ENERGY AUDIT REPORT

JAN-2025

B.S. Abdur Rahman Crescent Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956
GST Road, Vandalur, Chennai 600 048

BSA Crescent Institute of Science & Technology,

GST Road, Vandalur, Chennai,

Tamil Nādu – 600 048.

CONDUCTED BY

SLR INDUSTRIAL SOLUTIONS
(BEE Approved Energy Audit Firm)
No.15, 4th Street, VIP Nagar,
Thirukachur Post, Singaperumal Koil,
Chengalpattu District, Tamil Nadu – 603 204
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ACKNOWLEDGEMENT

SLR Industrial Solutions (SLRIS) conveys their gratitude and thanks to the management of **M/s Crescent Institute of Science & Technology – Chennai,** for giving us an opportunity to study their College & equipment's for the Energy Audit, which was conducted in **Jan - 2025**

We render our sincere thanks to **Mr.Mohamed Faleel, Director (ECD)** for his keen interest, proactive support for providing whole hearted support, helps and guidance during the course of study of the campus.

We are indeed touched by the helpful attitude and co-operation **Mr. Ramkumar, AP/EEE & Executive Engineer (Electrical) and Mr. E. Manivannan, Junior Engineer** & all technical staff, who rendered their valuable assistance and co-operation during the course of study.

The Audit and report making team constituted of the following Auditors from SLRIS.

Name of SLRIS Team Members

1. Mr. M. Srinivasan, Accredited Energy Auditor, BEE
2. Mrs. S. Hemavathi, Energy Analyst

M. Srinivasan
BEE Accredited Energy Auditor,
AEA 0324

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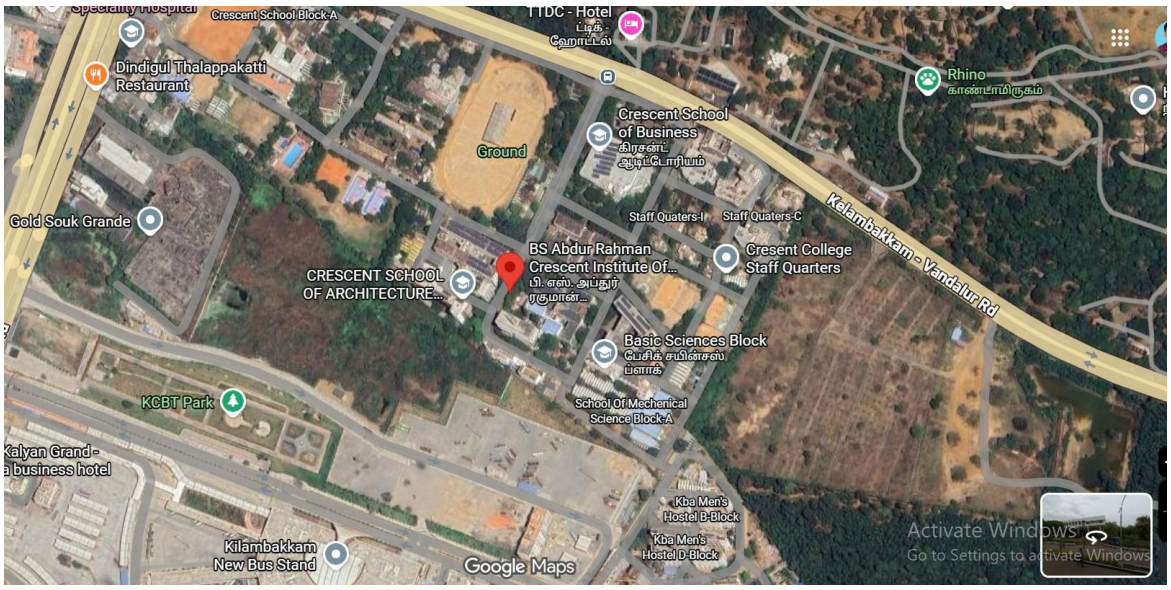
DETAILS OF CONSUMER

1. Name of the Consumer : Crescent Institute of Science & Technology, Chennai
2. Name of the Contact Person : Mr. Ramkumar, (AP/EEE & Executive Engineer), GST Road, Vandalur, Chennai, Tamilnadu – 600 048.
3. Website : www. Crescent.education.com
4. Nature of Business : Education
5. No of Shifts : General Shifts

https://www.google.com/maps/place/B.+S.+Abdur+Rahman+Crescent+Institute+Of+Science+And+Technology/@12.875337,80.0849918,320m/data=!3m1!1e3!4m6!3m5!1s0x3a52f60e8ef70dad:0x1b7886934a452db8!8m2!3d12.8753945!4d80.0837794!16zL20vMDRicjc2?entry=ttu&g_ep=EgoyMDI1MTExMi4wIKXMDSoASAFQAw%3D%3D



Location Map

ESM. No	Energy Saving Measures	Annual Savings		Investment	Payback
		kWh	Rs.	Rs.	Months
Short-Term Payback					
1	Replace FTL Lamps with LED and reduce power consumption	9,600	97,920	60,000	7
2	Improve Solar roof top panel generation efficiency	1,76,012	14,08,096	10,00,000	9
Long-Term Payback					
3	Replace conventional ceiling fans with BLDC fans	25,200	2,57,040	7,00,000	33
4	Replace old Window AC with Energy Efficient 5 star rated split AC	1,33,650	13,63,230	54,45,000	48
5	Replace street light with solar power light and reduce power consumption	657	6,701	30,000	54
6	Explore roof top solar PV possibility to generate electrical energy	2,18,400	17,47,200	84,00,000	58
Summary of Savings					
Annual	***Total Savings & Investment and Average Payback***	***5,63,519***	***48,80,187***	***1,56,35,000***	***38***
	Total kWh Savings in Percentage	***11***			
	Total Cost Savings in Percentage	***10***			
	Total CO_2 reduction in Tons	***410***			

CAMPUS ENERGY SAVINGS IDENTIFIED

1. Annual Energy Savings

Annual Energy Savings : 5, 63,519 kWh.

2. Annual Cost Savings

Annual Cost Savings : Rs. 48, 80,187.

3. Proposed Investment : Rs. 1, 56, 35, 000

4. Overall Payback period : 38 Months.

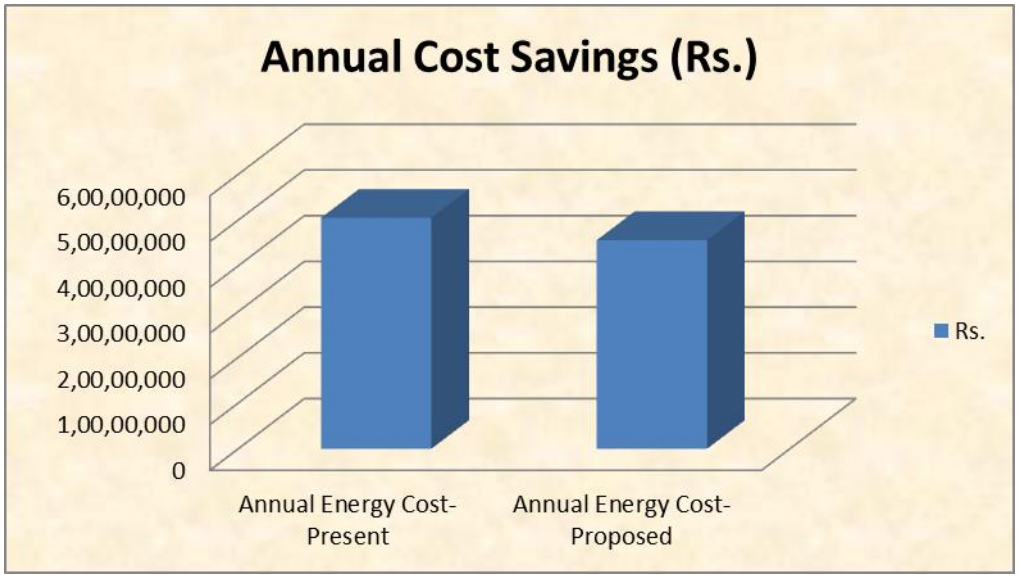


Figure 1 : Annual Cost Savings

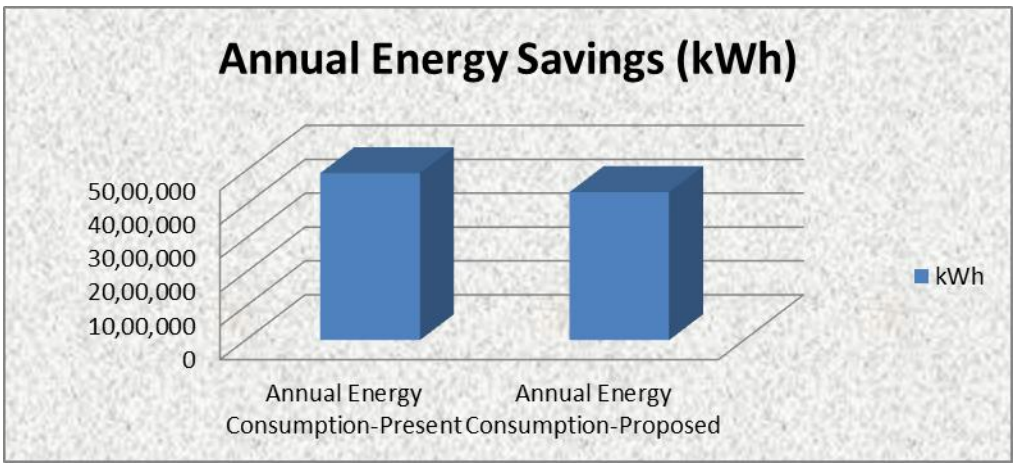


Figure 2 : Annual Energy Savings (%)

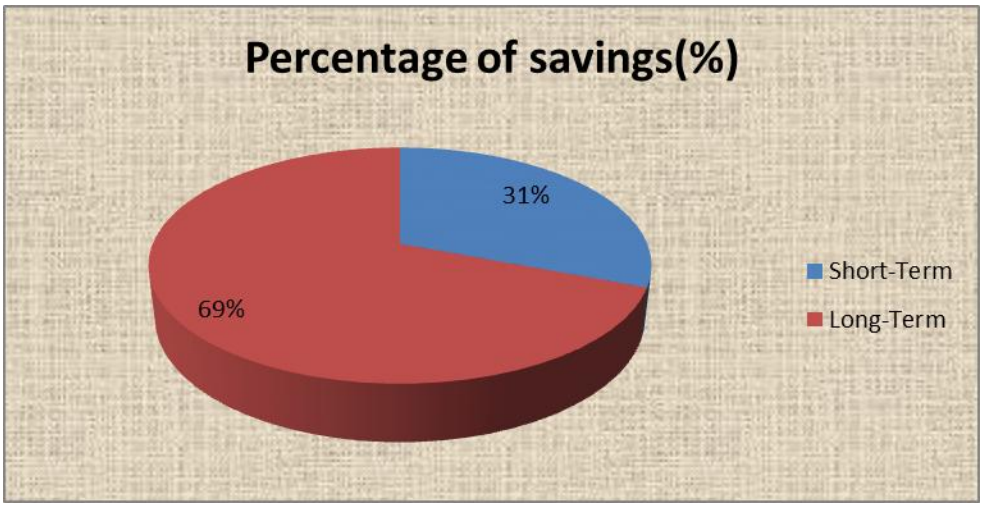


Figure 3: Savings (%)

1. INTRODUCTION

1.1 Preamble

B.S. Abdur Rahman Crescent Institute of Science and Technology is a renowned Quality Leadership Institution located at the greenest spot of Chennai near Tambaram.. Through our long history of 40 years of excellence, the Institution has offered access to a wide range of academic opportunities. With 54 programmes, grouped under 12 different Schools, 31 Undergraduate programmes, 23 Postgraduate programmes, and Ph.D. (in all the departments), this institution is a rising stalwart in higher education with promising Quality, Security and Placement. We welcome students from all countries and our educational programmes are designed to equip the learners with virtual knowledge that helps them to achieve what they want to be and go where they want to go in the ladder of success.

- Established in 1984 as Crescent Engineering College affiliated to the University of Madras and Anna University.
- It was upgraded and blossomed as B. S. Abdur Rahman Crescent Institute of Science and Technology (Deemed to be University) on its 25th silver jubilee year in 2009.
- The Institute is located in the state of Tamil Nadu in South India.
- 50.19 acres campus is based in what it calls "the greenest spot of Chennai", next to Aringnar Anna Zoological Park.
- Crescent Engineering College started on 12th October 1984 with intake of 180 students and sharing the facilities from existing Crescent School in the same campus.
- Formally inaugurated by M.A. Chidamabarm in the presence of DOTE Director Mr. Sivalingam, Chairman, Seethakathi Trust Mr. K.T.M.S. Abdul Cader (Thaikappa) and Founder B.S. Abdur Rahman.

This institution is an intellectual destination that challenges conventional thinking and stimulates passion to redefine learning. The distinctive teaching at this institution makes the students and scholars to compete with themselves and each other. Apart from providing top-notch education, our green campus and well-planned student life are solely dedicated to making students utilize the ambiance to the fullest. Through our wide array of educational programmes and unique clubs to foster student development activities, we provide opportunities and experiences that build community, help you grow personally and professionally, and create a place that you can call home now and throughout your life.

1.2 Objective

The energy audit is being conducted to identify areas of energy saving, both without and with investment.

This energy audit will also identify priorities for energy saving depending on saving potentials skills and time frame for execution, investment cost and payback etc.

1.3 Scope of Work

1 **Review of Electricity Bills, Contract Demand and Power Factor:** For the last one year, in which possibility will be explored for further reduction of contract demand and improvement of P.F.

2 **Electrical System Network:** Detailed study of all the Transformer operations of various Ratings / Capacities, their Operational Pattern, Loading, Power Factor Measurement on the Main Power Distribution Boards and scope for improvement if any. The study would also cover possible improvements in energy metering systems for better control and monitoring.

3 **Electrical Motors,** study of above 5 HP motors in terms of measurement of Voltage (V), Current (I), Power (kW) and P.F. in a complete cycle, and thereby suggesting measures for energy saving.

4 **Air Conditioning System:** The audit would involve analysis of various types of AC and usage. Further, various measures would be suggested to improve its performance.

5 **Illumination System:** Study of the illumination system, LUX level in various areas etc. and suggest measures for improvements and energy conservation opportunity wherever feasible.

6 **DG Sets:** Study the operations of DG Sets to evaluate their average cost of Power Generation, Specific Energy Generation and subsequently identify areas wherein energy savings could be achieved after analyzing the operational practices of the DG Sets.

7 **Pumping System:** Detailed Study of Pumps Measurement Analysis involves Pump Performance Study, the following parameters like Hydraulic Power, Pump Shaft Power, and Pump Efficiency are determined.

1.4 Methodology

SLRIS deputed his Team for conducting the study and they worked in close association with the staff and officers of Crescent – Chennai.

SLRIS submitted an execution plan for assignment which was mutually agreed and relevant data support was provided by Crescent – Chennai.

The audit was started with an orientation meeting with Management / Operations / Maintenance personals.

SLRIS team conducted all necessary field trials and collected various data for analysis.

All the instruments support was provided by SLRIS for conducting the field study where in following instruments were used

1.5 List of Instruments Used

S. No	Instrument name	Specification
1	Power Analyser	
	a. ACV (True RMS)	Up to 830V
	b. ACA (True RMS)	Up to 6500 A
	c. Frequency	40 to 70 Hz
	d. Accuracy	+/- 0.5%
2	Clamp on Meter	
	a. ACV (True RMS)	10 to 600V
	b. ACA (True RMS)	10 to 1500 A
	c. Frequency	50 or 60 Hz
	d. Accuracy	+/- 0.5%
3	Lux Meter	
	a. Range	0 to 9999 lux
	b. Accuracy	+/- 4% of reading
4	Anemo Meter	
	a. Range	1 to 25 m/s
	b. Accuracy	+/- 3% of reading
5	Thermo Meter	
	a. Range	-50°C to 750°C
	b. Accuracy	+/- 1% of reading

Bouquets to Crescent IoST-Chennai:

The following energy savings are already implemented in the Campus:

1. LED lightings
2. Occupancy Sensors
3. 5 star rated and VRF AC's
4. BLDC Fans
5. Solar Water Heaters
6. Solar Roof Top Power-650 kW
7. Solar Street Lights
8. Bio-gas Plant

2. BASELINE DATA FOR ENERGY AUDIT

2.1 Energy and Production

Energy (1 year data) details of Crescent IoST – Chennai is given below:

1. Name of Electricity office : TANGEDCO
2. Tariff : HT IIB
3. Annual Energy Consumption

   Total EB Consumption : 42, 73,653 kWh/ Annum

   Total Solar Generation : 4, 87,177 kWh/ Annum

   Total DG Generation : 1, 76, 992 kWh/Annum

4. Annual Energy bill

   Total Electricity bill paid to EB : Rs. 4, 57, 21,919 /Annum

   Total DG cost : Rs. 47, 67,210/ Annum

5. Unit Rate (EB+DG) : 10.2 Rs/kWh

% Source of Electricity

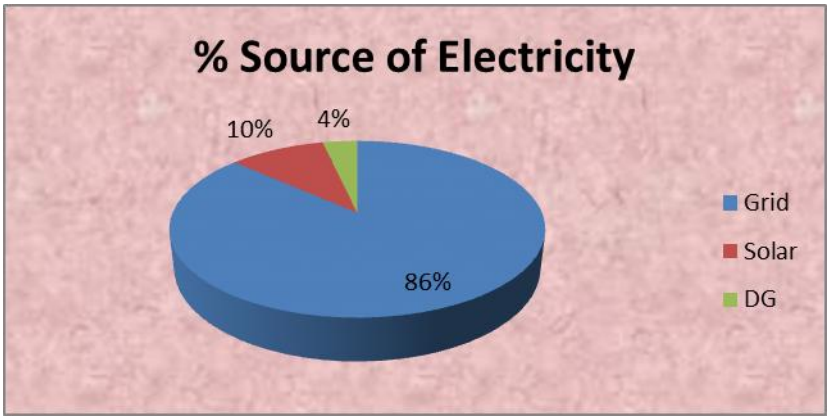


Figure 4: % Source of Electricity

% Load share of Utilities:

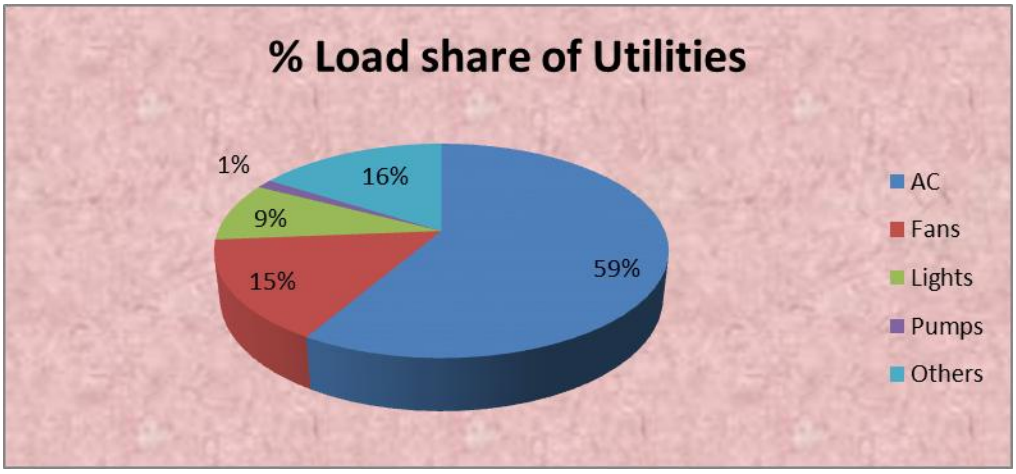


Figure 5: % Load of Utilities

Air Conditioners are the major power consumption followed by Fans.

3. TRANSFORMER AND ELECTRICAL DISTRIBUTION SYSTEM

3.1 Transformer

At Presently Crescent IoST- Chennai Receives Power from TANGEDCO at 11 kV and steps it down to 433 Volt using Distribution Transformer.

The Following Table showing the Design Details of the Transformer:

Distribution Transformer				
Description	**Unit**	**Transformer-1**	**Transformer-2**	**Transformer-3**
Make		Kirloskar	Universal	Universal
Type		Outdoor	Outdoor	Outdoor
Capacity	kVA	500	800	800
Voltage	HV	11000	11000	11000
	LV	433	433	433
Current	HV		42	42
	LV	666.7	1066.66	1066.66
Phases	HV	3	3	3
	LV	3	3	3
Frequency	Hz	50	50	50
Type of Cooling		ONAN	ONAN	ONAN
Year		1999	2006	2006
Status		Not in service	Working	Working

3.1.1 Voltage Analysis (800 kVA Transformer-2)

The Voltage (V) analysis for 800 kVA Transformer is given in following table

Parameter	Maximum	Minimum	Average
Line12 Voltage (Vrms)	412	398	405
Line 23 Voltage (Vrms)	415	402	409
Line 31 Voltage (Vrms)	411	398	406

3.1.2 Voltage Analysis (800 kVA Transformer-3)

The Voltage (V) analysis for 800 kVA Transformer is given in following table

Parameter	Maximum	Minimum	Average
Line12 Voltage (Vrms)	415	398	409
Line 23 Voltage (Vrms)	416	399	408
Line 31 Voltage (Vrms)	414	396	405

3.1.3 Current Analysis (800 kVA Transformer-2)

The Current (A) analysis for 800 kVA Transformer is given in following table.

Parameter	Maximum	Minimum	Average
Line1 Current (A)	635	585	610
Line 2 Current (A)	610	590	600
Line 3 Current (A)	620	570	595

3.1.4 Current Analysis (800 kVA Transformer-3)

The Current (A) analysis for 800 kVA Transformer is given in following table.

Parameter	Maximum	Minimum	Average
Line1 Current (A)	560	530	545
Line 2 Current (A)	610	520	565
Line 3 Current (A)	630	550	590

3.1.5 Apparent Power (kVA) Analysis (800 kVA Transformer-2)

The Apparent Power (kVA) analysis for 800 kVA Transformer is given in following table.

Parameter	Maximum	Minimum	Average
Line1 Power (kVA)	154	123	138
Line 2 Power (kVA)	149	124	133
Line 3 Power (kVA)	151	120	135

3.1.6 Apparent Power (kVA) Analysis (800 kVA Transformer-3)

The Apparent Power (kVA) analysis for 800 kVA Transformer is given in following table.

Parameter	Maximum	Minimum	Average
Line1 Power (kVA)	137	106	121
Line 2 Power (kVA)	149	126	137
Line 3 Power (kVA)	153	115	134

3.2 Transformer Loading

Transformer is a static device. Hence the losses of transformer are very low thus giving very high efficiency.

Crescent IoST – Chennai has 2 Transformer (2*800 KVA) for energizing the Campus and one 500 kVA which is not in use.

For backup power supply, like emergency and critical loads, 2 DG sets of 750 KVA and 500 KVA capacities are put into operation during grid power failure.

The following table will give the Loading percentage of Transformer during audit.

Description	Rated Capacity(kVA)	Loading kVA			Loading %		
		Minimum	Maximum	Average	Minimum	Maximum	Average
Transformer-2	800	367	454	415	46	57	52
Transformer-3	800	347	439	393	44	55	50

Note:

Transformer is loading around 44 to 57% which is OK.

4. REVIEW OF ELECTRICITY BILL

4.1 Analysis of Electricity Bill

Following data has been taken from electricity bill:

Contract Demand	:	1200 kVA
Maximum Demand recorded	:	1072 kVA (May 2024)
Demand Charges	:	Rs. 589/ kVA
Power Factor	:	0.97
Total Units Consumed	:	42, 73,653 kWh
Total Electricity Bill	:	Rs. 4, 57, 21,919
Unit Rate	:	Rs. 9.6/kWh

4.2 Energy Consumption Month wise

Average Unit cost is around Rs 9.6 for EB and Rs 10.2 for EB and DG. For savings calculation, unit cost is taken as Rs 10.2.

EB ANALYSIS FOR THE YEAR 2024															
No	Months	Actual Recorded Demand (kVA)	Billed Demand (kVA)	Demand Cost (Rs.)	EB units	Solar units	DG Units	Total Energy Consumption, kWh	Power Factor	Diesel ltrs	EB Amount (Rs)	DG Cost (Rs)	Total Amount-EB+DG (Rs)	Unit Cost-EB (Rs)	Unit Cost-EB+DG (Rs)
1	Jan-24	758	1080	6,06,960	2,43,326	4,87,177	3,821	7,34,324	0.97	1,380	27,32,260	1,29,720	28,61,980	3.7	3.9
2	Feb-24	865	1080	6,06,960	3,32,958		18,992	3,51,950	0.97	5,550	35,13,007	5,21,700	40,34,707	10.6	11.5
3	Mar-24	1062	1080	6,06,960	3,84,000		15,832	3,99,832	0.98	4,750	39,47,930	4,46,500	43,94,430	10.3	11.0
4	Apr-24	1036	1080	6,06,960	3,53,880		12,065	3,65,945	0.98	2,050	36,83,582	1,92,700	38,76,282	10.4	10.6
5	May-24	1072	1080	6,06,960	4,76,490		20,858	4,97,348	0.97	5,990	47,37,793	5,63,060	53,00,853	9.9	10.7
6	Jun-24	1014	1080	6,06,960	2,84,850		14,202	2,99,052	0.96	3,920	30,88,974	3,68,480	34,57,454	10.8	11.6
7	Jul-24	1040	1080	6,36,120	3,33,216		15,332	3,48,548	0.97	4,745	36,91,291	4,46,030	41,37,321	11.1	11.9
8	Aug-24	1039	1080	6,36,120	4,28,360		21,809	4,50,169	0.98	6,280	45,54,056	5,90,320	51,44,376	10.6	11.4
9	Sep-24	1015	1080	6,36,120	3,97,622		26,098	4,23,720	0.97	7,620	42,82,007	7,16,280	49,98,287	10.8	11.8
10	Oct-24	1044	1080	6,36,120	3,79,838		13,546	3,93,384	0.98	3,740	41,33,495	3,51,560	44,85,055	10.9	11.4
11	Nov-24	1010	1080	6,36,120	3,60,368		4,516	3,64,884	0.98	1,320	39,47,867	1,24,080	40,71,947	11.0	11.2
12	Dec-24	998	1080	6,36,120	2,98,745		9,921	3,08,666	0.98	3,370	34,09,657	3,16,780	37,26,437	11.4	12.1
Avg/Total		**996**	**1,080**	**74,58,480**	**42,73,653**	**4,87,177**	**1,76,992**	**49,37,822**	**0.97**	**50,715**	**4,57,21,919**	**47,67,210**	**5,04,89,129**	**9.6**	**10.2**

4.3 Month Vs. Energy Consumption Analysis

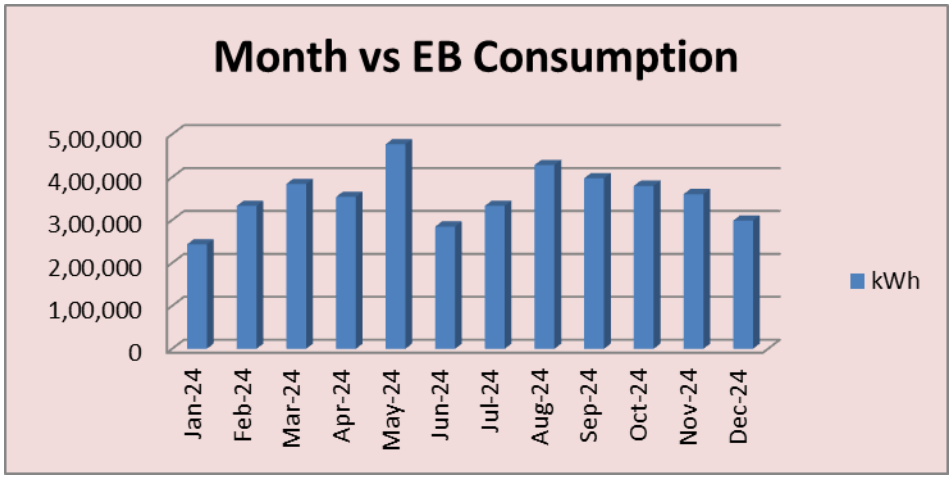


Figure 3: Month Vs. Energy Consumption Analysis

Power consumption is varied in months due to season variation.

4.4 Month vs. Total Cost Analysis

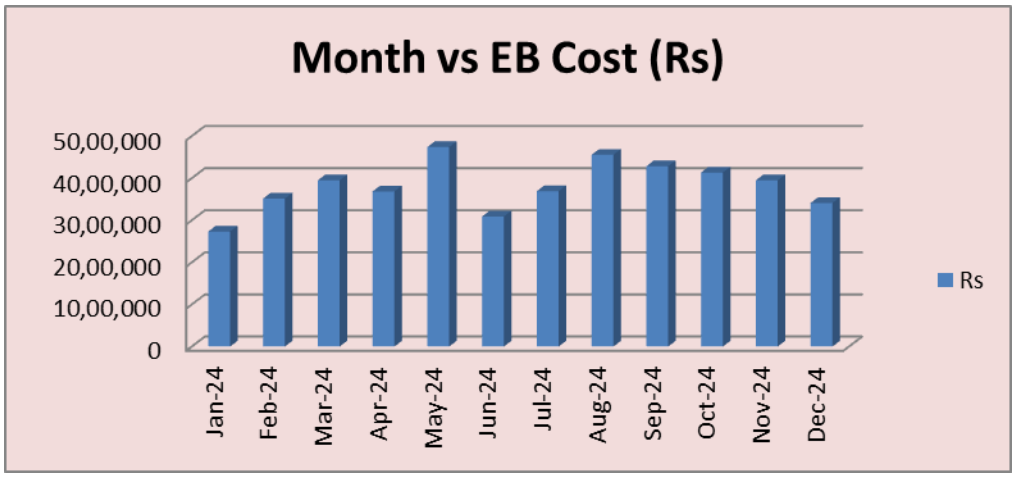


Figure 4: Month Vs. Total Cost Analysis

May Month EB cost is more due to more consumption.

4.5 Month vs. Demand Analysis

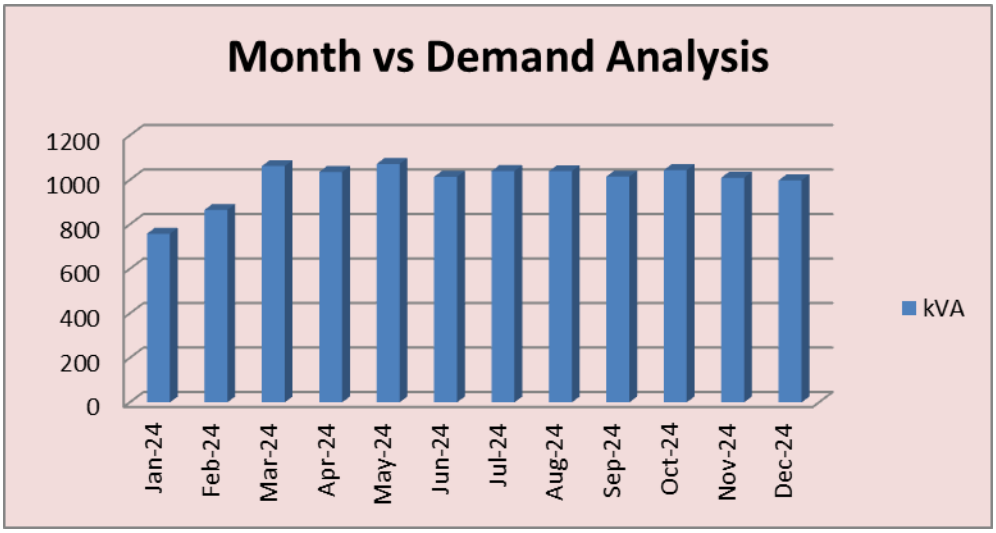


Figure 5: Month Vs. Demand Analysis

Max demand reached is 1072 kVA and contract demand is 1200 kVA which is OK.

4.6 Month vs. Power Factor Analysis

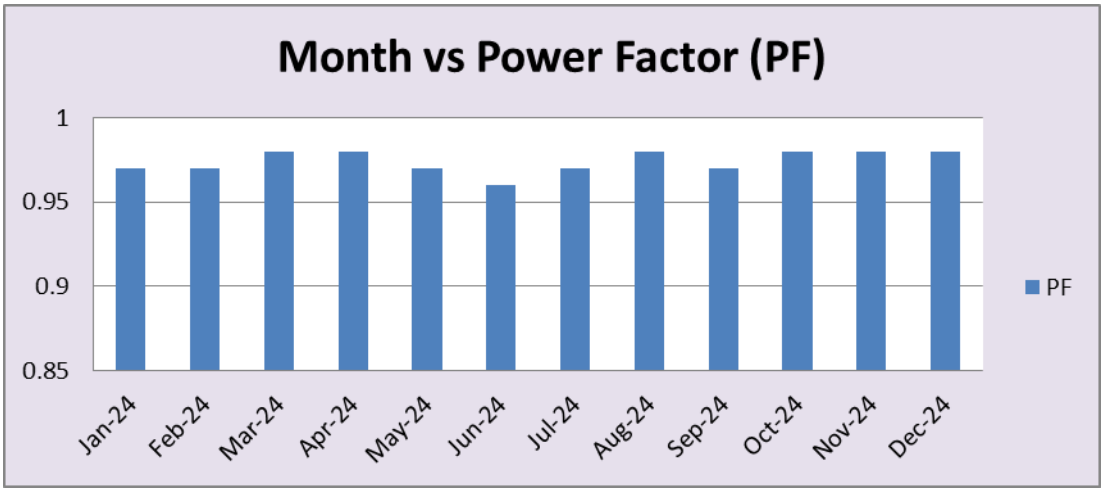


Figure 6: Month Vs. PF Analysis

Power Factor is maintained at 0.97 on average which is OK

5. LIGHTING SYSTEM

Lighting is a very significant aspect of utility. The efficiency, comfort factors and the quality of lighting should not be compromised.

75% lamps are replaced with LED lamps to reduce energy consumption.

SL NO	BUILDING	QTY	TOTAL WATTS
1	AUDITORIUM	206	4487
2	SCIENCE BLOCK	435	5684
3	AERO BLOCK	573	6964
4	MAIN BLOCK	382	6252
5	MBA BLOCK	123	2597
6	FIRST YEAR BLOCK	217	4305
7	LIFE SCIENCE BLOCK	108	2828
8	NEW STAFF QUARTERS	383	5135
9	LADIES HOSTEL	664	8359
10	CAMPUS STREET LIGHT	286	8570
11	MEDICAL	35	589
12	PHARMACY	143	2575
13	GM OFFICE	47	910
14	MAIN CANTEEN	45	1042
15	VC OFFICE	100	620
16	VC VILLA	51	571
17	GUEST HOUSE	37	680
18	DRIVERS CABIN	8	120
19	OLD STAFF QUARTERS	53	1005
20	SPORTS LIGHTING	64	12800
21	HR OFFICE	27	500
22	PARANTS WAITING HALL	12	166
24	NEW ARCHITECTURE BLOCK	614	10808
25	CIVIL YARD CLASS ROOMS	40	650
26	CSB ROOM MENS HOSTEL	47	780
27	ROBOTICS LAB	22	280
28	RESEARCH SCHOLAR ROOM CHEMISTRY	4	144
29	FOOD WASTE MANAGEMENT PLANT	26	640
30	SOLAR STREET LIGHT	10	250

SL NO	BUILDING	QTY	TOTAL WATTS
31	MENS HOSTEL	1007	13219
32	MBA PHASE 1	49	595
33	MBA PHASE 2	170	3108
34	COMPUTER SCIENCE LAB	51	690
35	PURCHASE OFFICE (EO)	2	30
36	CIIC BLOCK	328	5479
37	CIIC 2ND FLOOR STUDIO	13	225
38	DRAWING HALLS & LABS(MECH)	60	709
39	CANTEENS	119	1984
40	OUTDOOR LIGHTING	63	1306
TOTAL		**6624**	**117656**

It is suggested to replace remaining FTL with LED at Men's hostel and Canteen to reduce power consumption. (Refer ESM- 1)

Solar Street lights of 250 W x 10 Nos are available in Campus. It is recommended to install additional Solar street lights in road to reduce power consumption (Refer ESM-5)

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6. AIR CONDTIONERS

6.1 Introduction

In CRESCENT – Chennai using Split and Cassette type AC for comfort cooling. AC load is major one and around 1400 TR load is connected.

6.2 Study of AC

Set temperature of AC's are checked at various location. It is suggested to maintain AC temperature above 24°C. Old window AC's 99 Nos are available in Academic Blocks. It is suggested to replace the AC with 5 star rated Split AC to reduce power consumption. (Refer ESM-4).

7. Chiller

7.1 Introduction

In CRESCENT – Chennai using Chiller for Auditorium cooling. The following table gives the rated parameters of Chiller.

Description	Unit	Chiller-1	Chiller-2
Make		Blue Star	Blue Star
Type		Air Cooled	Air Cooled
Model		LCA1-090x54	LCA1-090x54
Cooling Capacity	TR	92	92
Chiller input power	kW	107	107
SEC	kW/TR	1.16	1.16
Refrigerant		R134a	R134a
Year		2012	2012

Chiller Pumps

S.No	Description	Rated Parameters					
		Pump Make	Design flow	Rated Head	Rated Power	Motor Make	Rated Motor Efficiency
			m3/h	m	kW		%
1	CH water pump-1	Kirloskar	50.4	30	7.5	Kirloskar	89.0
2	CH water pump-2	Kirloskar	50.4	30	7.5	Kirloskar	89.0
3	CH water pump-3	Kirloskar	50.4	30	7.5	Kirloskar	89.0

7.2 Chiller and Pumps

There are 2 new Air cooled chillers are available in plant. Normally 1 chiller with 1 chilled water circulation pump is in operation. 2nd Chiller and pump will ON based on occupancy in auditorium. 3rd pump is kept as standby.

Chilled Water Pumps:

*Water is pumped to circulate chilled water through AHU for cooling.

8. FANS

8.1 Introduction

In CRESCENT – Chennai using Ceiling fans at office and hostel room. Some fans are replaced with BLDC type and suggested to replace other fans with BLDC-Refer ESM 3.

9. RENEWABLE ENERGY

Solar Water heaters are available in campus & the details is as follows:

SL NO	BUILDING	QTY	TOTAL
1	SOLAR WATER HEATER MENS HOSTEL	20 Nos x500 LPH	10000 LPH
2	SOLAR WATER HEATER LADIES HOSTEL	16 x 500 LPH	8000 LPH

*650 kWp Solar roof top panels were installed in the campus. Solar energy generation is low as compared with previous year.

No	Solar Capacity	Power Generation kWh	
	kW	2023	2024
1	150	79888	34852
2	100	116519	71853
3	300	369865	278693
4	100	96930	102049
Total	**650**	**663202**	**487447**

It suggested to increase cleaning frequency and/or install Auto cleaning system to improve efficiency-Refer ESM 2

*Explore the possibility of installing solar panels in other locations-Refer ESM-6

*10 Nos of 250W Solar street lights are available in campus and suggested to provide additional lights–Refer ESM 5.

10 DIESEL GENERATORS

At CRESCENT – Chennai, 2 Diesel Generator sets of 750 kVA and 500 kVA capacities are used for power back-up during power failure. The specification of the DG's are listed in the below table.

Month wise power generation and Diesel consumption were recorded in log book by Campus. and the details are as follows:

No	Months	DG Units	Diesel ltrs	SEC
1	Jan-24	3,821	1,380	2.77
2	Feb-24	18,992	5,550	3.42
3	Mar-24	15,832	4,750	3.33
4	Apr-24	12,065	2,050	5.89
5	May-24	20,858	5,990	3.48
6	Jun-24	14,202	3,920	3.62
7	Jul-24	15,332	4,745	3.23
8	Aug-24	21,809	6,280	3.47
9	Sep-24	26,098	7,620	3.42
10	Oct-24	13,546	3,740	3.62
11	Nov-24	4,516	1,320	3.42
12	Dec-24	9,921	3,370	2.94
	Avg/Total	**1,76,992**	**50,715**	**3.49**

SEC has maintained above 3 kWh/Liter which is good.

11. Pumps

11.1 Introduction

CRESCENT Chennai using pumps for domestic water pumping and Blowers for aeration. The following table gives the rated parameters of Pumps.

Description	Main block Pump room			Science Block
	Pump: 1	Pump: 2	Pump: 3	Pump: 2
Pump Make	Beacon	Kirloskar	Crompton	Kirloskar
Total Head	35 m		36 m	
Rate of Flow			12 LPS	
Motor Make	Beacon	Kirloskar	Crompton	Kirloskar
Rated Power	5.5 kW	5.5 kW	5.5 kW	5.5 kW

12. ENERGY SAVING MEASURES

ESM1: Replace FTL Lamps with Energy Efficient LED Lamps

PRESENT SYSTEM

- Fluorescent tube lamps (FTL) are used at different locations in Campus
- Lamp efficacy is about 60-80 lumens/Watt
- FTLs have lamp life of < 8000 burning hours only
- Lumen depreciation Will be > 30% till end of life, leading to frequent maintenance & replacements
- Minimum voltage required is 180 V to ignite lamp

PROPOSAL

- Replace all remaining FTL lamps with Energy Efficient LED lamps-Men's hostel and Canteen
- Longer lamp life than conventional lamps
- 50% reduction in energy consumption with constant luminous flux compared with conventional lamps

ESTIMATED BENEFITS

Recurring annual cost savings : Rs 97,920
Investment Cost : Rs 60,000
Payback period : 7 Months

BACK-UP CALCULATION

Description	Units	Value
Power Consumption of FTL lamps	W	40
Power consumption of LED	W	20
Total no of Lamps	No	200
Lamps Glowing Hours	Hours/day	8
Operating Days(Approx)	Days/ Annum	300
Expected Energy Savings	kWh/Annum	9,600
Energy Cost	Rs/kWh	10.2
Monetary Savings	Rs./ Annum	97,920
Investment Cost	Rs	60,000
Payback period	Months	7

ESM 2 Improve Solar roof top panel generation Efficiency and reduce EB power consumption

PRESENT SYSTEM

- Solar roof top panel of 650 kWp was installed in Campus.
- Power generation was low as compared to previous year
- EB power consumption is more (86%).

PROPOSAL

- Increase the cleaning frequency of panels
- Provide Auto cleaning system (Water Spray with Pump)
- Solar additional power can be generated daily.
- This will save EB energy cost.

ESTIMATED BENEFITS

Recurring annual cost savings : Rs 14,08,096
Investment Cost : Rs 10, 00,000
Payback period : 9 Months

BACK-UP CALCULATION

Description	Units	Value
Solar plant capacity	kW	650
Actual power generation by the plant year 2024	kwh/Annum	4,87,177
Power generation by the plant year 2023	kwh/Annum	6,63,189
Additional power to be generated	kwh/Annum	1,76,012
Unit Cost saving	Rs./kWh	8
Annual Cost Savings	Rs	14,08,096
Investment cost	Rs	10,00,000
Payback Period	Months	9

ESM 3 Replace conventional fans with EE BLDC fans

PRESENT SYSTEM

- Ceiling fans are used at Campus and hostel areas.
- Conventional types are available.
- This leads to high power consumption

PROPOSAL

- Replace conventional fans into energy efficient BLDC fans-Men's & Ladies hostel, Staff Quarters, and Aero block
- BLDC fans consumes less energy
- This will reduce power consumption.

ESTIMATED BENEFITS

Recurring annual cost savings : Rs 2, 57,040
Investment Cost : Rs 7, 00,000
Payback period : 33 Months

BACK-UP CALCULATION

Description	Units	Value
Total No of Fans identified for replacement	No	200
Present Power consumption of fan	W	70
Proposed EE fan power consumption	W	35
Savings	W	35
Annual Operating Hours	h	3,600
Annual Energy Savings	kWh	25,200
Electricity cost	Rs./kWh	10.2
Annual cost Savings	Rs	2,57,040
One time cost of implementation	Rs	7,00,000
Payback	Months	33

ESM -4: Replace old Window AC's with Energy efficient 5 star rated split AC and reduce power consumption

PRESENT SYSTEM

- Windows AC of 2 TR capacities are running at Academics block.
- Old AC SEC is high
- It leads to more power consumption.

PROPOSAL

- Replace existing window AC with 5 star rated split AC
- 5 Star rated ACs SEC is low
- This will reduce power consumption.

ESTIMATED BENEFITS

Recurring annual cost savings : Rs 13, 63,230
Investment Cost : Rs. 54, 45,000
Payback period : 48 Months

BACK-UP CALCULATION

Description	Units	Value
Number of air conditionersin academic block	No	99
Installed cooling capacity	TR	1.5
Specific power consumption of present AC	kW/TR	1.3
Power consumption of present AC	kW	2.0
Specific power consumption of proposed AC	kW/TR	1
Expected power consumption with new AC	kW	1.5
Power savings	kW	0.5
Annual operating hours	h	3,000
Annual energy savings	kWh	1,33,650
Unit power cost	Rs./kWh	10.2
Annual cost savings	Rs.	13,63,230
One time cost of Implementation	Rs.	54,45,000
Payback period	Months	48

ESM -05: Replace Street light with Solar powered light and reduce power consumption

PRESENT SYSTEM

- Presently Street lights are available in Campus for lighting purpose
- 30W LED lamps are used
- It leads to electricity power consumption.

PROPOSAL

- Provide additional Solar Street light in front of the roads.
- Install 5 no's of lights.
- This will reduce power consumption.

ESTIMATED BENEFITS

Recurring annual cost savings : Rs 6,701
Investment Cost : Rs 30,000
Payback period : 54 Months

BACK-UP CALCULATION

Description	Units	Value
Power Consumption of Street lamps	W	30
No of lamps for replacement	No	5
Usage Hours	Hours/day	12
Present Power Consumption	kW/day	1.8
Proposed Power Consumption	kW/day	0
Savings	kWh/day	1.8
Operating Days(Approx)	Days/ Annum	365
Expected Energy Savings	kWh/Annum	657
Energy Cost	Rs/kWh	10.2
Monetary Savings	Rs./ Annum	6,701
Investment Cost	Rs	30,000
Payback period	Months	54

ESM 6 Explore the possibility of Roof Top Solar PV to generate electrical energy

PRESENT SYSTEM

- 650 kWp Solar roof top panel was installed in Campus
- Presently Architecture block, Science block, Main block, Aerodynamic block, MBA block, Auditorium & CIIC area's are having solar panels

PROPOSAL

- Explore the possibility to Install Solar Roof Top panel in identified areas- Substation and/or FM Lab etc.
- Possibility of generation of 200 kW power
- This will save EB cost.

ESTIMATED BENEFITS

Recurring annual cost savings : Rs 17, 47, 200
Investment Cost : Rs 84, 00,000
Payback period : 58 Months

BACK-UP CALCULATION

Description	Units	Value
Available roof-top area	m^2	3,000
Installable capacity of SPV generation	kWp	200
Proposed average power generation	kW/day	840
No.of days considered	Days	260
Annual Electricity generation from solar PV	kWh	2,18,400
Present electricity unit cost	Rs./kWh	8
Recurring annual cost savings	Rs	17,47,200
One-time cost of implementation	Rs	84,00,000
Payback period	months	58

13. Recommendation and Conclusions

- On an energy bill of Rs 5, 04, 89, 129 around 10% of savings can be achieved by implementing all schemes.
- The annual savings potential is Rs 48, 80,187 which can be gained by investing Rs 1, 56, 35, 000 with an average payback period of 38 months.
- It is recommended to install dedicated energy meters and energy monitoring system before implementing the schemes. This is required for establishing the baseline as well as for measurement and verification of savings upon implementation of each scheme.
- CRESCENT CHENNAI to reconfirm the investments by obtaining site-specific offers covering performance guarantee for savings.
- The implementation of the evaluated schemes needs to be taken up for implementation in a time bound manner with in a period of two years.

End of the Report