Energy Audit: 2023-24

JAWAHARLAL NEHRU COLLEGE

BOKO, KAMRUP, ASSAM – 781123

According to Energy Conservation Act, 2001, Energy Audit is the verification, monitoring and analysis of the use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption.

Energy and electricity audit cover the average consumption of Electrical and Natural Gas energy within the campus. Electricity audit tries to give an idea about the consumption of average Electricity power within the various Academic and Administrative Blocks of the college campus. On the other hand, within the Hostel's Natural gases (LPG cylinders) are primarily used for cooking purpose. Moreover, J N College is taking its initial initiatives to utilize renewable energy such as solar power energy to generate electricity to compensate the necessity of electrical energy within the campus. To achieve that goal, 22 Nos. of Integrated Solar Street light are already been installed within the different parts of the campus each of which generates 8 KWH per day. Moreover, initially a Rooftop Solar Adjustment (20KWH) has already been installed over the roof of administrative office building. On the other hand, to minimize the consumption of electrical energy highly efficient and low power consumable LED light panels are installed within the various departments as well as hotels and Guest House.

On an average 97.042 KVA units per month of electricity energy has been consumed by the College in the year 2023-24 (July, 23 to June, 24). In the previous year 2022-23, average power consumed by the same was 102.513 KVA units per month. It has been observed that, there is was sharp increase of 5.34 % (approximately) in the monthly average electricity energy consumption for previous year and it is due to increasing number of infrastructural developments within the campus. **Table 03** drawn below shows the average consumption of electrical energy per month from the financial year 2019 – 20 to 2023 – 24.

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SOP for calculating electrical energy consumption:

Consumption of electrical energy depends on various factors like:

1) Initial load in KWA (Present sanctioned load 80 KWA by APDCL),
2) Electrical phase and thereby resistance,
3) Nature of the conducting material used,
4) Nature and type of electrical gadgets used and
5) Duration of the electrical appliances used.

Table 01: Average energy consumed by various electrical gadgets per hour used within the College campus

Serial No	Name of the Equipment	Energy consumed per hour in Watt	Average Running time per day (in Hr)	Energy Consumed per day (WH)
01	LED Tube Light	12 – 39	3	76.5
02	Ceiling Fan	75	3	150
03	Computer (Desktop & Laptop)	170	2	340
04	Printer (Colour, Black & White)	50	1	50
05	Xerox Machine	250	1	250
06	Television	30	1	30
07	CCTV Monitor	40	6	240
08	Server Computer	120	6	720
09	CRO	35	6	210
10	Refrigerator	130	6	780
11	Smart Board with inbuilt computer	150	2	300
12	Projector	150	1	150
13	Laboratory Equipment	300	1	300
14	Water Pump	750	1	750
15	Water Purifier (Reverse Osmosis)	25	6	150
16	Biometric Machine	5	8	40
17	Exhaust Fan	40	6	240
18	LED Bulb	30	2	60
19	Air conditioner 5-Star rated	150	3	450

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Table 02: Electricity Bill paid by the College for the financial year 2023 – 24 along with the units of electricity (KVA) consumed

Serial No	Months	Energy Consumed (in KVA)	Bill Paid (in Rupees)	Remarks
1	July/ 23	37.000	25, 485/-	Lowest (Vacation)
2	August/ 23	173.400	71, 905/-	
3	September/ 23	180.400	78, 562/-	Highest
4	October/ 23	118.500	56, 634/-	
5	November/ 23	73.900	40, 089/-	
6	December/ 23	50.300	31, 067/-	
7	January/ 24	32.100	23, 694/-	
8	February/ 24	48.000	29, 142/-	
9	March/ 24	72.300	40, 770/-	
10	April/ 24	67.100	38, 437/-	
11	May/ 24	158.500	69, 398/-	
12	June/ 24	153.000	43, 411/-	
	Total	**1164.500**	**5, 48, 564/-**	
	Average	**97.042**	**45, 714/-**	

Table 03: Average consumption of electrical energy per annum from the financial year 2019 – 2020 to 2023 – 2024

Sl. No	Financial Year	Average Energy consumption per Months (KVA)	Average Monthly Electricity Bill (Rupees)
1	2023 – 24	97.042	45, 714/-
2	2022 – 23	102.513	57, 846/-
3	2021 – 22	35.143	16, 555/-
4	2020 – 21	35.714	16, 824/-
5	2019 – 20	35.714	16, 824/-
Average		**35.200**	**16, 582/-**

From the data it is evident that the average 35.200 KVA unit per annum of electricity energy has been consumed in the last five financial years from 2019 – 2020 to 2023 – 2024. Data shows that the average power consumed by the college has huge fluctuation of average consumption, which is due to increasing infrastructural developmental activities within the campus. However, soon there will be a good possibility to increase the more monthly average electrical energy power consumption as soon as the more infrastructural developments activities were undertaken.

Figures given below shows the comparison of monthly average power consumption within the College campus

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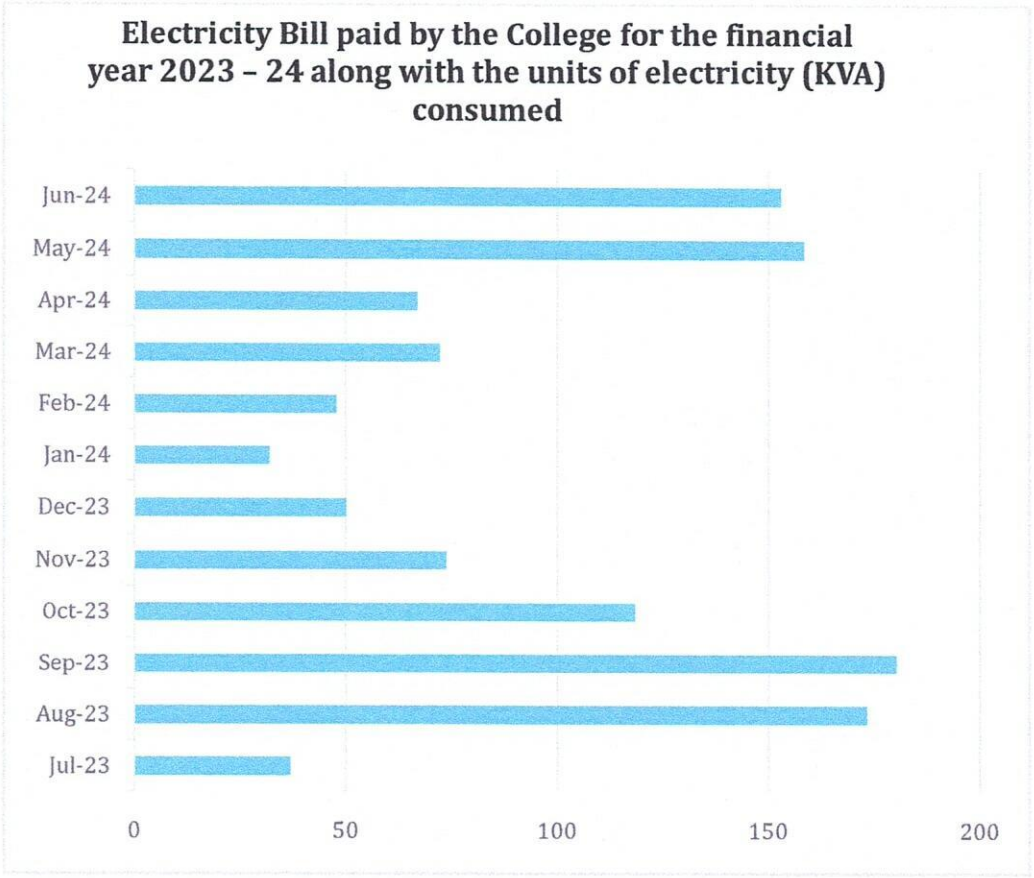

Figure 01: Average monthly consumption of electric power within the campus 2023-24

Drastic variation of power consumption is due to pick-hour of academic session, infrastructural development activities, Examination period and holidays.

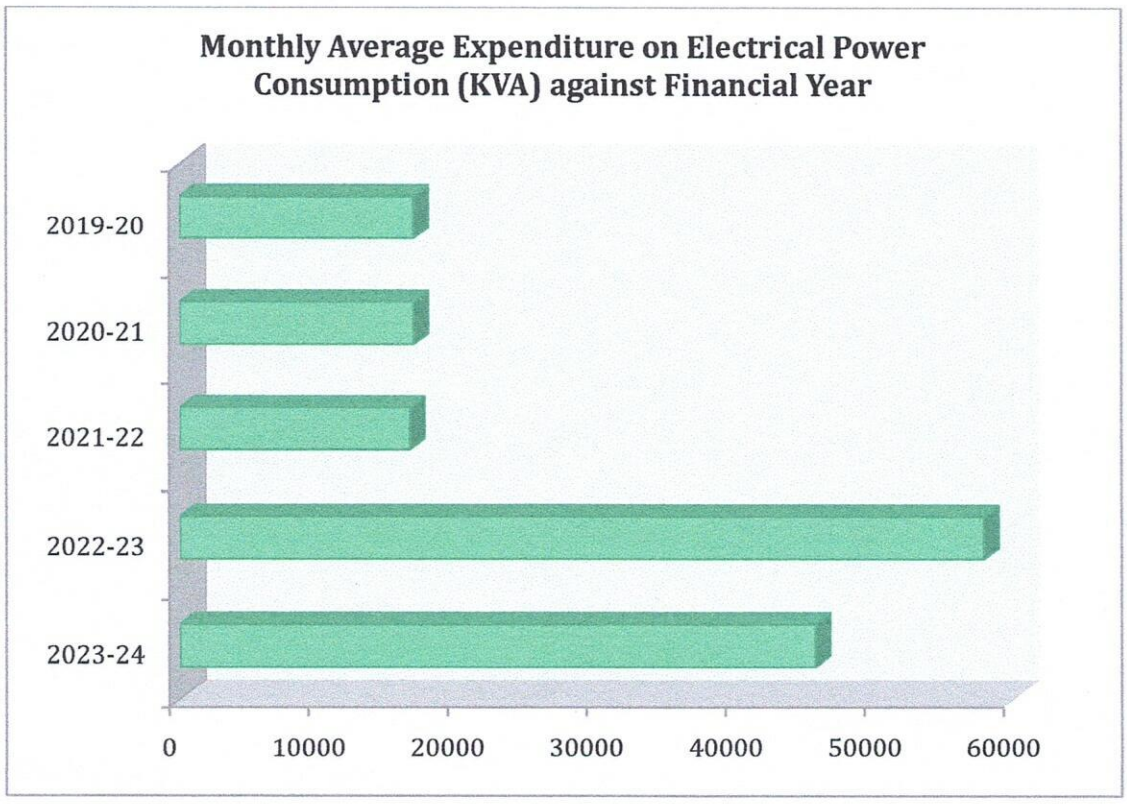

Figure 02: Average consumption of electric power for last five years

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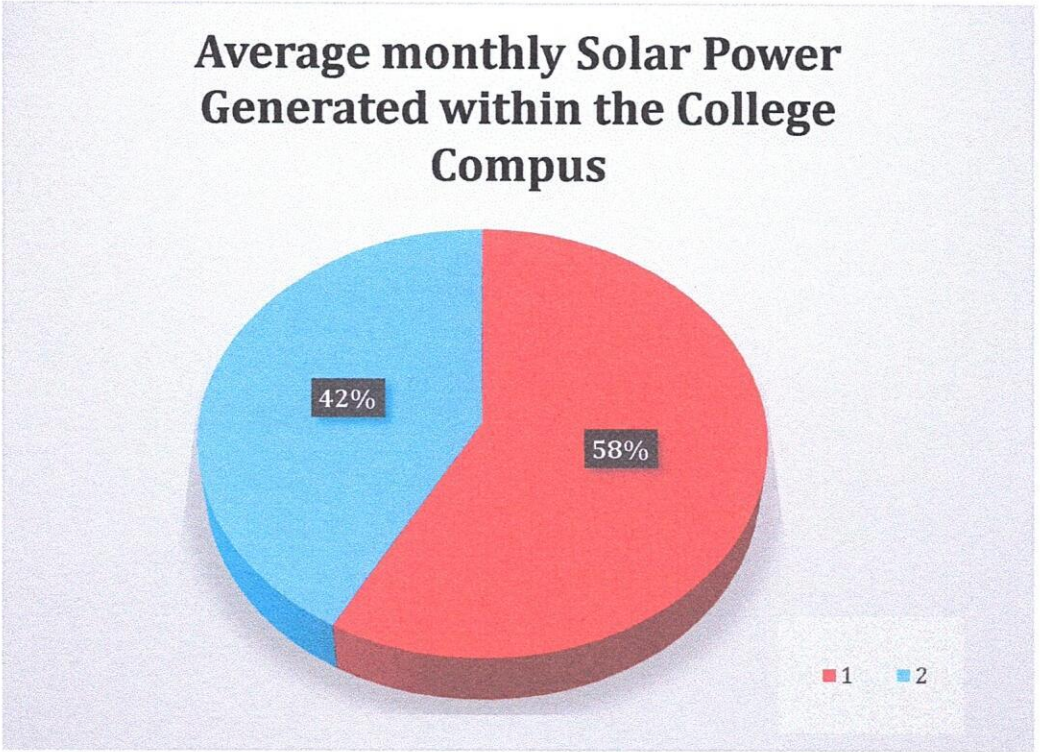

Figure **03**: Monthly Solar power generated (Blue) and Electric Power Consumed (Red) within college campus

It has been observed from Figure **02**, that there is an equilibrium demand in the electricity power requirement within the College campus. To compensate the rising power requirement 22 Nos. of integrated solar street light and a Rooftop Solar Adjustment (20KWH) are already installed within the College campus. Annually, JN College has generated **592** KWH of electricity energy through integrated solar panels. Figure **03**, gives the power generated from the solar power panels installed within the College campus. In the coming financial years the College authority planned to install more On-Grid Roof Top solar panel and street lights within the campus to minimize regular electricity consumption and to keep pace with on-going sustainable development goal.

To minimize the power consumption within the campus, JN College is in a process of replacing old high-power Halogen and CFL blubs with low power consumption LED Bulbs.

Numbers of various electrical gadgets used within the college campus are shown in the tabular form along with their numbers. On the other hand, on an average 96 numbers of natural gas (LPG cylinders) per annum has been consumed in the laboratories, hostel, and College canteen.

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Serial No	Name of the Equipment	Quantity
01	LED Tube Light and Bulbs:	
	12W (Bulbs)	83
	15W (Bulbs)	109
	18W (Bulbs)	123
	20W (Tubes)	299
02	LED Halogen	39
03	Ceiling Fan	396
04	Wall Fan	18
05	Exhaust Fan	32
06	Computer (Desktop & Laptop)	127
07	Printer (Colour, Black & White)	25
08	Xerox Machine	03
09	Television	01
10	CCTV Monitor	15
11	Server Computer	01
12	Scanner	01
13	CRO	02
14	Refrigerator	08
15	Smart Board with inbuilt computer	06
16	Projector	17
17	Lab Equipment (Electrically Operated)	65
18	Water Pump (Motor, Z-Pump)	07
19	Water Purifier (Reverse Osmosis)	14
20	Biometric Machine	01
21	Air conditioner 5-Star rated	23
22	Inverter	14
23	Online UPS	10
24	Submergible Tubal	02
25	LPG Connection	04
26	Rooftop Solar Adjustment (20KWH)	01
27	Solar Street Light 8W	22
28	Sound System	06
29	35 KW DG Set	02

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Recommendations:

- Installation of more Solar Panels should be of outmost priority
- Old cables should immediately be replaced to minimize power loss
- Bulbs other than energy efficient LED must not be used
- Smart fans may be used instead of conventional fans to reduce power consumption
- All AC's should be upgraded to 5* (Five Star) operating at low voltage
- A caretaker be assigned to monitor all electrical appliances to minimise power loss

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