Criteria	**Criteria-VII –** Institutional Values and Best Practices
Key Indicator	7.1. Institutional Values and Social Responsibilities
Metric	7.1.6. Quality audits on environment and energy are regularly undertaken by the institution

ENERGY AUDIT REPORT

A copy of the report for energy audit undertaken by the institution is attached below.

Registrar

REGISTRAR
Kalasalingam Academy of Research and Education
(Deemed to be University)
Anand Nagar, Krishnankoil - 626 126.

KALASALINGAM ACADEMY OF RESEARCH AND EDUCATION
(DEEMED TO BE UNIVERSITY)

Under sec.3 of UGC act 1956, Accredited by NAAC with "A" Grade
Anand Nagar, Krishnankoil-626126, Tamil Nadu,India.

ENERGY AUDIT REPORT

April 2020

Report prepared by

M.VIVEKANANDAN, M.E.,(Ph.D)
Bureau of Energy Efficiency Certified Energy Auditor
Certificate Number – EA-19216
Chief Executive Officer (CEO),
TryCAE Industrial Engineering Pvt. Ltd,
K.K. Nagar, Trichy – 620021. Tamil Nadu, India

m.vivekanandan.

TryCAE Industrial Engineering Pvt.Ltd.,
D.No.24/77, 2A, SECOND FLOOR
AMPLE "ARUDHRA TOWERS"
RAJARAM SALAI MAIN ROAD,
K.K. NAGAR, TRICHY - 620 021.
TAMILNADU.

TRYCAE
ENGINEERING FOR SUSTAINABLE FUTURE

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ABSTRACT OF ENERGY AUDIT

The energy audit of KARE campus was done from the year 2018 to April 2020. The following are the comprehensive abstract of Energy Audit. Average money spend for power consumption per month for katre campus is Rs. 23 Lakhs 61 thousand (Rs.23,61,000), KARE campus installed solar PV panels to the tune of 791 kw in building rooftops. Power from solar PV panel shares about 18% of total power consumption of KARE. As of now solar PV Panels generates about 16,40,000 kWH of energy. 730 tonnes of CO_2 emissions is stopped, because of installation of solar PV panels. This installation 791 kW of solar panels aid for the sustainable environmental approach. There are also 50 no's of 25 Watt solar street light installed. And other energy conservations measures are suggested in this report

M.Vivekanandan M.E., (Ph.D)
BEE Certified Energy Auditor (EA-19216)
CEO, TryCAE Industrial Engineering Pvt. Ltd.,
Trichy, Tamil Nadu

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TryCAE Industrial Engineering Pvt. Ltd
Engineering for Sustainable Future
Corporate ID No: U74999TN2017PTC115589.
24/77, 2A, Second Floor, Ample Arudhra Towers, Rajaram Salai , KK Nagar, Trichy - 620021, Tamil Nadu, India
www.trycae.com vivek@trycae.com +91 98424 83034 GSTIN : 33AAGCT1724M1ZA

TO WHOM SO EVER IT MAY CONCERN

This is certify that myself M.Vivekanandan, Certified Energy auditor of Bureau of Energy Efficiency, India bearing the registration no. EA-19216, personally done Energy and Green audit at the Kalasalingam Academy of Research And Education, (Deemed To Be University), Anand Nagar, Krishnankoil – 626126, during August 2020 and recommendations to conserve energy is given in the report. I thank the management of KARE for providing me the opportunity, I also thank the team members of energy audit and green audit for rendering their support to the audit.

m.vivekanandan.

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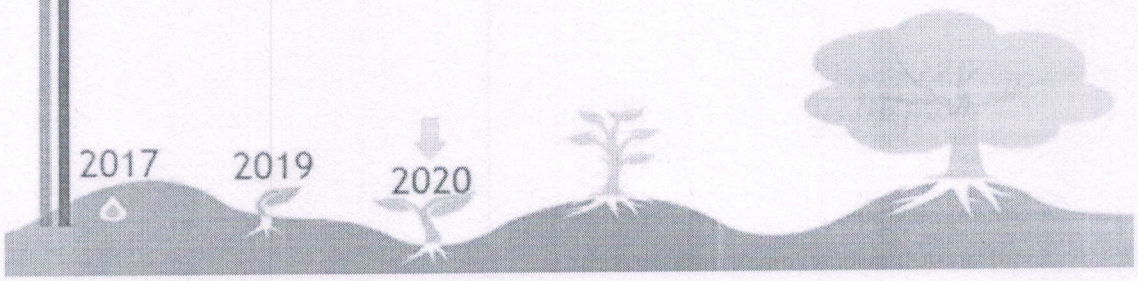


1.0: INTRODUCTION

1.1 About TryCAE Industrial Engineering Pvt. Ltd.,

TryCAE is an engineering services company from Tiruchirappalli, Tamil Nadu, India. Majority of the company expertise domain lies in CFD Analysis, FEA Analysis, Design Automation, Equipment Design and Energy Audits. TryCAE is engaged in the projects like L&T Khargone, Rajasthan Atomic Power Plant and L&T Ghatampur. TryCAE also capable in Design Automation where the drawings will be generated based on the input. We are working with ISGEC for design automation. Notable CFD projects are with BrahMOS and AGNI missile components currently working on an underwater torpedo's. They had done physical modelling of ESP for NTPC Farakka 500 MW plant. Currently we are working on CFD analysis of FGD project for NTPC Kudgi and for KC Cottrell.

The company has been mentored by the industry experts like Dr. R. Vasudevan, Dr. V. Gopalakrishnan, Dr. C. Mani and Mr. K. Sakthi.

1.2 About Kalasalingam Academy of Research And Education (Deemed to be University)

Kalasalingam Academy of Research and Education (KARE) formerly Arulmigu Kalasalingam College of Engineering was established in 1984 by the pioneering Kalasalingam Anandam Ammal Charities. Located at the pristine foothills of scenic Western Ghats, the college obtained the Deemed to be University status in 2006. The Institution has been serving the society for thirty four long years and it caters to the needs of the students from all walks of the society. KARE offers UG programmes, PG programmes and Ph.D programmes. It is the first Institution in India to introduce a special B.Tech programme in engineering for the differently able (speech and hearing impaired) students. The Institution has been re-accredited by NAAC with 'A' grade with a CGPA of 3.11 in 2015. Six UG programmes have been accredited by NBA under Tier-1. The Institution continues to do indefatigable work in getting projects and research centers. It has received DST funding to establish the National Center for Advance Research in Discrete Mathematics. KARE has got the state of the art IRC with splendid high end instruments for advanced research in material sciences and life sciences. Multistoried separate hostels with plenty of facilities provide accommodation to thousands of students. The institution has spent exorbitant sum to create a world class swimming pool and indoor auditorium for sports. Furthermore KARE gives utmost importance to Intra-mural and Extra mural activities for the holistic development of the students.

1.3 ABOUT ENERGY AUDIT

The building sector has gained prominence over the past few decades as the largest consumers of energy. 45% of total global energy is used in heating, cooling and lighting of buildings. Energy consumption patterns could be substantially altered by adopting energy conserving measures, particularly during the phase of building design.

Hence energy requirement to the building is need of the hour for the institutions, this might be the first step in achieving the green audit to the campus

1.4 OBJECTIVES & GOALS OF ENERGY AUDIT

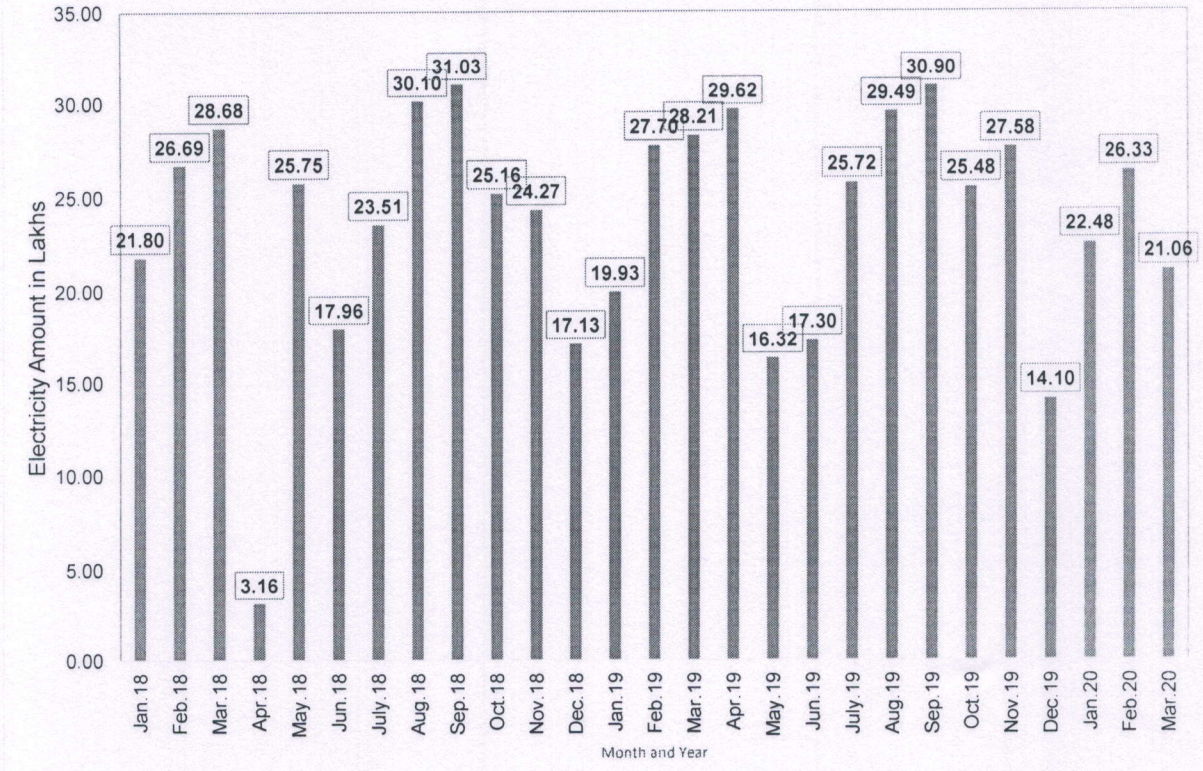
- To minimise energy costs / waste
- To minimise environmental effects.
- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in various departments.
- Identifying potential areas of energy saving primarily in lighting, fans and Air conditioners
- Highlighting wastage's in major areas.
- Fixing of energy saving potential targets for energy guzzlers
- Implementation of measures for energy conservation & realization of savings with return on investment

2.0: ENERGY AUDIT

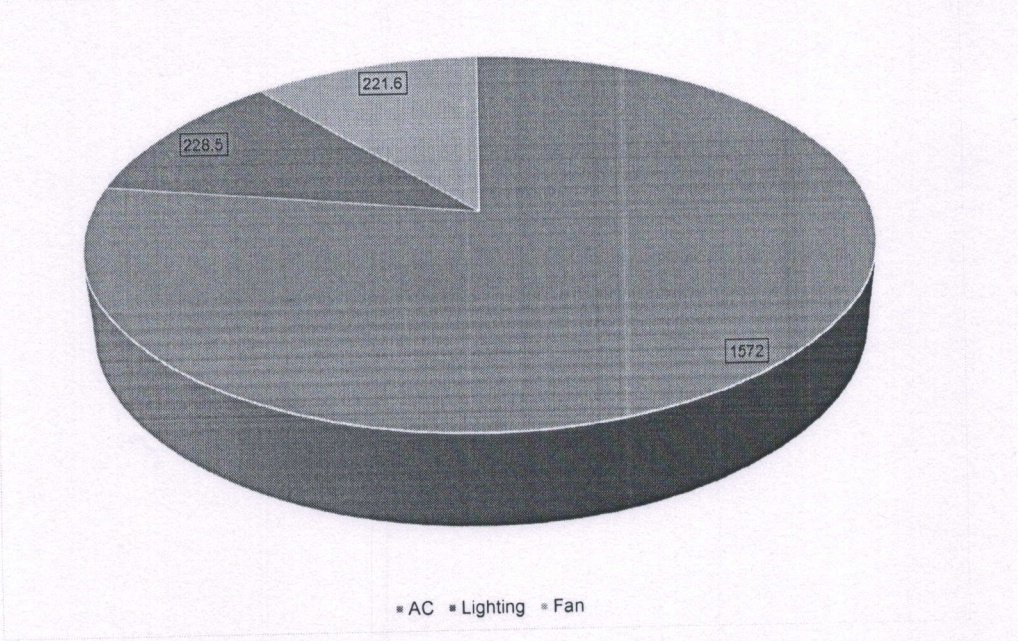
The area of the energy audit includes

- Class Rooms
- Faculty Room
- Laboratories
- Office Rooms
- Seminar Halls
- Hostels
- Canteen

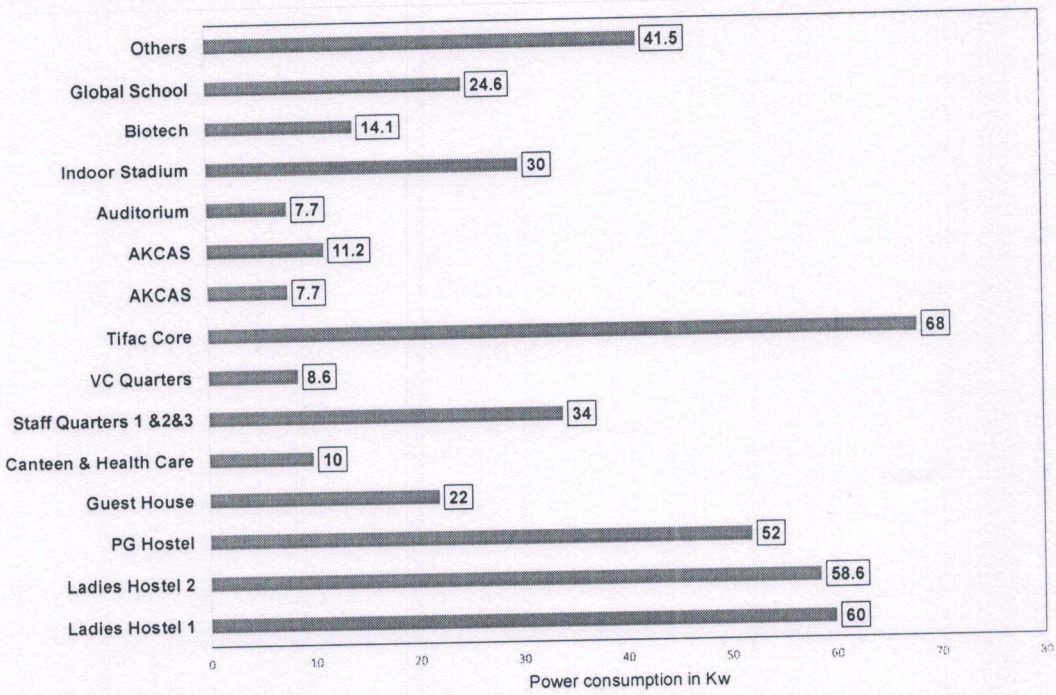
2.1 Power Consumption Pattern from January 2018



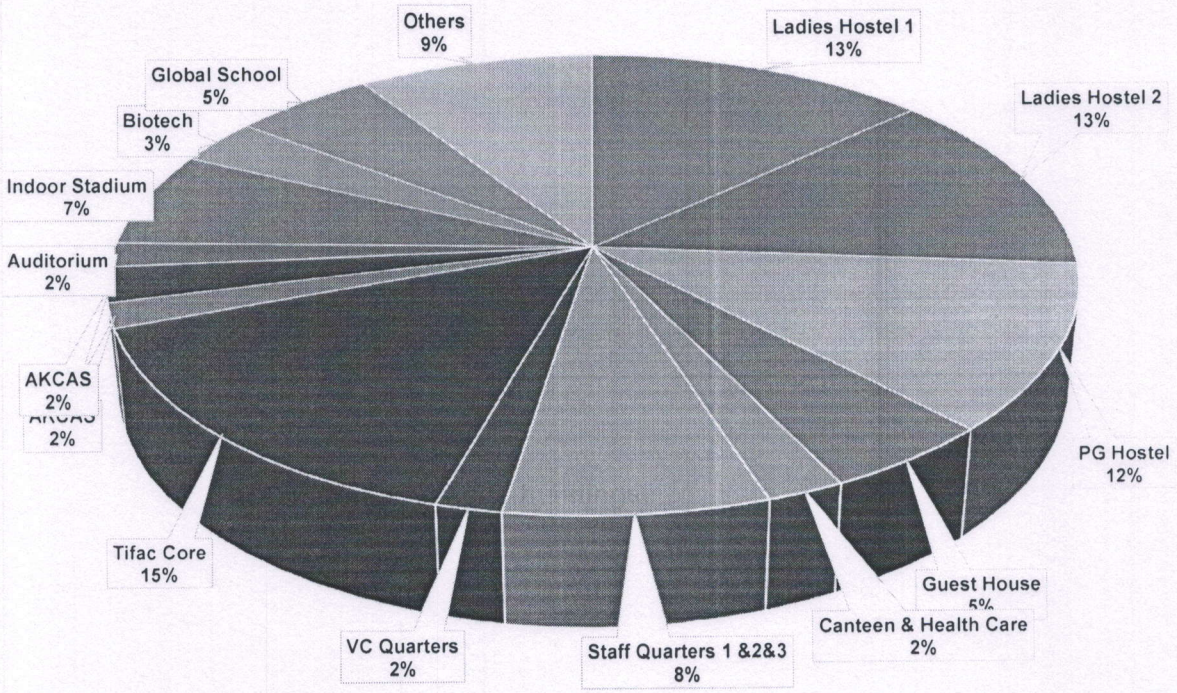
2.2 Connected load distribution of the Kare Campus in KW



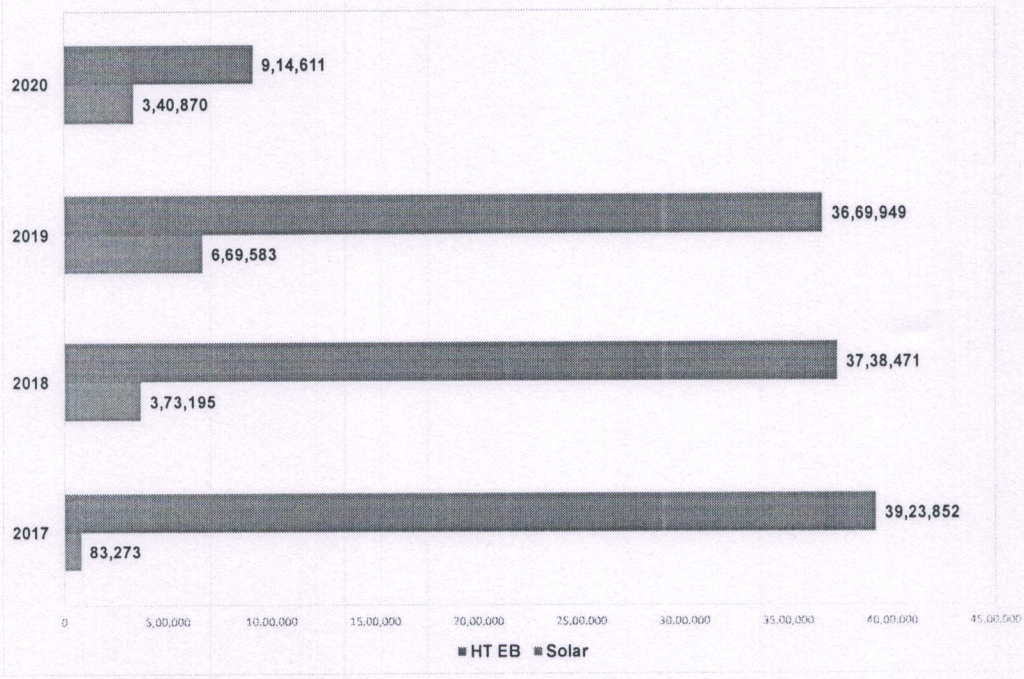
2.3 Power consumption for various buildings in kw



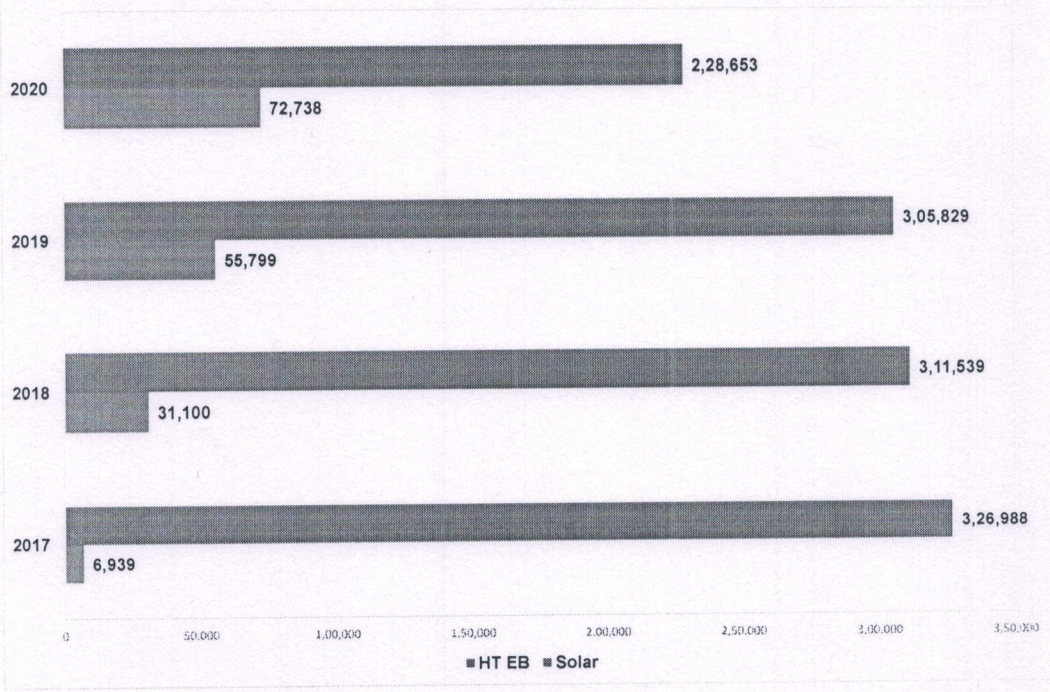
2.4 Percentage distribution for various buildings,



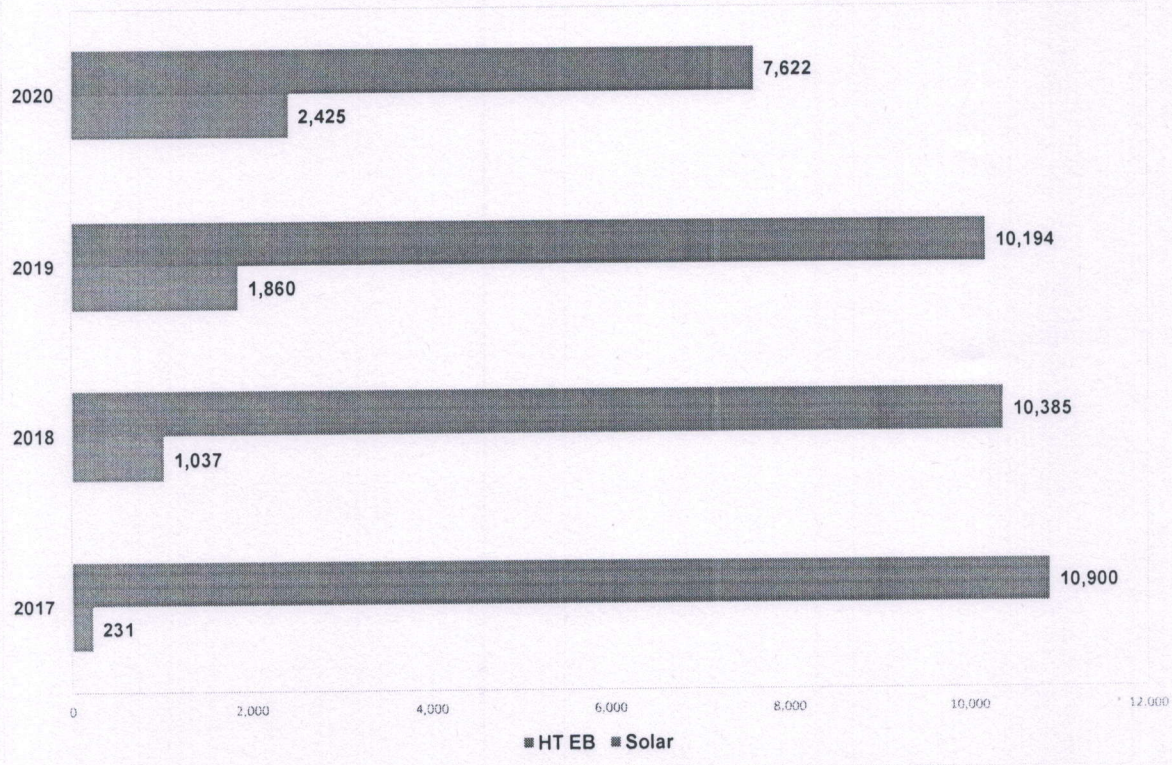
2.5 Number of units consumed from solar and HT-EB last four years



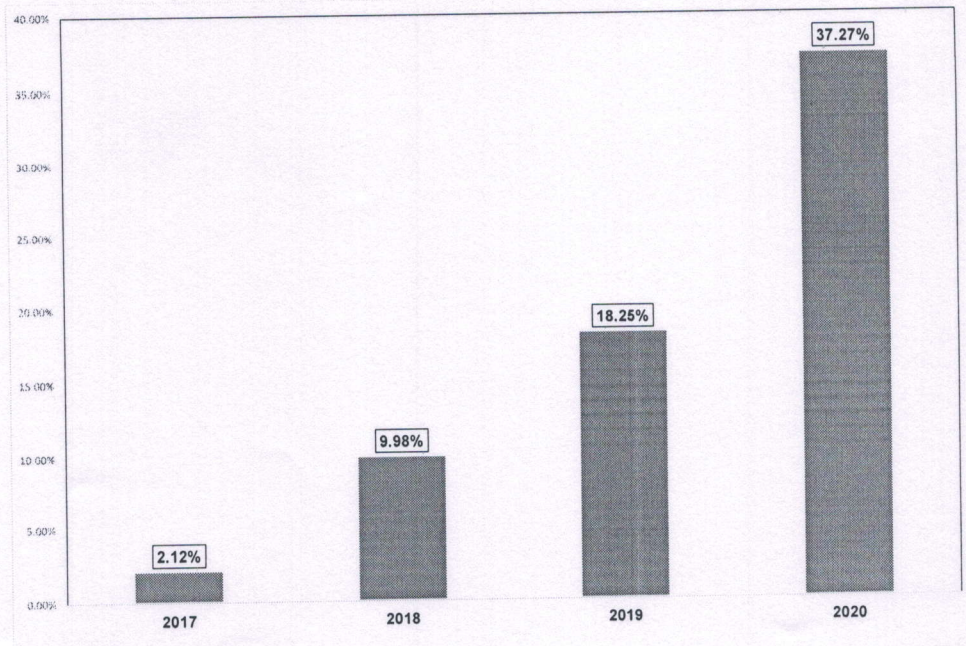
2.6 per month average consumption for last four years



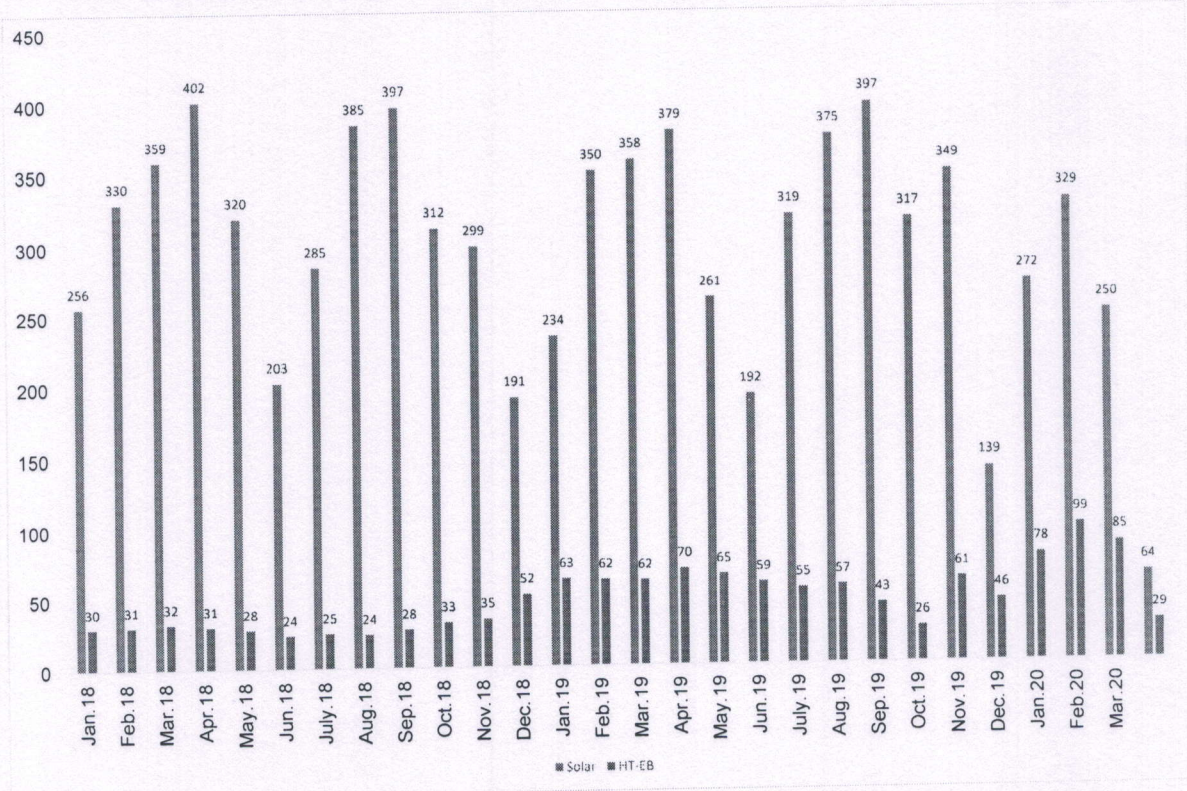
2.7 per day average consumption for last four years



2.8 Percentage of utilization solar vs HT EB for last four years



2.9 Power consumption from HT and Solar for last 3 years



2.10 Other information's

Total Build Up Area : 24,35,768 Sq. ft

Total Carpet Area : 2,64,300 Sq. ft (Air Conditioned)

Total Carpet Area : 18,06,102 Sq. ft (Non - Air Conditioned)

No of Blocks : 40 Nos

Electricity Bill : 3669949 kWh & Rs. 2,92,32,396/-

Contract Demand : 1300 kVA

Incoming Voltage : 11 kVA

Tariff Code : II B

Transformers: Total Numbers : 5 Nos

PI indicate separately for each transformer : Capacity(kVA), HT / LT Voltage & Present Loading %

(1000 + 500 + 500 + 500 + 500) - 11 KV / 440 V

Captive Power Generation :

Solar PV Plant : Capacity - 791.22 kWp Units Generated - 60871 kWh / month

II. ELECTRICAL DETAILS

1. TRANSFORMERS

	No. 1	No. 2	No. 3	No. 4	No. 5
Rating	500	500	500	500	1000
Voltage Ratio	11KV/433 V	11KV/433 V	11KV/433 V	11KV/433 V	11KV/433 V
kVA	500	500	500	500	1000
% Impendence	5.35	5.31	4.64	4.01	5.03

2. CONSUMPTION

	Particulars	Demand		
A	Contract demand kVA	1300 KVA		
B	Maximum demand	1170 KVA		
C	Total Energy units consumed / day	10194 KWh		
D	Avg. Power Factor (P.F.)	0.94		
E	Avg. Energy bills (Rs/month)	Rs.24,36,033		
F	kVA Load	Morning	Noon	Night
	Peak kVA Duration	600	1100	720

3. LIST OF ELECTRIC MOTORS OPERATING IN THE PLANT

S No	NAME OF THE PLANT	kW	NO. OF MOTORS
1	Sewage Treatment plant 1	77	14
2	Sewage Treatment plant 2	55	12
3	Mineral Water plant	6	3
4			
5			

4. DETAILS OF CAPACITORS FOR P.F. IMPROVEMENT

S.NO.	NAME OF THE PLANT	kVAR
1	Administrative Block	33
2	Mens Hostel – I	33
3	Library	33
4	IRC	33
5	Tifac Core	33
6	Substation – I	66
7	Workshop	33
8	Block – V	33
9	Computer Block	33
10	PG Block	33
11	Substation II	100
12	Motors	50

CONNECTED LOAD

	EQUIPMENT	LOAD IN kW
A	Motors <10 HP – 6 Nos >10 HP – 48 Nos	239
B	Compressors Details	*Rated CFM*
	Compressor – 1	
	Compressor – 2	
	Compressor – 3	
C	**AC & Ventilation with TR capacity**	**TR CAP**
	Air Conditioner Plant (Split & Window)	362 Tr
	A.H.U. (Package, Duct, VRV & Cassette)	834 Tr
	Others	
D	Process	
E	Lights & Fan	450230 W
	Total Load	

A. DIESEL GENERATING SET

S.No	Make	Model	Rating KVA	Stand by or Continuous operation	Actual Average Loading
1	Kirloskar	2006	250	Standby	60%
2	Kirloskar	2006	250	Standby	60%
3	Kirloskar	2008	180	Standby	70%
4	Kirloskar	2011	160	Standby	50%
5	Cummins	2012	380	Standby	80%
6	Cummins	2013	250	Standby	80%
7	Cummins	2011	180	Standby	70%
8	Cummins	2011	180	Standby	70%
9	Cummins	2009	180	Standby	70%
10	Cummins	2009	180	Standby	70%
11	Cummins	2014	125	Standby	50%
12	Cummins	2012	82.5	Standby	80%

4.0 ENERGY CONSERVATION RECOMMENDATIONS

4.1 Summary of Recommendations

Sl. No.	Topic	Descriptions	Investment(Rs.)	Return on Investment
1.	Replacing the 60 watt tube lights to a LED tube lights	• Older 60 W tube light consumes 50% of total light load • LED tube lights are up to 66% more efficient • Replacement of 60 Watt lights with LED Tube light (Savings= 943 Units per Day)	6 Lakhs	60 days
2.	Replacing the 40 Watt copper choke tube lights to a LED tube lights	• Older 40 W tube light consumes 50% of total light load • LED tube lights are up to 66% more efficient • Replacement of 60 Watt lights with LED Tube light (Savings= 725 Units per Day)	6 Lakhs	120 days
3.	Replacement of older fans with superfan	There are around 1500 fans in the campus, phase wise replacing of 200 normal fan to will be very economical Super fans are up to 50% more efficient • Replacement of older fans with super fan (Savings= 96 Units per Day)	14 Lakhs	87 Months
4.	Alternate lighting scheme for Street Light	After 12:00 am to 6:00 am percentage utilization of the street light will be less. Hence it is proposed to install alternate	4 Lakhs	120 days

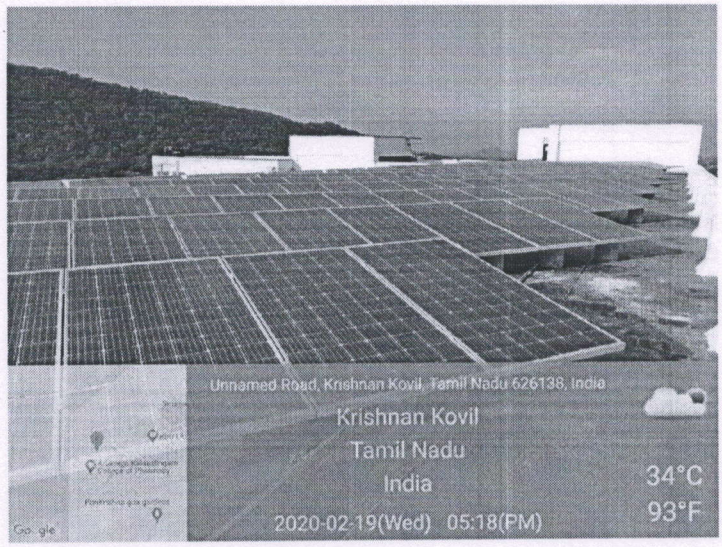
Sl. No.	Topic	Descriptions	Investment(Rs.)	Return on Investment
		lighting scheme, where ODD numbers (installed) lights will be switched off after 12 am.		
5.	Proximity sensor for varendas, corridors, porticos and wash rooms	Proximity sensor or alternate lighting scheme can be implemented to save energy	3 Lakhs	4 months
6.	Day time savings in hostels	A Common MCB which control all the power input to the floor is to be provided by switching off the MCB. We might save power, if some of the students forget to switch off the fans or lights.	1 lakh	90 days
7.	High volume low speed fan for Indoor stadium and for hostel mess	A High volume low speed fan is recommended for the indoor stadium.	6 lakhs	3 years

4.0 INITIATIVES BY COLLEGE TOWARDS SUSTAINABLE ENVIRONMENT

Solar PV Panels

To tap the alternate energy sources, KARE has installed solar rooftop plants on top of seven of its buildings.

Capacity : 791 KW

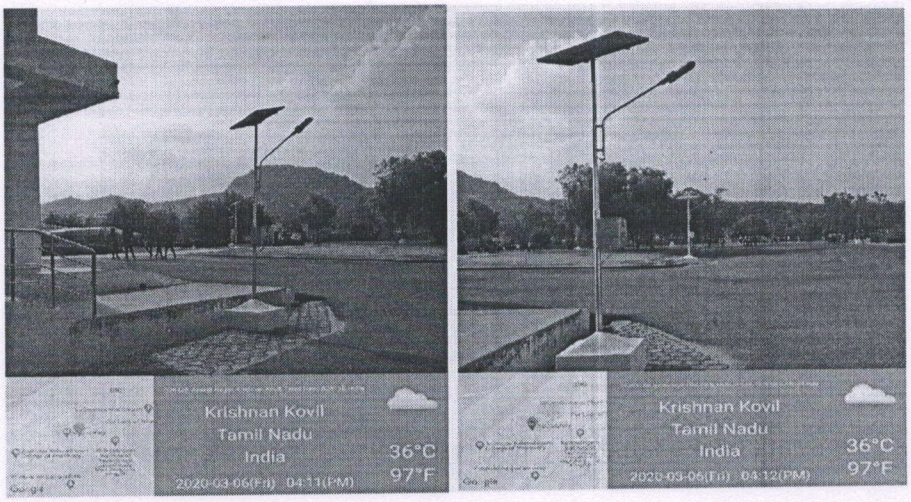


Power produced/ annum (solar plant) = 14,60,000 kWh

Solar Street Lights:

The institution has also installed solar street lights throughout the campus with a capacity of 25W/75W.

No of solar street light installed: 50



LED lamps:

The existing fluorescent lamps are replaced with LED bulbs in a phased manner.

And also ordinary fans is replaced by super fans in a phased manner

The projected reduction in the usage of electricity per month because of the LED bulbs and Super fans is **1,11,323 kWh** (from 209568.6kWh to 98245.08kWh). 50 Tons of CO_2 reduction per year.

4.0 Conclusion

The energy audit of KARE campus was done from the year 2018 to April 2020. The following are the conclusions of the Energy Audit.

- Average money spend for power consumption per month for katre campus is Rs. 23 Lakhs 61 thousand (Rs.23,61,000),
- KARE campus installed solar PV panels to the tune of 791 kw in building rooftops.
- Power from solar PV panel shares about 18% of total power consumption of KARE.
- Solar PV Panels generates about 16,40,000 kWH of energy. 730 tonnes of CO_2 emissions is stopped, because of installation of solar PV panels.
- Potential of energy saving is very high by changing the 40 W and 60 Watts tube light to LED tube lights, but as a trade of THD (Total harmonic distortion) is to be measured before phase wise changing of LED tube light, first preference should be given to hostels
- Phase wise changing of ordinary fans to super fan should be envisaged, management can think of donating the older high power consumption lights and fans to government schools or hospitals as part of CSR.

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