ENERGY AUDIT REPORT
OF
COTTON UNIVERSITY

(2025-26)

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Audit conducted by

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EXECUTIVE SUMMARY OF THE REPORT

I) Introduction:

Details of the preliminary energy audit of Cotton University, Guwahati are furnished in this report under different sections. The report is based on physical inspection of the campus of the University, interaction with the concerned engineers including analysis of the available data/ documents like monthly electricity bills etc. The report is based on electricity data for the year 2025-26 and all other building and infrastructure data/ information available at the time of conducting the audit. Apart from the available data/ information referred above, report is also based on physical inspections and interaction with the engineers, who were however very cooperative. Entire exercise is aimed to assess and review the power consumptions vis-a-vis the present power distribution in the campus and available power connections from the utility with the prime objective to reduce power consumption and the energy bills of the campus by optimally limiting the number of service connections, contract demands, taking green energy initiatives and using energy efficient equipment, fittings and accessories.

University does not have a unified campus and spread across a large area consisting of different isolated zones. Some of the zones are in distant locations approachable only through public roads. This had created a huge challenge in planning the electrical distribution and optimization of energy consumptions. This problem was critically reviewed in the energy audit done by the undersigned in 2017 and a new power distribution system for the campus was suggested by optimally limiting the number of service connections, selecting supply voltage level and transformers, to ensure better reliability, control and to reduce power consumption and wastage. Subsequently, the University has been developing the new infrastructures in consideration of the roadmaps for electrical distribution system suggested in that energy audit report.

The University has been divided into six campuses and audit in respect to electricity consumption & billing has been conducted to assess the potential in saving by optimizing service connections and maximum demands, the six campuses are shown below-

CAMPUS-1	Main administrative area
CAMPUS-2	Botany, Zoology, Biotech Departments and hostels in eastern side
CAMPUS-3	Chemistry Department area
CAMPUS-4	Physics Department area
CAMPUS-5	Guest House, Hospital area
CAMPUS-6	Girls Hostel

II) Annual Power Consumption data:

Power consumption of the University in 2025-26

Campus	Total connections	Transformer capacity	Unit consumed (KWh)
Campus-1	5	1X800KVA	441458.94
Campus-2	11	No transformer	176299.6
Campus-3	2	1X100KVA	18402.28
Campus-4	3	1X100KVA	57759.31
Campus-5	1	1X100	18700.59
Campus-6	1	1X250KVA	12395.96
Total	**23**	**1350KVA**	**725016.68**

III) Immediate saving potential:

Actions	**Reference para of the report**	**Annual saving (Rs)**
A By optimizing number of service connections and contract demands		
Campus-1		
	1.2.1(a)	**129650.00**
Disconnecting power supply to SBI public ATM from University source	1.2.1(b)	**298800.00**
	1.2.1(c)	**370584.00**
Campus-2	1.2.2(c)	173308.00
Campus-3	1.2.3(c)	80035.00
Campus-4	1.2.4(b)	60568.00
Camus-5	1.2.5(b)	26478.00
Campus-6	1.2.6(b)	137646.00
B, By Green Energy initiative		
Installation of Solar Roof-top plants of 106KWp as assed for the first phase under RESCO model This is expected to generate 131546 KWh green energy annually	1.3.3	434102.00
Total saving potential		**1711171.00**

IV Other key findings:

a) Almost 75% of the total electrical consumptions is attributed to the academic or office buildings. Balance 25% is consumed by the hostels and other buildings

b) Percentage of maximum demand against connected load in the campus as a whole is very low- around 45%. The ratio is very low in campus 2, 5 and 6.

c) The green energy initiative in the University is in nascent stage. An assessment of installation of solar roof-top plant of 106KWp has been made for taking up in first phase under RESCO model.

d) It is found that power supply is being provided to one public ATM of SBI from the University source. Even the ATM is getting standby DG power from the University

e) It is suggested that single HT connection be taken for the new buildings proposed in the campus-2 under APWD and power supply be provided to all the buildings in Campus-2 including Botany and Zoology departments and all present connections in that campus may be surrendered

f) The initiatives and actions by the University in use of energy efficient technology in respect to light fittings, AC, fan and other appliances equipment are on right track

1.0. Analysis of power consumption in the campus and strategy & scope for reduction in electricity cost by optimizing service connections & maximum demands.

1.1. About the campus:

The University does not have a unified campus and spread across a large area consisting of different isolated zones. Some of the zones are in distant locations approachable only through public roads. Apart from the difficulty in administration and academic activities, this has created huge challenge in planning for electrical distribution and optimization of energy consumptions. This problem was critically reviewed in the energy audit done by the undersigned in 2017 and a new power distribution system for the campus was suggested by optimally limiting the number of service connections, selecting supply voltage level and transformers, to ensure better reliability, control and to reduce power consumption and wastage. Subsequently, the University has been developing the new infrastructures in consideration of the roadmaps for electrical distribution system suggested in that energy audit report.

In the energy audit report submitted in 2017, the University was divided into 6 (six) campuses in consideration of the physical isolation and electrical loads were considered separately against each of them with the ultimate objective of taking one HT power connection to each of the six campuses. The roadmap was to finally reduce the power connection to six against present 23 power connections. It may be noted that Professors' colony, being a purely residential campus, has been excluded from the purview of this audit for the time being.

The six campuses are shown below-

CAMPUS-1	MCB Building, KBR Hall, BKB Building, SKB Library, CS IT, Anthropology Deptt, New Boys Hostels 1&2, Administrative Building, Academic Building, Zeology Building, KKH, ARB & SMH Hostel Blocks Students Day Home etc.
CAMPUS-2	Botany, Zoology, Biotech Departments and RKB, SNBC, MNDP Hostels etc.
CAMPUS-3	Chemistry Department, EDC canteen etc.
CAMPUS-4	Physics Department, New Arts Building, Sudmersen Hall, etc.
CAMPUS-5	Guest House, Hospital etc.
CAMPUS-6	Girls' Hostel

Henceforth, in any description/ reference made in this report, about a particular campus, would mean the nomenclature as defined above.

1.2. Analysis of annual power consumption in the campus:

1.2.1 Campus -1

The power consumption data in Campus-1 of the university campus in 2025-26 is shown in the Table-1 below:

Table-1
Power Consumption in 2025-26
Campus-1
(MCB Building, KBR Hall, BKB Building, SKB Library, CS IT, Anthropology Deptt, New Boys Hostels 1&2, Administrative Building, Academic Building, Zeology Building, KKH, ARB & SMH Hostel Blocks Students Day Home etc).

No	Cons. No	Category	Building/ Deptt/ Block	Trf. Capacity (KVA)	Contract demand (KVA)	Max Demand recorded (KVA)	Unit consumed (KWh)
1	6000000164	HT-Bulk EI	Main HT Connectiion	1X800	705.88	275.34	419778.94
2	4000001739	LT -Gen	KKH Hostel Block	---	20	7.95	9587
3	4000001731	-do-	ARB Hostel block-1	---	15.29	NA	2203
4	4000001730	-do-	ARB Hostel block-2	---	16.47	NA	5819
5	4000001736	-do-	SMH Hostel Block		14.12	NA	4071
Total Consumption							**441458.94**

1.2.1(a): It may be seen from the above table that while the main HT connection was taken with the objective of providing all the power connections from single HT connection, still there are 4 (four) LT service connections operational from APDCL.

Immediate action suggested: All LT connections shown under Sl nos- 2,3,4 & 5 may be surrendered and connections may be provided from the main HT connections of Campus-1.

Yearly financial saving: Yearly financial saving in fixed charges shall be (65.48 X 165 X 12) = Rs 1,29,650.00. Total contract demand for sl nos- 2, 3, 4 & 5 being 65.48.

1.2.1(b): It is found that one public SBI ATM is being supplied from the University source of the campus. While the University has SBI ATM inside the campus, there is no reason why the University should bear the electricity bills for the public ATM. Approximate power consumption of the ATM should be at least 36,000 KWh per year.

Immediate action suggested: SBI should be served notice for disconnection of power supply from the University source and they be requested to take independent power connection from APDCL. It is also noted with concern that since the power connection is clubbed with the Indoor Stadium of the University even in case of failure of power supply, the ATM gets backup supply from the University DG set.

Yearly financial saving: Yearly financial saving in energy charges shall be 36,000 X 8.30 = Rs 2,98,800.00.

1.2.1(c): The contract demand of the HT connection is 705.88 KVA and the maximum demand recorded in the year 2025-26 was 275.34KVA. Taking into account of the electrical loads of the new buildings coming up in the campus, maximum demand should not exceed 500KVA in coming two years. So the University should apply for reduction in contract demand to 500KVA which will fetch saving in fixed charges**.**

Immediate action suggested:- APDCL should be approached for reduction in contract demand from 705.88KVA to 500KVA. Contract demand can be extended whenever required according to our load growth since the transformer capacity is 800KVA. Reduction in contract demand will fetch financial saving in fixed charge cost.

Yearly financial saving: Yearly financial saving in fixed charges shall be 205.88 X 150 X 12 = Rs3,70,584.00. Reduction in contract demand being 205.88KVA (705.88 – 500)

1.2.2 Campus-2:

The power consumption data in Campus-2 of the university in 2025-26 is shown in the Table-2 below:

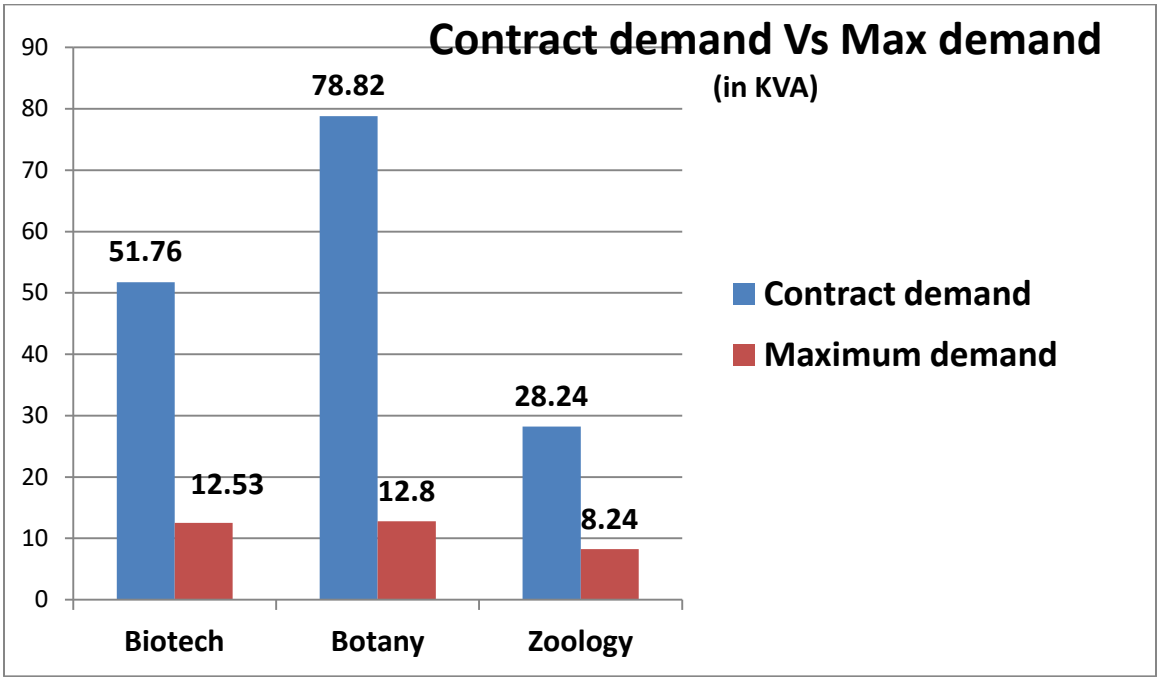
Table-2
Power Consumption in 2025-26
Campus-2
(Botany, Zoology, Biotech Departments and RKB, SNBC, MNDP Hostel *etc*).

No	Cons. No	Category	Building/ Deptt/ Block	Trf. Capacity (KVA)	Contract demand (KVA)	Max Demand recorded (KVA)	Unit consumed (KWh)
1	6000002572	HT-Blk-EI	Biotech Deptt	No Transformer	51.76	12.53	19020.42
2	6000002571	HT-Blk-EI	Botany Deptt.		78.82	12.8	33903.04
3	6000003217	HT-Blk-EI	Zoology Deptt.		28.24	8.24	18886.14
4	4000001750	LT-Gen	Zoology Deptt.		18.82	13.22	8853
5	4000001747	-do-	SNBC Hostel Block-1		15.29	4.24	12846
6	4000001748	-do-	SNBC Hostel Block -2		16.47	2.59	13976
7	4000001742	-do-	MNDP Hostel Block		18.82	8.68	28861
8	4000001752	-do-	RKB Hostel new block		8.24	--	14812
9	4000001751	-do-	RKB Hostel old block		14.12	1	15206
10	4000001755	-do-	AGRC Hostel		12.94	3.12	8426
11	4000001754	-do-	RKB Hostel Library		11.76	--	1510
						Total consumption	**176299.6**

1.2.2(a): While analyzing the power consumption data of this campus, connections under sl nos 5 to 11 have not been considered for comments as all these connections

shall have to be surrendered due to the proposed constructions to be undertaken under APWD.

1.2.2(b): While comparing the contract demands Vs maximum demands of Biotech, Botany and Zoology Departments (sl 1,2&3), huge gaps have been observed as shown below-



Considering that there are two connections in Zoology department, the LT connection (Sl-4) may be surrendered and loads may be connected from the HT connection (Sl-3). This will fetch financial saving in fixed charges against the connection at Sl-4. Further, APDCL may be applied for reduction in load in the HT connection of Botany department from the present 78.82 KVA to 25KVA. This will fetch a saving in fixed charges for 53.82KVA (78.82-25). Similarly, APDCL may also be applied for reduction in load in the HT connection of Biotech department from the present 51.76 KVA to 25KVA. This will fetch a saving in energy charges for 21.76KVA (51.76-25).

1.2.2(c) Immediate actions suggested:

Actions	Annual Financial saving (Rs)
LT connection of Zoology (Cons no- 4000001750) may be surrendered and loads may be connected from the HT connection already available in the department (Cons no- 6000003217). This will result in financial saving in fixed charges against the connection at Sl-4.	**Rs 37,264.00 (18.82 X 165 X12)**
APDCL may be approached for reduction in load in the HT connection of Botany department (Cons no-6000002571) from the present 78.82 KVA to 25KVA. This will result in saving in fixed charges for 53.82KVA (78.82-25).	**Rs 96,876.00 (53.82 X 150 X 12)**

APDCL may also be approached for reduction in load in the HT connection of Biotech department (Cons no-6000002572) from the present 51.76 KVA to 25KVA. Saving in fixed charges shall be for 21.76KVA (51.76-25)	**Rs 39,168.00 (21.76 X 150 X 12)**
Total saving	**Rs 1,73,308.00**

1.2.2(d) Suggestion for the new construction to be undertaken by APWD:
It is suggested that single HT connection be taken for the new buildings proposed in the campus(2) and power supply be provided to all the buildings in Campus-2 including Botany and Zoology departments and all present connections in the campus may be surrendered

1.2.3 Campus-3:

The power consumption data in Campus-3 of the university in 2025-26 is shown in the Table-3 below:

Table-3
Power Consumption in 2025-26
Campus-3
(*Chemistry*).

No	Cons. No	Category	Building/ Deptt/ Block	Trf. Capacity (KVA)	Contract demand (KVA)	Max Demand recorded (KVA)	Unit consumed (KWh)
1	6000002354	HT-Blk-EI	Chemistry Building	1X100	44.71	5.85	12801.1
2	6010060174	HT-Blk	EDC Canteen	---	31.76	5.47	5601.18
						Total consumption	**18402.28**

1.2.3(a) It is observed that the meter of the HT connection is out of order and bills are being served on average basis. Therefore no realistic analysis could be made on the consumptions of the main HT connection of the campus (3) under Sl-1

1.2.3(b) It is observed that another connection for EDC Canteen (Sl-2) is operational in the campus(3). It is surprising to note that while the contract demand against that connection is 31.76KVA, maximum demand recorded in the year is only 5.47KVA. Thus the University is unnecessarily paying huge amount as fixed charge in monthly bills while actual maximum demand is only one fifth of the contract demand. This connection may surrendered and supply may be provided from the main HT connection of the Chemistry building (Sl-1). This will affect saving in the fixed charge being unnecessarily paid against that connection.

1.2.3(c) Immediate action suggested: Connection for the EDC Canteen (Cons no-6010060174) should be surrendered and supply may be provided from the main HT connection of the Chemistry building (Cons no-6000002354).

Yearly financial saving: Yearly financial saving in fixed charges shall be 31.76 X 210 X 12 = Rs 80,035.00.

1.2.4 Campus-4:

The power consumption data in Campus-4 of the university in 2025-26 is shown in the Table-4 below:

Table-4
Power Consumption in 2025-26
Campus-4
(Physics Department, New Arts Building, Sudmerson Hall, etc.).

No	Cons. No	Category	Building/ Deptt/ Block	Trf. Capacity (KVA)	Contract demand (KVA)	Max Demand recorded (KVA)	Unit consumed (KWh)
1	6000002969	HT-Blk-EI	Physics New Bldg	1X100	52.94	21.38	53350.31
2	4000001721	LT-Gen	Sudmerson Hall	---	12.94	6.75	663
3	4000001810	LT-Gen	New Arts Bldg.	---	17.65	4.49	3746
						Total consumption	**57759.31**

1.2.4(a) It is observed that in spite of having the HT connection with 1X 100KVA transformer(Sl-1), 2(two) additional LT connections are operational in the campus(4). Since maximum demand recorded in the HT connection is only 21.38KVA (against contract demand of 52.94KVA), the two LT connections can be surrendered and power supply to the Sudmerson hall and New Arts Building may be provided from the HT connection. If required, contract demand of the HT connection may be extended after observing the demand of the newly renovated Sudmerson Hall. This will result in saving of fixed charges being paid by the University against the connections at Sl nos-2 & 3.

1.2.4(b) Immediate action suggested: LT Connection for Sudmerson Hall (Cons no-4000001721) and New Arts Building (Cons no- 4000001810) should be surrendered and supply may be provided from the main HT connection of the Physics building (Cons no-6000002969).
Yearly financial saving: Yearly financial saving in fixed charges shall be 30.59 X 165 X 12 = Rs 60,568.00. Total contract demands of Sudmerson Hall and New Arts Building being 30.59 (12.94 + 17.65)

1.2.5 Campus-5:

The power consumption data in Campus-5 of the university in 2025-26 is shown in the Table-5 below:

Table-5
Power Consumption in 2025-26
Campus-5
(Guest House, Hospital etc.)

No	Cons. No	Category	Building/ Deptt/ Block	Trf. Capacity (KVA)	Contract demand (KVA)	Max Demand recorded (KVA)	Unit consumed (KWh)
1	6000001843	HT-Blk-EI	Hospital Bldg, Guest House	1X100	44.71	13.78	**18700.59**

1.2.5(a) In this campus also there is wide gap between contract demand and maximum demand recorded. Maximum demand recorded throughout the year is only 31% of the contract demand. So the University is paying monthly fixed charges for 69% of the demand charges unnecessarily, Considering the minimum contract demand for eligibility of HT connection, contract demand may be reduced to 30KVA.

1.2.5(b) Immediate action suggested: APDCL may be approached for reduction in contract demand for the HT connection (Cons no-6000001843) from present 44.71KVA to 30KVA. This will result in saving in monthly fixed charges for 14.71KVA (44.71 – 30)
Yearly financial saving: Yearly financial saving in fixed charges shall be 14.71 X 150 X 12 = Rs 26,478.00.

1.2.6 Campus-6:

The power consumption data in Campus-6 of the university in 2025-26 is shown in the Table-6 below:

Table-6
Power Consumption in 2025-26
Campus-6
(Girls Hostel.)

No	Cons. No	Category	Building/ Deptt/ Block	Trf. Capacity (KVA)	Contract demand (KVA)	Max Demand recorded (KVA)	Unit consumed (KWh)
	6000003536	HT-Blk-EI	Girls Hostel	1X250	196.47	34.35	**12395.96**

1,2,6(a) In this campus also there is huge gap between contract demand and maximum demand. Maximum demand recorded throughout the year is only 17.5%% of the contract demand. So the University is paying monthly fixed charges for about 82%% of the demand charges unnecessarily. Considering the loads for the new Girls hostel after occupation, contract demand may be reduced to 120KVA.

1.2.6(b) Immediate action suggested: APDCL may be approached for reduction in contract demand for the HT connection (Cons no-6000003536) from present 196.47KVA to 120KVA. This will result in saving in monthly fixed charges for 76.47KVA (196.47 – 120).

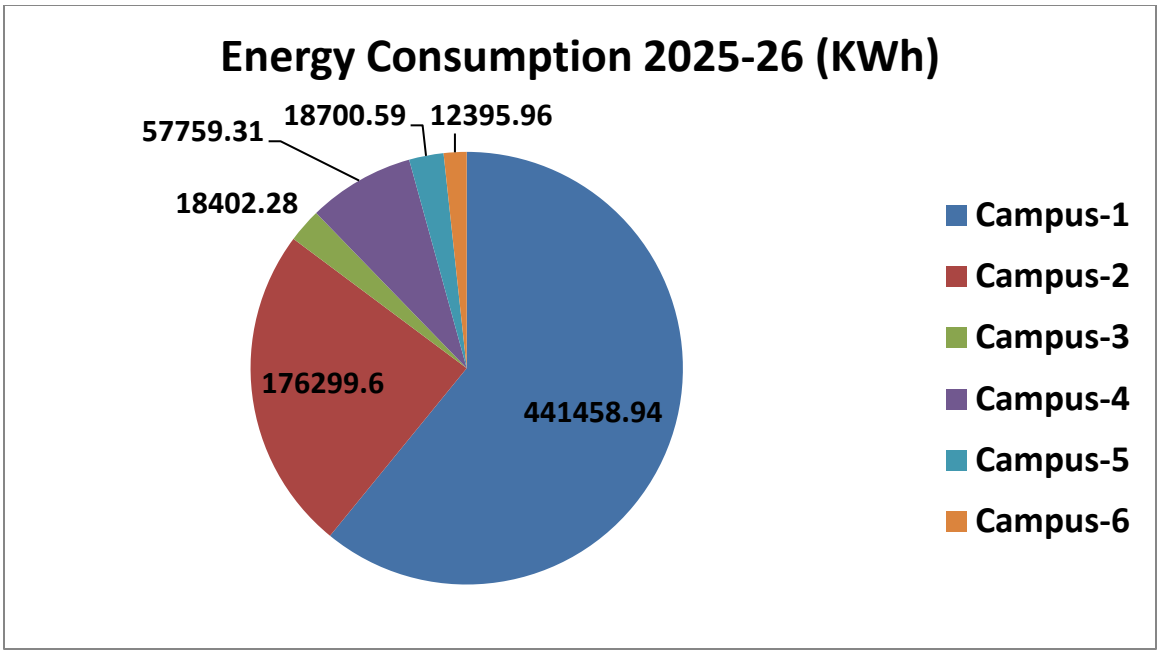
Yearly financial saving: Yearly financial saving in fixed charges shall be 76.47 X 150 X 12 = Rs 1,37,646.00.00.

1.2.7 Summary of power consumption in the University in 2025-26

The power consumption data of the University is summarized and shown in Table-7

Table-7
Power consumption of the University in 2025-26

Campus	Total connections	Transformer capacity	Unit consumed (KWh)
Campus-1	5	1X800KVA	441458.94
Campus-2	11	No transformer	176299.6
Campus-3	2	1X100KVA	18402.28
Campus-4	3	1X100KVA	57759.31
Campus-5	1	1X100	18700.59
Campus-6	1	1X250KVA	12395.96
Total	**23**	**1350KVA**	**725016.68**



1.3 Green Energy Initiatives

1.3.1 Use of green energy in the University is in nascent stage. Only 14KWp roof top solar PV system has been installed in the University including 12KWp on-grid and 2 KWp off-grid systems. There is also 3500LPD solar water heater installed in the Girls Hostel.

1.3.2 An assessment has been made for taking up on-grid solar roof top plant installation in the first phase as shown in Table-8 below. In the first phase only RCC terrace has been considered

Table-8
Assessment of capacity of solar roof-top system installation in Phase-1

Building	Roof top area (sq mm)	Capacity of solar plant (KWp)
Geology	50	5
New Academic	200	20
Library	50	5
Admin	350	35
DSW	40	4
New Boys Hostel	160	16
New Girls Hostel	150	15
Physics	60	6
Total assessed capacity		**106**

1.3.3 Immediate action suggested: Process of installation of grid interactive solar roof-top plant may be taken up by the university in RESCO model through invitation of competitive bid (RFP). It is expected that tariff for such system should be around Rs 4.50 to Rs 5.00 per KWh. Expected generation in Guwahati should be around 3.40 KWh per day per KWp on yearly average. On that basis, yearly generation should be 1, 31,546 KWh.

Yearly saving: Considering present APDCL tariff of Rs 8.30/ KWh and RESCO tariff for solar as Rs 5.00, saving per unit should be Rs 3.30/ KWh (8.30 – 5.00). Thus expected total saving per year should be 4,34,102.00 (131546 X 3.30)

1.4 Initiatives in Use of Energy Efficient equipment/ appliances

1.4.1 Light Fittings: There are total 5484 light fittings of various types including bulbs installed in the University. Almost all the light fittings installed, are LED. In term of percentage, about 99% lights are LED

1.4.2 Air Conditioners: There are altogether 102 Air Conditioners of various capacities in the University. All new Room air-conditioners installed since last 4 years are energy efficient inverter type. It is noted that the University has made a policy to install only 'Inverter type' AC against new requirement or wherever replacement of old ACs are required

1.4.3 Fans: Total number of fans installed is 2563 including ceiling, stand and exhaust types. It is also noted that in the new buildings, energy efficient BLDC fans are being installed

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