Lab.	S	1	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
11	Room No. 116	S	1	1.5	24	12	20	53	0.03	2.4	25	38	0.33	0.58	1.78	1.98
12	Room No. 117	S	1	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
13	Room No. 118	S	1	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
14	Seminar Hall R.No. 102	S	0	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
15	Room No. 108 DRC Lab.	S	2	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
16	Room No. 107 DRC Lab.	S	3	1.5	23	11	19	53	0.03	2.4	22	38	0.4	0.81	2.02	1.74
	Room No. 109 DRC Lab. Server Room	S	2	1.5	22	11.5	22	52	0.03	2.1	23	43	0.44	0.77	1.77	1.99
18	Library Ground	S	3	17	22	10	19	52	0.03	2.2	20	37	0.39	0.78	1.99	1.77



	Floor															
19	Amba Dalmia Resource Centre	S	2	1.5	23	11	21	53	0.03	2.5	24	40	0.42	0.74	1.77	1.99
20	Digital Resource Centre	S	5	1.5	24	11	20	52	0.03	2.3	22	38	0.38	0.65	1.69	2.08
21	Teaching Study Room (Library)	S	2	1.5	24	12	20	53	0.03	2.5	25	38	0.34	0.6	1.79	1.97
22	Porta Cabin-I	S	2	1.5	24	12	20	53	0.03	2.4	25	38	0.33	0.58	1.78	1.98
23	Porta Cabin-II	S	2	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
24	Porta Cabin-III	S	2	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
25	Porta Cabin-IV	S	2	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
26	Room No. 215 (Phil)	S	1	1.5	23	11	19	53	0.03	2.4	22	38	0.4	0.81	2.02	1.74
27	Room No. 214 Staff Lounge	S	3	1.5	22	11.5	22	52	0.03	2.1	23	43	0.44	0.77	1.77	1.99
28	Room No. 213 History	S	1	1.5	23	11	21	52	0.03	2.4	24	40	0.4	0.72	1.8	1.95
29	Room No. 212, Hindi	S	1	1.5	23	11	21	53	0.03	2.5	24	40	0.42	0.74	1.77	1.99
30	Room No. 211, Economics	S	1	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
31	English Department	S	1	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
32	Room No. 203, Geography	S	1	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
33	Room No. 204,	S	1	1.5	24	11	20	52	0.03	2.3	22	38	0.38	0.65	1.69	2.08



	Political Science															
34	Room No. 205, Sociology	S	1	1.5	24	12	20	53	0.03	2.5	25	38	0.34	0.6	1.79	1.97
35	Room No. 206, Bengali	S	1	1.5	24	12	20	53	0.03	2.4	25	38	0.33	0.58	1.78	1.98
36	Room No. 220, Sanskrit	S	1	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
37	Room No. 222, Mathematics	S	1	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
38	Room No.235, Biotechnology Lab.	W	3	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
39	Room No. 250, Project Lab. DSKC	S	2	1.5	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1
40	Physics Computer Lab.	S	2	1.5	23	11	19	53	0.03	2.4	22	38	0.4	0.81	2.02	1.74
41	Physics Teacher's Room	S	1	1.5	23	11	21	52	0.03	2.4	24	40	0.4	0.72	1.8	1.95
42	DSKC Physics II Floor	S	2	1.5	22	10	19	52	0.03	2.2	20	37	0.39	0.78	1.99	1.77
43	Physics Porta Cabin	S	1	1.5	23	12	19	52	0.03	2.3	24	37	0.33	0.58	1.74	2.02
44	Room No. 245	S	2	1.5	24	11	20	52	0.03	2.3	22	38	0.38	0.65	1.69	2.08
45	Room No. 236, Computer Science	S	3	1.5	24	12	20	53	0.03	2.4	25	38	0.33	0.58	1.78	1.98
46	Room No. 145, CLT	S	3	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02



47	Room No. 150 (DSKC Lab.)	S	2	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
48	Room No.146	W/S	3	1.5	23	11	19	53	0.03	2.4	22	38	0.4	0.81	2.02	1.74
49	Room No. 265	S	1	1.5	23	11	21	52	0.03	2.4	24	40	0.4	0.72	1.8	1.95
50	Room No. 308	S	3	1.5	23	11	21	53	0.03	2.5	24	40	0.42	0.74	1.77	1.99
51	Room No. 310	S	1	1.5	23	12	19	52	0.03	2.3	24	37	0.33	0.58	1.74	2.02
52	Room No. 311	S	1	1.5	24	12	20	53	0.03	2.5	25	38	0.34	0.6	1.79	1.97
53	Room No. 312	S	1	1.5	24	12	20	53	0.03	2.4	25	38	0.33	0.58	1.78	1.98
54	Room No. 315	S	2	1.5	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
55	Administration Office	W	2	2	22	10.5	21	52	0.062	2.4	22	39	0.88	1.53	1.74	2.02
56	Seminar Hall R.No. 102	S	6	2	22	10.5	20	52	0.062	2.1	21	38	0.77	1.28	1.67	2.1

Remarks: - We have checked Energy Efficiency Ratio of AC's and EER of AC's is fairly OK. But in future you should purchase 5-Star rated inverter based split AC's because power consumption of Inverter based BEE 5-Star rated AC's is less than non-star rated AC's.

## 5. CEILING FAN ANALYSIS

In the MH College, 934 Ceiling Fans are installed, out of which 905 fans are of 70W and 29 fans are 120W. The observation and suggestion are given below.

Sl No.	Location/Identification	Ceiling Fan 70W	Ceiling Fan 120W
1	Room no. 120	6	0
2	Room No.119	6	0
3	Room No.118	6	0
4	Room No.117	4	0
5	Room No.116	4	0



6	Room NO.115	2	0
7	Room No.114	4	0
8	Room No. 113	1	0
9	Room No. 112	1	0
10	Room No. 101	3	0
11	Room No. 102	10	0
12	Bank Area	5	0
13	Room No. 104	3	0
14	Auditorium	22	0
15	Wash Room Auditorium	2	0
16	Room No. 105	3	0
17	Room No.111	1	0
18	Room No. 106	2	0
19	Room No. 107	4	0
20	Rom No. 108	8	0
21	Rom No. 109	2	0
22	Room No. 110	2	0
23	Server Room	1	0
24	Principal Office Area	14	0
25	Admin Office	16	0
26	Room No. 128	0	5
27	Room no. 129	4	0
28	Room No. 130	0	2
29	Room No. 131	1	6
30	Room No. 132	1	0
31	Room No. 133	1	0
32	Room No. 134	1	0
33	Room No. 135	1	0
34	Room No. 136	8	0
35	Room No. 137	3	0
36	Room No. 138	2	0
37	Room No. 139	2	0
38	Room No. 140	6	0
39	Room No. 141	2	0
40	Room No. 142	2	0
41	Room No. 143	10	0
42	Room No. 144	2	0
43	Room No. 145	0	7
44	Room NO. 146	3	0
45	Room No. 148	2	0



46	Room No. 149	4	0
47	Room No. 150	0	9
48	Room No. 151	4	0
49	Room No. 152	18	0
50	Room No. 153	2	0
51	Room No. 154	2	0
52	Room No. 155	4	0
53	Room No. 156	18	0
54	Room No. 157	16	0
55	Room No. 158	6	0
56	Room No. 201	1	0
57	Room No. 202	6	0
58	Room No. 203	1	0
59	Room No. 204	1	0
60	Room No. 205	1	0
61	Room No. 206	1	0
62	Room No. 207	6	0
63	Room NO. 208	6	0
64	Room No. 209	6	0
65	Room No. 210	6	0
66	Room NO. 211	4	0
67	Room No. 212	4	0
68	Room No. 213	2	0
69	Room No. 214	5	0
70	Room No. 215	2	0
71	Room No. 216	4	0
72	Room No. 217	3	0
73	Room No.218	3	0
74	Room No.219	6	0
75	Room No. 220	2	0
76	Room No. 221	10	0
77	Room No. 222	2	0
78	Room No.223	2	0
79	Room No. 224	2	0
80	Room No. 225	4	0
81	Room No. 226	4	0
82	Room No. 227	4	0
83	Room No.228	6	0
84	Room No. 229	6	0
85	Room No. 230	6	0



86	Room No. 231	4	0
87	Room No. 232	1	0
88	Room No. 233	2	0
89	Room No. 234	3	0
90	Room No. 235	8	0
91	Roomn No. 236	9	0
92	Roomn no.237	2	0
93	Room No. 238	4	0
94	Room No.239	8	0
95	Room No. 240	1	0
96	Room No.241	8	0
97	Room No.242	1	0
98	Room No. 243	1	0
99	Room No. 244	1	0
100	Room No. 245	1	0
101	Room No. 246	4	0
102	Room No. 247	8	0
103	Room No. 248	6	0
104	Room No. 249	3	0
105	Room No. 250	6	0
106	Room no.251	14	0
107	Room No. 252	2	0
108	Room No. 253	10	0
109	Room No. 254	4	0
110	Room No. 255	2	0
111	Room No. 256	1	0
112	Room No. 257	1	0
113	Room No. 258	1	0
114	Room No. 259	1	0
115	Room No. 260	9	0
116	Room No. 261	22	0
117	Room No. 262	3	0
118	Room No. 263	4	0
119	Room No. 264	8	0
120	Room No. 265	21	0
121	Room No. 266	4	0
122	Room No. 267	6	0
123	Room No. 268	6	0
124	Room No. 301	8	0
125	Room No. 302	6	0



126	Room No. 303	4	0
127	Room No. 304	10	0
128	Room No. 305	10	0
129	Room No. 306	3	0
130	Room No. 307	9	0
131	Room No. 308	20	0
132	Room No. 309	1	0
133	Room No. 310	1	0
134	Room No. 311	1	0
135	Room No. 312	0	0
136	Room No. 313	8	0
137	Room No. 314	8	0
138	Room No. 315	4	0
139	Room No. 316	4	0
140	Room No. 317	2	0
141	Room No. 318	9	0
142	Room No. 319	5	0
143	Room No. 320	6	0
144	Room No. 321	4	0
145	Room No. 322	6	0
146	Room No. 323	6	0
147	College Library Building	164	0
148	College Canteen	20	0
149	Student Activity Room	10	0
150	Nescafe Kiosk	1	0
151	Pizza And More	1	0
152	DRC Server Room	1	0
<b>Total</b>		<b>905</b>	<b>29</b>

### Observation and Suggestions:-

In the college, old ceiling fans of 70/80 W are installed but BEE 5 Star Rated of 30W Ceiling Fans are present in the market. Therefore we suggest to replace BEE 5 Star rated fans of 30W.



## ECRM-1-Energy saving by replacing 70/120 W fans with energy efficient 30W ceiling fans

Total no of Ceiling Fans (70/80W)	=	905	Nos.
Total no of Ceiling Fans (120W)	=	29	Nos.
Total wattage of 70W Ceiling Fans	=	63350	Watt
Total wattage of 120W Ceiling Fans	=	3480	Watt
Total wattage of BEE 5 Star rated Fans (30W)	=	28020	Watt
Total saving in Wattage after replacement	=	38810	Watt
Operating hours per day	=	8	Hours
Operating days per annum	=	276	Days
Energy charges per unit in Rs.	=	8	INR
Saving in Rs./annum	=	685539.84	INR
Investment INR	=	2802000	INR
Payback period:- Months	=	4.09	YEARS

**Note:-** Energy saving will increase or decrease if operating hours of machine /equipment will be increase or decrease and payback period will also increase or decrease if cost of investment(Cost of machine/equipment/accessories of machine) will increase or decrease because cost of investment is taken on tentative basis.

## 6. ANALYSIS OF LIGHTING SYSTEM

### 6.1 Brief description of existing system

For assessing energy efficiency of lighting system, Inventory of the Lighting System has been noted / collected, with the aid of a lux meter, measurement and documentation of the lux levels at various locations at working level has been done.

### 6.2 Inventory of Lighting

Sl. No.	Location /Identification	36W Light	32W LED	150W LED	20W LED	20W LED-FOB Aly Side	10W LED Glow Shine
1	Room no. 120	14	0	0	0	0	0
2	Room No. 119	14	0	0	0	0	0
3	Room No. 118	14	0	0	0	0	0
4	Room No. 117	8	0	0	0	0	0



5	Room No. 116	8	0	0	0	0	0
6	Room No. 115	6	0	0	0	0	0
7	Room No. 114	8	0	0	0	0	0
8	Rom No. 113	1	0	0	0	0	0
9	Room No. 112	1	0	0	0	0	0
10	Room No. 101	3	0	0	0	14	0
11	Room No. 102	0	0	0	28	0	0
12	Bank Area	0	0	0	23	0	0
13	Room No. 104	0	0	0	0	0	12
14	Auditorium	0	0	0	0	26	0
15	Wash Room Auditorium	8	0	0	0	0	0
16	Room No. 105	8	0	0	0	0	0
17	Room No. 111	2	0	0	0	0	0
18	Room No. 106	8	0	0	0	0	0
19	Room No. 107	32	0	0	0	0	0
20	Room No. 108	44	0	0	0	0	0
21	Room No. 109	8	0	0	0	0	0
22	Room No. 110	6	0	0	0	0	0
23	Server Room	4	0	0	0	0	0
24	Principal Office Area	0	0	0	0	0	32
25	Admin. Office	0	0	0	0	26	0
26	Room No. 128	0	0	0	0	12	0
27	Accounts Branch Area	0	0	0	0	24	0
28	Room No. 129	12	0	0	0	0	0
29	Room No. 130	4	0	0	0	0	0
30	Room No. 131	4	0	0	0	0	0
31	Room No. 132	4	0	0	0	0	0
32	Room No. 133	4	0	0	0	0	0
33	Room No. 134	4	0	0	0	0	0
34	Room No. 135	4	0	0	0	0	0
35	Room No. 136	36	0	0	0	0	0
36	Room No. 137	12	0	0	0	0	0
37	Room No. 138	8	0	0	0	0	0
38	Room No. 139	8	0	0	0	0	0
39	Room No. 140	12	0	0	0	0	0
40	Room No. 141	10	0	0	0	0	0
41	Room No. 142	6	0	0	0	0	0
42	Room No. 143	18	0	0	0	0	0
43	Room No. 144	0	0	0	10	0	0
44	Room No. 145	24	0	0	0	0	0
45	Room NO. 146	10	0	0	0	0	0



46	Room No. 148	4	0	0	0	0	0
47	Room No. 149	16	0	0	0	0	0
48	Room No. 150	22	0	0	0	0	0
49	Room No. 151	12	0	0	0	0	0
50	Room No. 152	108	0	0	0	0	0
51	Room No. 153	9	0	0	0	0	0
52	Room No. 154	8	0	0	0	0	0
53	Room No. 155	0	6	0	0	0	0
54	Room No. 156	0	37	0	0	0	0
55	Room No. 157	0	34	0	0	0	0
56	Room No. 158	0	8	0	0	0	0
57	Room No. 201	0	0	0	4	0	0
58	Room No. 202	0	0	0	4	0	0
59	Room No. 203	0	0	0	4	0	0
60	Room No. 204	0	0	0	4	0	0
61	Room No. 205	0	0	0	4	0	0
62	Room No. 206	0	0	0	4	0	0
63	Room No. 207	12	0	0	0	0	0
64	Room NO. 208	12	0	0	0	0	0
65	Room No. 209	12	0	0	0	0	0
66	Room No. 210	12	0	0	0	0	0
67	Room NO. 211	0	0	0	12	0	0
68	Room No. 212	0	0	0	12	0	0
69	Room No. 213	2	0	0	0	0	0
70	Room No. 214	0	0	0	8	0	0
71	Room No. 215	0	0	0	9	0	0
72	Room No. 216	0	0	0	8	0	0
73	Room No. 217	0	9	0	0	0	0
74	Room No.218	6	0	0	0	0	0
75	Room No.219	12	0	0	0	0	0
76	Room No. 220	8	0	0	0	0	0
77	Room No. 221	8	0	0	0	0	0
78	Room No. 222	8	0	0	0	0	0
79	Room No.223	8	0	0	0	0	0
80	Room No. 224	8	0	0	0	0	0
81	Room No. 225	12	0	0	0	0	0
82	Room No. 226	8	0	0	0	0	0
83	Room No. 227	8	0	0	0	0	0
84	Room No.228	14	0	0	0	0	0
85	Room No. 229	14	0	0	0	0	0
86	Room No. 230	14	0	0	0	0	0
87	Room No. 231	8	0	0	0	0	0



88	Room No. 232	0	0	0	4	0	0
89	Room No. 233	0	0	0	8	0	0
90	Room No. 234	0	0	0	4	0	0
91	Room No. 235	0	0	0	14	0	0
92	Roomn No. 236	4	0	0	20	0	0
93	Roomn no.237	4	0	0	0	0	0
94	Room No. 238	12	0	0	0	0	0
95	Room No.239	18	0	0	0	0	0
96	Room No. 240	6	0	0	0	0	0
97	Room No.241	18	0	0	0	0	0
98	Room No.242	4	0	0	0	0	0
99	Room No. 243	4	0	0	0	0	0
100	Room No. 244	4	0	0	0	0	0
101	Room No. 245	4	0	0	0	0	0
102	Room No. 246	12	0	0	0	0	0
103	Room No. 247	45	0	0	0	0	0
104	Room No. 248	36	0	0	0	0	0
105	Room No. 249	18	0	0	0	0	0
106	Room No. 250	12	0	0	0	0	0
107	Room no.251	22	0	0	0	0	0
108	Room No. 252	6	0	0	0	0	0
109	Room No. 253	42	0	0	0	0	0
110	Room No. 254	10	0	0	0	0	0
111	Room No. 255	40	0	0	4	0	0
112	Room No. 256	0	2	0	0	0	0
113	Room No. 257	0	0	0	2	0	0
114	Room No. 258	0	0	0	2	0	0
115	Room No. 259	0	0	0	2	0	0
116	Room No. 260	22	0	0	0	0	0
117	Room No. 261	129	0	0	0	0	0
118	Room No. 262	16	0	0	0	0	0
119	Room No. 263	0	6	0	0	0	0
120	Room No. 264	0	20	0	0	0	0
121	Room No. 265	0	45	0	4	0	0
122	Room No. 266	0	6	0	6	0	0
123	Room No. 267	0	11	0	8	0	0
124	Room No. 268	0	11	0	8	0	0
125	Room No. 301	36	0	0	0	0	0
126	Room No. 302	24	0	0	0	0	0
127	Room No. 303	10	0	0	0	0	0
128	Room No. 304	45	0	0	0	0	0
129	Room No. 305	42	0	0	0	0	0



130	Room No. 306	12	0	0	0	0	0
131	Room No. 307	18	0	0	0	0	0
132	Room No. 308	78	0	0	0	0	0
133	Room No. 309	0	0	0	4	0	0
134	Room No. 310	4	0	0	0	0	0
135	Room No. 311	0	0	0	2	0	0
136	Room No. 312	36	0	0	0	0	0
137	Room No. 313	0	0	0	0	0	0
138	Room No. 314	36	0	0	0	0	0
139	Room No. 315	0	6	0	0	0	0
140	Room No. 316	0	9	0	0	0	0
141	Room No. 317	0	6	0	0	0	0
142	Room No. 318	0	11	0	0	0	0
143	Room No. 319	0	11	0	0	0	0
144	Room No. 320	0	12	0	0	0	0
145	Room No. 321	0	6	0	6	0	0
146	Room No. 322	0	11	0	8	0	0
147	Room No. 323	0	11	0	8	0	0
148	College Library Building	0	0	0	475	0	0
149	College Canteen	18	0	0	20	0	0
150	Student Activity Room	0	0	0	14	0	0
151	Nescafe Kiosk	4	0	0	0	0	0
152	Pizza And More	4	0	0	0	0	0
153	DRC Server Room	4	0	0	0	0	0
154	New Building Terrace	0	0	8	0	0	0
	<b>TOTAL</b>	<b>1601</b>	<b>278</b>	<b>8</b>	<b>757</b>	<b>102</b>	<b>44</b>

### 6.3 Lux Measurement

Description	Lux	Remark
<b>Class Rooms</b>	120 to 235	Acceptable
<b>Offices</b>	130 to 240	Acceptable
<b>Corridors</b>	35 to 90	Acceptable
<b>Washrooms</b>	45 to 76	Acceptable
<b>Outdoor</b>	36 to 95	Acceptable



<b>Computer Lab</b>	150 to 289	Acceptable
<b>Parking area</b>	45 to 94	Acceptable
<b>Canteen</b>	69 to 185	Acceptable

## Observation

College has initiated the implementation of LED based lighting solution, but still there are 1601 (36W) tube lights. LEDs save energy, the life span is much greater and emit virtually no heat. We recommend to replace the tube lights with LEDs.

Table below shows the performance characteristics comparison of all luminaries.

Table - Luminous Performance Characteristics of Commonly Used Luminaries					
Type of Lamp	Lumens/Watt		Colour Rendering Index	Typical Application	Typical Life
	Range	Avg.			
<b>Incandescent</b>	8-18	14	Excellent (100)	Homes, restaurants, general lighting emergency lighting	1000
<b>Fluorescent lamps</b>	46-60	50	Good w.r.t coating (67-77)	Offices, shops, hospitals, homes	5000
<b>Compact fluorescent Lamps (CFL)</b>	40-70	60	Very Good (85)	Hotels, shops, homes, offices	8000-10000
<b>High pressure mercury (HPMV)</b>	44-57	50	Fair (45)	General lighting in factories, garages, car parking. flood lighting	5000
<b>Halogen lamps</b>	18-24	22	Excellent (100)	Display, flood lightening, stadium exhibition grounds, construction areas	2000 - 4000
<b>High pressure sodium (HPSV) SON</b>	67-121	90	Fair (22)	General lighting in ware houses, factories, street lighting	6000 - 12000
<b>Low pressure sodium (LPSV) SOX</b>	101-175	150	Poor (10)	Roadways, tunnels, canals, street lighting	6000 - 12000
<b>Metal halide lamps</b>	75-125	100	Good (70)	Industrial bays, spot lighting, flood	8000



				lighting, retail stores	
<b>LED Lamps</b>	30-50	40	Good (70)	Reading lights, desk lamps, night lights, spotlights, security lights, signage lights, etc.	40000 - 100000

## 7. OTHER POWER CONSUMPTION

60W Exhaust Fan	0
160W Exhaust Fan	17
Water Cooler-200W	9
180W-Desert Cooler	0
180W-Circulating Fan	0
7.5 hp Pump	3
5 hp Pump	8
3 hp pump	1
1 hp pump	7

## ANALYSIS

There should be regular maintenance schedule of equipment like geyser, water coolers, pumps, etc. All Computers/laptops that are more than 3 year or 5 years old should be replaced with new computers/laptops.

## 8. CAPACITOR BANK

Sl. No.	Identification	Capacity in KVAR
1	Sub station I	500 KVAR
2	Sub station II	500 KVAR

\*\*\*\*\* END OF THE REPORT \*\*\*\*\*