



# Jyothi Engineering College

NAAC Accredited College with NBA Accredited Programmes\*

Approved by AICTE & affiliated to APJ Abdul Kalam Technological University

A CENTRE OF EXCELLENCE IN SCIENCE & TECHNOLOGY BY THE CATHOLIC ARCHDIOCESE OF TRICHUR

JYOTHI HILLS, VETIKATTIRI P.O., CHERUTHURUTHY, THRISSUR, PIN-679531 PH : +91- 4884-259000, 274423 FAX : 04884-274777



NBA accredited B.Tech Programmes in Computer Science & Engineering, Electronics & Communication Engineering, Electrical & Electronics Engineering and Mechanical Engineering valid for the academic years 2016-2022. NBA accredited B.Tech Programme in Civil Engineering valid for the academic years 2019-2022.

## 7.1.6 Quality audits on environment and energy– Audit Reports

### INDEX SHEET

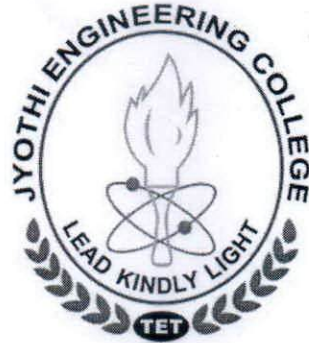
Sl. No.	Particulars
1	Energy Audit Report

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# ENERGY AUDIT - 2020



CREATING TECHNOLOGY  
LEADERS OF TOMORROW  
ESTD 2002.

**JYOTHI ENGINEERING COLLEGE - CHERUTHURUTHY**  
THRISSUR  
KERALA

*EXECUTED BY*




**ATHUL ENERGY CONSULTANTS PVT LTD**

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March 2020

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## ACKNOWLEDGEMENTS

We express our sincere gratitude to the **Jyothi Engineering College, Thrissur** for giving us an opportunity to carry out the project of Energy Audit. We are extremely thankful all the staffs for their support to carry out the studies and for input data, and measurements related to the project of Energy audit. Here we are presenting the whole hearted support from the management of Jyothi engineering college as

- |                                      |                         |
|--------------------------------------|-------------------------|
| 1 Rev. Fr. Roy Joseph Vadakkan       | Secretary & Campus Head |
| 2 Rev. Dr. Jose Kannampuzha          | Director of Academics   |
| 3 Fr. Dr. Jaison Paul Mulerikkal CMI | Principal               |


Also congratulating our Energy audit team members for successfully completing the assignment in time and making their best efforts to add value.

### ELECTRICAL SAFETY & ENERGY AUDIT TEAM

- 1. Mr. Santhosh A**  
Registered Energy Auditor of Bureau of Energy Efficiency (BEE – Govt. of India)  
Accredited Energy Auditor No – EA 7597
- 2. Mr. Ashok KMP**  
Registered Energy Manager of Bureau of Energy Efficiency (BEE – Govt. of India)  
Energy Manager No – EA 25612
- 3. Jaideep P P**  
Senior Project Engineer, ME – Energy Engineering

Yours faithfully



  
Managing Director  
Athul Energy Consultants Pvt Ltd

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**EXECUTIVE SUMMARY****1. ANNUAL ENERGY CONSUMPTION**

Annual cost for energy consumption during last 12 months (Mar-2019 to Feb-2020).

Particulars	Unit	Quantity	Average Cost (Rs Lakhs)
<b>Electricity</b>	kWh	308862	2669341

**TABLE 1: ANNUAL ENERGY COST****2. ENERGY SAVING PROPOSALS**

The following table shows the energy saving proposals

Sl. no	Energy conservation measures	Annual Energy Savings kWh	Annual Financial Savings Rs	Investment Rs	Simple payback period Months
2	Replacement of ceiling fans with BLDC fans (350no: Preferred to change in Office, Staff room, security cabin and then hostels)	31500	198450	10,50,000	64
3	Replacement of Fluorescent tubes with energy efficient LED lights (60 of T-8 and 800 of T-12No: Office, staff room, Hostels)	44832	282442	301000	13
4	Removal extra batteries in UPS 30kVA and 15 kVA UPS	4000	25200	Nil	Nil
5	Replacement of existing old air conditioners in Computer room ( 1.5) and server rooms( 01TR) 01 no each	3290	20727	42000	24
	<b>Total</b>	<b>83622</b>	<b>526819</b>	<b>13,93,000</b>	<b>32</b>

**TABLE 2: ENERGY SAVING PROPOSALS**

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### 3. AUDIT SUMMARY - ACTIONS

The actionable summary of the audit report is given in the table below.

Sl No:	Particulars	Location	Action to be taken	Remarks
1	Power factor improvement by avoid leading power factor	Main distribution panel	Fine tuning of capacitors in APFC panel or bypass the harmonic filter	Which results in increasing the rate of incentives
2	Replacement of ceiling fans with BLDC fans	Classrooms, Staff rooms	Change the existing old ceiling fans with BLDC fans	Energy consumption will come down
3	Replacement of old split AC with New 5 star rated ones	Computer room	Change the old existing ACs with 5 star ACs.	Energy consumption will come down
4	Replacement of old split AC with new Inverter AC	Server Room	Change the existing AC to Inverter type AC for less power consumption	In Server room AC is working continuously and the payback period will immediate
5	Replacement of Fluorescent lights with LED	Class rooms, Staff rooms	Replace with LED lights.	Energy consumption will come down

TABLE 3: ENERGY AUDIT SUMMARY - ACTIONS

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#### 4. ENERGY AUDIT SUMMARY & RECOMMENDATIONS

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The summary of the report with respect to each section is as follows.

##### 1. Electricity consumption analysis:

- **Demand analysis:** The demand analysis gives an output that recorded maximum demand in the last 12 months was always below the minimum value which is 75% of the contract demand. In only few months it came above the minimum billing demand.
- **Power factor analysis:** For last month, the pf was found to be low and there are penalties.

##### 2. Electricity performance

- **Voltage:** The Voltage found to be low at the time of audit and unbalance was observed.
- **Capacitors:** From the analyzation of active and reactive power with Power factor, the present installation method of capacitors at the transformer end, is not satisfactorily maintained. By replacing the existing inline capacitors with APFC panel at the Main Switch board in both transformers, will optimize the PF to near unity.
- **Air conditioners:** Replacement of old AC's with new energy efficient star rated AC's.
- **Light loads:** Majority of the lighting fixtures are fluorescent type (T12). By replacing these loads with LED light fittings will reduce the overall power consumption.
- **Ceiling fan loads:** Ceiling fans are installed in majority of the areas by replacing it with Brushless DC fans which consumes in the range of 25 to 30W at full speed, instead of 70W in normal fans, will reduce the power consumption considerably. Also while purchasing new fans priority should be given for BLDC.
- **Solar power plant:** Jyothi Engineering College already installed on 63.7 kWp grid solar power plant in its building and approximately 75000kWh units are as annual savings.
- College students conducted various programs and projects for promoting energy conservation in its campus and outside.

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## 5. ENERGY PERFORMANCE INDEX (EPI)

EPI was based on the energy consumption in Mar-19 to Feb-20. The futuristic energy consumption after the implementation of energy saving proposals is given in the tables below.

Parameters	Values
Present Annual Electricity Consumption (kWh/year)	308862
<b>Building area of college in M<sup>2</sup></b>	14000
<b>Total annual electricity cost (Rs.)</b>	2669341
Present Specific Electricity Consumption (kWh/M <sup>2</sup> )	22.06
<b>After Energy Saving Implementation</b>	
Annual electricity consumption (kWh/year)	225240
Present Specific Electricity Consumption (kWh/M <sup>2</sup> )	16.09
Total electricity Savings in %	27
Total electricity cost savings in %	19.7

TABLE 4: ENERGY INDEX

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## ABBREVIATIONS

APFC	:	Automatic Power Factor controller
AVG	:	Average
BDV	:	Breakdown voltage
BEE	:	Bureau of energy efficiency
CEA	:	Central electrical authority
CFL	:	Compact fluorescent lamp
CFM	:	Feet cube per minute
DB	:	Distribution Board
DG Set	:	Diesel Generator Set
EC	:	Energy Conservation
FD	:	Forced draft
HPSV	:	High-pressure sodium vapour
HT	:	High Tension
ID	:	Induced draft
IEC	:	International electro technical commission
IEEE	:	The Institute of electrical and electronics engineers
IS	:	Indian Standard
KG	:	Kilogram
KVA	:	Kilo Volt Ampere
KVAH	:	Kilo volt Ampere Hour
KVAR	:	Kilo volt-ampere
KW	:	Kilo Watts
KWH	:	Kilowatt-hour
LED	:	Light emitting diode
MAX	:	Maximum
MH	:	Metal halide
NEMA	:	National Electrical Manufacturers Association
OLTC	:	On load tap changer
ONAN	:	Oil natural air natural
PCC	:	Point of common coupling
PSI	:	Pound square inch
RMD	:	Registered Maximum demand
SEC	:	Specific electricity consumption
SFU	:	Switch Fuse Unit
SLD	:	Single Line Diagram
TDD	:	Total demand distortion
THD	:	Total harmonics distortion
TOE	:	Tonne of oil equivalent
UPS	:	Uninterruptible power supply
VFD	:	Variable frequency drive

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### INSTRUMENTS USED

SL.NO	EQUIPMENT DESCRIPTION	MAKE & MODEL
1	Power energy & harmonic Analyser	Krykard ALM 35
2	Thermal Imager	FLIR E50

TABLE 5: INSTRUMENTS USED

### REFERENCES

1. BEE energy audit books
2. CEA regulations of grid connectivity-2007
3. IEEE Std. 519-1992.
4. National lighting code - 2010

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CERTIFICATES



## BUREAU OF ENERGY EFFICIENCY



Examination Registration No.: EA-7597  
Accreditation Registration No.: AEA-0275

### Certificate of Accreditation

This is to certify that Mr./Ms. Santhosh. A having its trade/registered office at Kerala has been given accreditation as accredited energy auditor. The certificate shall be effective from 2<sup>nd</sup> day of November, 2017.

The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. 0275 in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this 12<sup>th</sup> day of February, 2018

  
Secretary,  
Bureau of Energy Efficiency  
New Delhi

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*Amrith*

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**Energy Management Centre - Kerala**  
(Department of Power, Govt of Kerala)

**CERTIFICATE OF EMPANELMENT**

*This is to certify that **M/s. Athul Energy Consultants Pvt Ltd** (4/2, Capital Legend, Korapath Lane, Round North, Thrissur - 680 020) is empanelled as Energy Audit firm in Energy Management Centre Kerala to conduct mandatory energy audit as per Government of Kerala G.O (Rt) No.2/2011/PD dated 01.01.2011.*

**Empanelment No:**  
**EMCEEA- 0811F-2**

Scope/Area	Building	Industry -Electrical	Industry Thermal
	Yes	Yes	Yes

*This empanelment is valid up to 20<sup>th</sup> December 2020*

*Issuing Date: 01/01/2018*

*Place: Thiruvananthapuram*

Director,  
Energy Management Centre Kerala

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