## 7.2.2 - Plans to upgrade Existing Buildings to Higher Energy Efficiency Buildings

Karunya Institute of Technology and Sciences (KITS) continues to prioritize sustainable development and energy conservation through comprehensive strategies that focus on upgrading its existing buildings to achieve higher energy efficiency. In alignment with national and global goals on sustainable energy (SDG 7), the University remains committed to reducing carbon emissions, optimizing power usage, and adopting renewable and energy-efficient technologies across campus facilities.

### Institutional Commitment to Energy Efficiency

KITS energy policy emphasizes the regular assessment and upgradation of existing infrastructure to align with current energy efficiency standards. Each year, a detailed review is conducted to identify outdated or energy-intensive systems and to replace them with modern, low-consumption, and eco-friendly alternatives. The administration places energy conservation as a strategic priority, integrating it into both operational practices and long-term development plans.

All renovations and new constructions within the campus adhere to energy-efficient design principles and follow institutional guidelines ensuring compliance with national energy conservation codes. The University also encourages departments and administrative units to incorporate sustainable technologies and smart controls into their daily operations.

### Upgradation of Existing Systems

The University has systematically replaced conventional and high-energy-consuming equipment with more efficient and automated systems. The key areas of modification include:

| S. No. | Existing Item | Modification Implemented |
|---|---|---|
| 1 | Sodium or Halogen Lights | Replaced with sensor-based LED lights |
| 2 | Manual operated overhead water tanks | Automated with sensor-based water level controllers |
| 3 | Old model lifts | Upgraded to V3F drive-based energy-efficient lifts |
| 4 | Traditional electric water heaters in hostels | Replaced with solar-based water heating systems |
| 5 | Sodium/Halogen street lights in hostels | Replaced with solar-powered street lights |
| 6 | CFL or Fluorescent corridor lights | Upgraded to sensor-based LED corridor lighting |
| 7 | Fluorescent classroom lights | Upgraded to energy-efficient LED tube lights |

These replacements have significantly reduced electricity consumption across the campus, improved the operational lifespan of fixtures, and minimized maintenance costs.

**Solar Street Lighting System**

Karunya Institute has successfully implemented solar-powered street lighting in multiple campus locations. A total of **seven solar street lights** have been installed in strategic areas such as the Guest House, the vicinity of the S&H Auditorium, and the Mechanical Building Yard. All units are operational and utilize **crystalline solar panels** integrated with **high-efficiency solar cells** and **low-maintenance lead-acid batteries**.

Each system is equipped with robust mechanical features including toughened glass covers, anodized aluminium mounting frames, and ABS-moulded junction boxes for durability. The installation of these lights has effectively reduced dependency on grid-based electricity and enhanced illumination quality in outdoor areas while promoting safety and sustainability.

**Adoption of Solar Energy Systems**

In its journey towards renewable energy integration, the University has invested substantially in solar power and water heating systems. The solar infrastructure includes multiple rooftop solar power plants across administrative and academic blocks, and solar water heating systems in student hostels.

The total renewable energy generated from these installations is **1,704,783.71 kWh per annum**, distributed as follows:

- **95 kW Solar Power Plant (Admin Block):** 87,473.71 kWh
- **20 kW Solar Power Plant (EVR/Oprah Mess Building):** 24,388 kWh
- **87,600 LPD Solar Water Heating System (30 units):** 15,45,718 kWh

These renewable systems not only supplement grid power but also significantly offset the institution's carbon footprint, contributing to a greener and more sustainable campus environment.

**Sensor-Based Energy Conservation Systems**

To minimize unnecessary energy usage, sensor-based lighting and control systems have been deployed across several buildings. Corridors, classrooms, and common areas are now equipped with motion sensors that automatically switch lights on or off based on occupancy. This initiative has led to measurable reductions in power wastage, particularly during non-peak hours.

Similarly, automatic sensor-based water level controllers have been installed to regulate water pumping systems in overhead tanks. This automation has optimized water management, reduced manual intervention, and conserved both electricity and water resources.

**Energy-Efficient Equipment and Infrastructure**

The University has progressively upgraded its electrical and mechanical systems to include energy-efficient variants. The installation of **V3F drive-based lifts** ensures smooth operation and energy savings by dynamically adjusting motor speed according to load conditions. In academic blocks, all fluorescent and halogen fixtures have been phased out and replaced with LED tube lights, further reducing energy intensity.

Additionally, computer laboratories have introduced **green computing** initiatives, replacing conventional systems with energy-efficient computers that consume significantly less power without compromising performance.

### Monitoring and Evaluation

Energy conservation at Karunya Institute is supported by continuous monitoring of electricity usage through smart metering and periodic audits. The collected data is analyzed to assess consumption trends, identify inefficiencies, and plan targeted interventions. The results have consistently shown a downward trend in power consumption and carbon emissions, validating the effectiveness of implemented measures.

Regular maintenance schedules and awareness programs are conducted to sensitize staff and students about energy conservation practices. These efforts collectively foster a culture of sustainability and responsible resource management.

### Policy Framework and Future Plans

The University follows a robust policy framework that governs all energy-related initiatives. The policy mandates that all new constructions, retrofits, and major renovations integrate energy-efficient systems and materials. Future plans include expanding solar power capacity, implementing centralized energy management systems, and upgrading HVAC systems to high-efficiency models.

In the coming years, the institution aims to:

- Increase the total installed solar power capacity by 25%.
- Extend sensor-based systems to all classrooms and laboratories.
- Introduce smart campus-level energy monitoring through IoT-enabled systems.
- Replace remaining outdated fixtures and appliances with star-rated energy-efficient models.
- Enhance awareness through annual "Energy Conservation Week" campaigns and workshops.

### Outcomes and Impact

Through its sustained commitment and systematic implementation, Karunya Institute of Technology and Sciences has achieved measurable improvements in its energy performance. The adoption of solar power and sensor-based systems has contributed to:

- **Reduction in total energy consumption** by a significant margin.
- **Minimization of carbon emissions**, aligning with the national mission for sustainable energy.
- **Lower operational costs** due to decreased dependency on grid electricity.
- **Improved environmental sustainability** across the campus ecosystem.

KITS initiatives on energy conservation exemplify a holistic approach that combines technology, policy, and behavioral change to promote energy efficiency. These ongoing efforts reinforce the institution's role as a responsible academic body dedicated to sustainable development and environmental stewardship.

**Solar Street Lighting in Karunya Institute of Technology and Sciences**


**Fig 1. Solar based Street Light**

**Total lights Installed in Karunya Institute of Technology and Sciences are 7 lights**

| Street Light Installed Place | Panel Used | No. of Lights | Present Condition |
|---|---|---|---|
| Guest House | Crystalline Type | 4 | Working |
| Opposite to Elshadai Auditorium | Crystalline Type | 2 | Working |
| Mechanical Building Yard | Crystalline Type | 1 | Working |

**Specifications for Solar Street Lights**

**Electrical Parameters**

Panel Type : Crystalline Type
Cell Type : High efficiency Solar Cells
Nominal Capacity : 1*120 W
Peak Power Voltage : 16.2 Volts
Peak Current : 8.3 Amps
Tolerance : $\pm$ 5%

**Mechanical Parameters**

Front cover glass : Toughened Glass
Encapsulate : Ethylene Vinyl Acetate (EVA)
Mounting frames : Anodized aluminium channel
Rear panel : Polyvinyl Fluoride (PVF)
Junction box : ABS moulded box
Weight : 5.4 Kgs

**Battery**

**Electrical Parameters**

| | |
|---|---|
| Normal capacity | : 100 Ampere Hours |
| Rated current Discharge | : C/10 |
| Normal voltage | : 12V |
| Self-discharge | : About 0.5% per week |
| Expected life | : About 1500 cycles |

**General parameters**

| | |
|---|---|
| Types | : low maintenance lead acid |
| Construction | : 12V block |
| Container material | : polypropylene |

**Solar light controller:**

Charge Controller Type and Rating: Series Pulsed Two Step 15A max.

**Cable Assembly:**

| | |
|---|---|
| Module to Light Controller | : 4.0 $m^{2\,-}$ cable with ring terminal |
| Luminary to Lighting Controller | : 1.5 $m^{2}$ dual sheathed cable |
| Battery to Lightning | : 4.0 $m^{2}$ with ring and fork terminal |

The Institution has facilities for alternate sources of energy and energyconservation measures such as Solar energy, Sensor-based energy conservation and Usage of LED bulbs/ power efficient equipment

**Solar Water Heating System In Karunya Institute of Technology and Sciences Hostels**


**Fig 2. Solar roof top in the Main (Administrative Building)**


**Fig 3. Solar roof top in the Main (Administrative Building)**

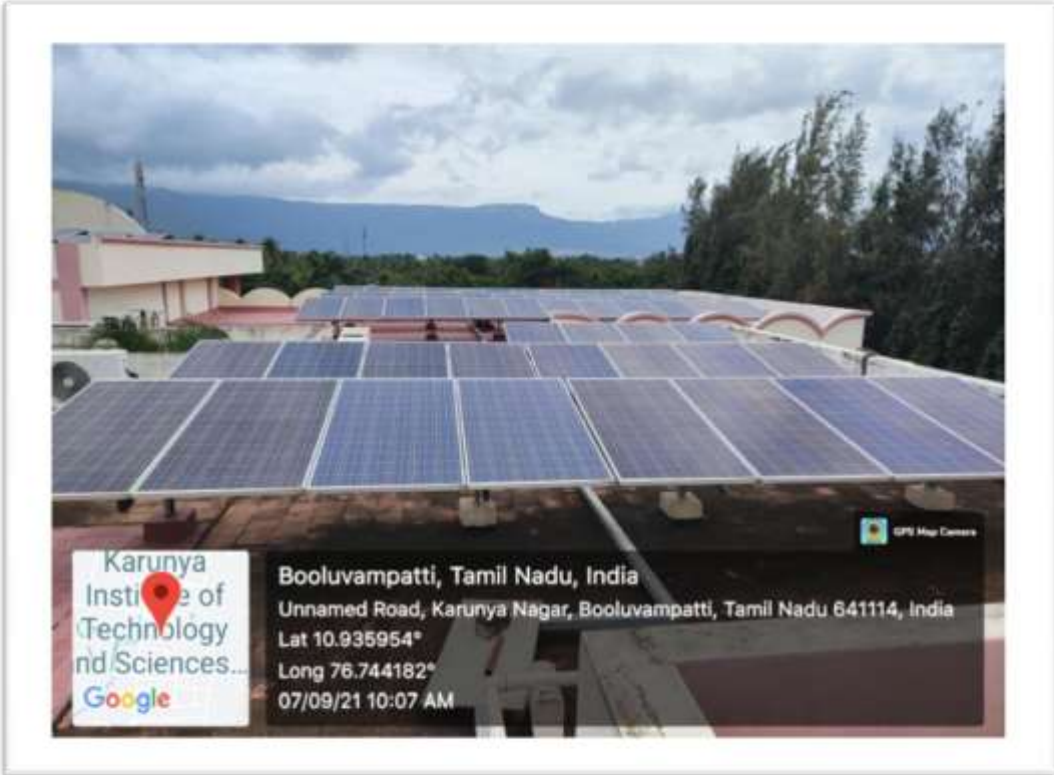


**Fig 4. Solar roof top in the Main (Administrative Building)**

| | |
|---|---|
| Number of renewable energy sources on campus | **2 No.s**<br>[4 No.s of Solar Power Plant + Solar Water heaters] |
| Renewable energy sources and their amount of the energy produced | **1,704,783.71 kWh**<br><br>[87,473.71 kWh + 24,388 kWh + 38,829 kWh + 8,375 kWh + 15,45,718 kWh] |



**Fig 5.95kW Solar Power Plant in Admin Block: 87,473.71 kWh**



**Fig 6. 20kW Solar Power Plant in EVR/Oprah Mess Building: 24,388 kWh**


**Fig 7. 87,600 LPD Solar Water heating system (30 Nos): 15,45,718 kWh**


**Fig 8. Sensor based LED Lights**


**Fig 9. V3f drive based energy efficient Lifts**

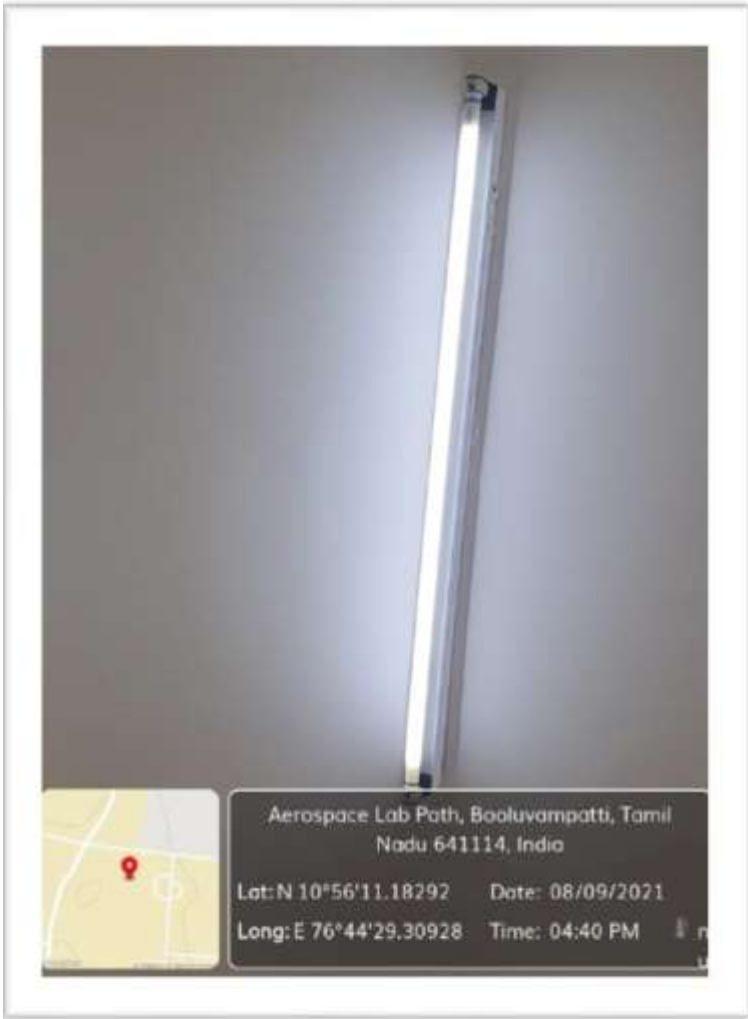


**Fig 10. LED Tube Lights in the Classrooms.**

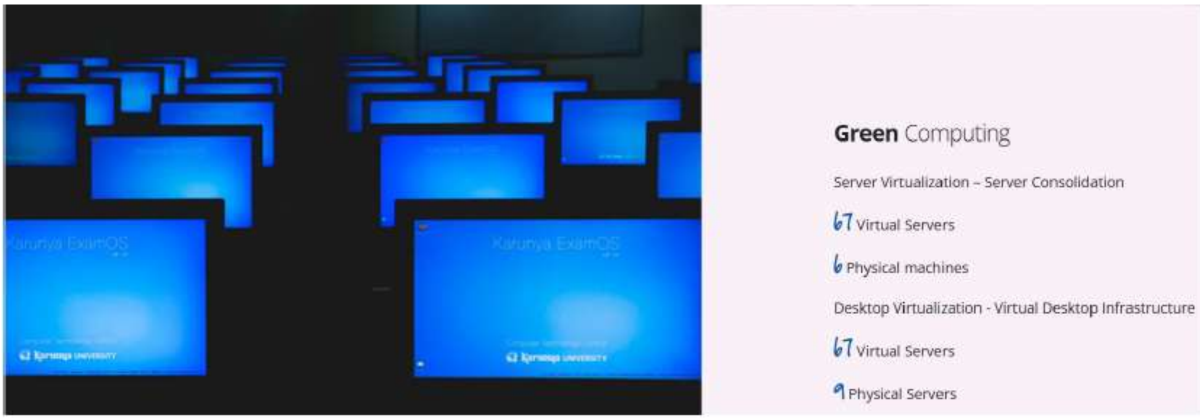


**Fig 11. Green Computing - Energy efficient computers**

GOVERNMENT OF TAMILNADU
ELECTRICAL INSPECTORATE

(Reply By Designation Only)

From
Er. R.Sivakumar, B.E.,M.B.A.,
Electrical Inspector,
Coimbatore South,
Corporation Commercial Complex,
Dr. Nanjappa Road,
Coimbatore - 641 018

Order No. PYK 2205 / EI / CBE (South) / R32 / DR / 2023 Dt : 25.03.2024

To
M/s. Karunya Institute of Technology,
(College Campus), Karunya Nagar,
Coimbatore-641 114.

Whereas the HT Installation at above premises was inspected on 31.1.2024 under Regulation 32 of Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023 for the year 2023-2024 and whereas it appears to me that you have not complied with the CEA (MSES) Regulations, 2023 in the following respect as detailed below. You are hereby called upon to comply with the said regulations on or before 24.6.24 and to report compliance in writing to this office with a copy to Senior Electrical Inspector/ Coimbatore and Chief Electrical Inspector to Govt, Chennai 32.

An appeal may be filed against this order under sub section 2 of section 162 of the Electricity Act, 2003 within three months of the date on which this order is served or delivered or is deemed to have been served but this order must be complied with not withstanding such appeal, unless the appellate authority [namely, the Chief Electrical Inspector to Government, Chennai ] on or before the date specified in paragraph I above suspends in operation.

**DEFECTS**

1)Following periodical tests are due. They should be conducted and the test reports entered in the log book for reference and maintenance. R48(6)

| | | | |
|---|---|---|---|
| 1 | Earth electrodes | For individual and combined earth resistances | Once in a year on a dry day during a dry season |
| 2 | Transformer oil | Dielectric strength and acidity | once in a year |
| 3 | Protective relays | For proper functioning and sensitivity | once in a year |

2) Most of the LDBs are not having RCCB protection. RCBO of 30mA residual operating current should be provided at the incoming of side of all lighting circuit DBs and street lights. R 44

3) 100mA RCBO protection should be provided for the portable equipments and loads fed from socket outlets. R 44

4) The following details should be identified permanently with proper paint marking / sticker on the metallic enclosure of the panels and DBs. R 21(6)

a. Name of the SSBs, panels, PDBs & LDBs
b. The source of incoming supply to SSBs, PDBs & LDBs
c. Updated Circuit list with load details, size of the cable, circuit number, rating of MCBs in all DBs and LDBs

5) The following should be made available in the MV panel room for reference and maintenance: R 14(1)
(i) Permission issued from this department for the electrical installations.

6) Maintenance registers and details of permission obtained from electrical inspector are not properly updated and it is not properly monitored by the Designated electrical supervisor. Considering the importance of the installation it is the responsibility of the Designated electrical supervisor to update and maintain the entire installation in a condition free from danger and records should be duly updated as recommended by the Regulations . R 14(1) & R3

7) Standard Danger notice should be pasted conspicuously in all panels, PDBs and LDBs. R 20

8) Two separate and distinct earth connections should be provided for all lab equipments and DBs and continuity with main earth flats should be checked and ensure effective earth connections. R 44(vii)

9) Drawing proposal for the addition and alteration equipments at bio tech building, fire pumps, innovative cell , food processing lab , lab equipments should be sent and permission should be obtained as per Regulations 45 . As per regulation 45, permission from electrical inspector should be obtained for any addition and alterations of the electrical equipment's before connecting to the supply. R 45

10) Guarding is not provided for the 5 span of TANGEDCO's HT bare overhead lines running inside the premises, incoming OH line to the supplier DP structure . Suitable earthed cradle guarding arrangement should be provided for the above bare overhead lines in consultation with the TANGEDCO authorities for rendering them electrically harmless in case they break. R.76.

11) Electricity Tax on captive consumption using DG set and solar plant should be paid every month and monthly return in form C2 sent to this office .
Sec 3 of the Tamil Nadu Tax on Consumption or Sale of Electricity Act-2003

All the above defects should be arranged to be rectified as per the provisions of Regulation 31 of CEA (MSES) regulations 2023.

**Electrical Inspector**
**Coimbatore South**

Copy Submitted to the Chief Electrical Inspector to Govt, Chennai 32.
Copy Submitted to the Senior Electrical Inspector / Coimbatore.