Karunya INSTITUTE OF TECHNOLOGY AND SCIENCES
(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)
MoE, UGC & AICTE Approved
NAAC A++ Accredited

SDG 7 AFFORDABLE AND CLEAN ENERGY

REPORT

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 Each year, a detailed review is conducted to identify outdated or energy-intensive systems and to replace them with modern, low-consumption, and eco-friendly alternatives.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** [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** [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

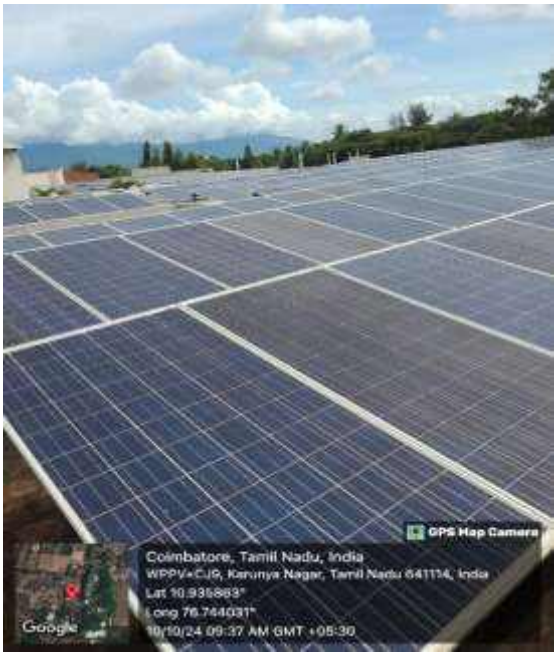


Fig 6. 20kW Solar Power Plant in EVR/Oprah Mess Building: 24,388 kWh

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

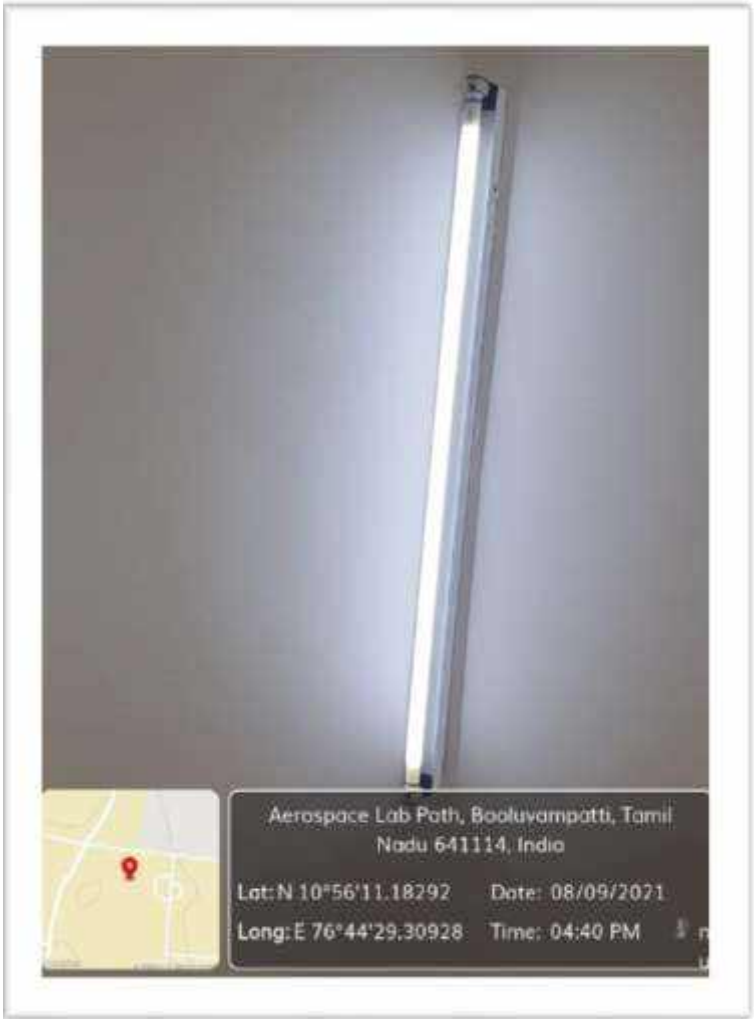


Fig 10. LED Tube Lights in the Classrooms.

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.

25/3/24

Electrical Inspector
Coimbatore South

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

7.2.3 Carbon Management and Reducing Carbon dioxide Emission

KITS is actively involved in developing innovative scientific and technological solutions to create a sustainable, green campus. In putting Sustainable Development Goals (SDGs) into practice, the Karunya Centre for Conservation and Management of Natural Resources (KCCMN) has initiated various projects grounded in the "Reduce, Reuse, and Recycle" (3Rs) principles to support a cleaner, greener campus.

The primary objectives of KCCMN are: (i) Overall maintenance of campus infrastructure, including buildings, gardens, sports facilities, and playgrounds; (ii) Maintenance and servicing of generators and other electrical systems, recalibration and refilling of fire extinguishers, provision of fire safety protocols, and facilitating access for individuals with disabilities—all managed by the skilled engineers and technical team from the Construction and Maintenance Department (CMD); and (iii) Conducting energy audits to monitor and improve energy efficiency of both conventional and renewable energy sources, aimed at reducing CO_2 emissions.

Following are the steps taken to conserve energy and make the campus Green with less carbon footprint.

1. Usage of Solar Energy – Steps taken, energy saved per annum.

Renewable energy produced during March 2023 – April 2024:

- 95kW Solar Power Plant in Admin Block : 1,24,770 kWh
- 20kW Solar Power Plant in EVR / Oprah
- Mess Building : 23,986 kWh
- Solar Water heating system (87,600 LPD) : 15,45,718 kWh
- Biogas : 58 kWh

Total Renewable Energy Produced : 16,94,532 kWh

2. Conversion to LED - Energy saved every year

(i) 15,066 Nos of Conventional tube lights with 40 watts converted to LED Tube lights with 18 watts respectively from which we saved 81,88,050 units/Annum

3. Sensors in Pumping, Water supply – Water/Electricity Saved

(i) 36 HP of Motor which pumps water to Overhead tank manually is converted to wireless automated water level controller system from which we save 29,734 Units/Annum.

4. Other Steps taken to save energy

- Motion sensor lights are provided in administrative block, corridors and toilets for energy savings. The Institute has an Air Quality Sensor Station which helps to know the air quality.
- The wastage of water due to the overflow in the storage tanks and sumps is controlled by using sensor-based pump operating system. The sumps in the campus and student residences are connected to ensure water supply at all times in the case of any reduction in groundwater level or mechanical failure of pumps in the borewells. Three IoT enabled automated water controllers have been installed in the overhead tanks and sumps by which 20% of water and energy are saved.
- To maintain Unity Power factor, capacitors are installed at the load end in order to save 2, 25,000 Units/Annum.
- The water purifiers in all the buildings are switched off during holidays to save power.
- The timer is fixed for Street Lights in the campus to switch on the lights based on the daylight in order to save electrical energy.
- Training Programs conducted to the entire technician to be implemented for energy savings and safety awareness.

Located in the foothills of Western Ghats, KITS is known for its floral and faunal biodiversity. Taking up the challenges of conserving natural resources and ecosystems, and biodiversity, KITS is actively engaged in developing innovative scientific and technological interventions to build a green campus.

Our university reports its carbon emissions in line with the United Nations Framework Convention on Climate Change

Below mentioned are the details providing the total Scope 1 and 2 carbon emissions in tCO2e (tonnes (t) of carbon dioxide (CO2) equivalent (e).

a) Base line Year: 2015

Total Power Consumption: 7417799 kWh
CO2 Emission- 4989.8 tonnes

b) Reporting year (2023-2024)

Total Electricity Consumption for the campus and residences: **67,48,167 kWh**
CO2 Emissions - **6888.62 metric tons**

Renewable Energy sources

Details of Solar Water Heating System in KITS

Sl.No	Description of Work	Location	Capacity in Litres per Day	Total installed capacity in LPD
1	Solar Water Heating system	Hostel Campus	87600	87,600
			Total capacity	**87,600**
			Total kilo calories	35,04,000
			Total Units Saved per Day	4,793
			Total units saved per Month	1,43,803
			Total units saved per Annum	15,81,833
			Power saving Cost per Annum (Rs)	**1,00,44,640.00**

Solar Water heating system of total capacity of 87,600 LPD is installed in our campus and Electricity power savings per Annum is Rs.1 Crore

Sl.No	Description	Existing Light Fittings	Replaced LED Tube Light fittings
1	Power Consumption	40 Watts	18 Watts
2	No of Light Fittings	15066 Nos	15066 Nos
3	Units consumed per day	4,821 Units	2,169 Units
4	LUX (Intensity of Light)	95 Lx	150 Lx
5	Units consumed per year	15,66,825 Units	7,04,925 units
6	EB Charges/year	Rs. 1,48,84,837/-	Rs. 66,96,787/-
7	Maintenance Charges/Year	Rs. 45,000/-	Replacement warranty upto 3 Years
Electricity Charges Savings/Annum			**Rs,81,88,050/-**

2. SOLAR STREET LIGHTING IN KARUNYA UNIVERSITY

Total lights Installed in Karunya University are 7 lights

Street Light Installed Place	Panel Used	No. of Lights	Present Condition
Guest House	Crystalline Type	4	Working
Opposite to S&H 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	: ± 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

Renewable Energy Sources (Solar)

Solar Water Heating System in Karunya University Residences

Hostel	Angelina Residence	Hephzibah Residence	Father Duraisamy Residence	Edward George Residence	New JVR Residence	New JMR Residence	New BRR Residence	New Bethany Residence
System Model	TWINWALL model Solar system							
Type of Collector	Flat Plate Collector							
System Capacity	3500 Lts per day	2500 Lts per day	3500 Lts per day	2500 Lts per day	3500 Lts per day	3500 Lts per day	3500 Lts per day	3500 Lts per day
No. of Units	2 Units	3 Units	1 Unit	2 Units	2 Units	2 Units	2 Units	2 Units
System Temperature	60®c	60®c	60®c	60®c	60®c	60®c	60®c	60®c
No. of Solar Collectors	1 set, 28 Collectors	1 set, 20 Collectors	1 set, 28 Collectors	1 set, 20 Collectors	1 set, 28 Collectors	1 set, 28 Collectors	1 set, 28 Collectors	1 set, 28 Collectors
Circulation and its Space	Natural Gravity Circulation System Space required 60 m^2 for 3500 LPD System and 45 m^2 for 2500 LPD System							
Application	Hot Water							
Electrical back-up heater	Auxiliary Heating With Electrical Supply of 4 Kw with thermostat							
Tank Capacity	3500 Lts with air vent provision	2500 Lts with air vent provision	3500 Lts with air vent provision	2500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision
Tank Type	Stainless steel storage tanks insulated with Glass wool Cladded with aluminium, Cage type Stainless steel Heat exchanger							
Support stands for tank and collector	Mounted on Concrete floor with steel frame and Anchoring bolts							

Hostel Specifications	**Sevugapandian Residence**	**Sundararaj Residence**	**P R Garg Residence**	**Dakshinamoorthy Residence**	**Oprah Residence**	**Evangeline Residence**
System Model	VESAT Solar Products					
Type of Collector	Flat Plate Collector					
System Capacity	3500 Lts per day	3500 Lts per day	500 Lts per day	3500 Lts per day	3500 Lts per day	3500 Lts per day
No. of Units	2 Units	2 Units	1 Unit	1 Unit	1 Unit	2 Units
System Temperature	60®c	60®c	60®c	60®c	60®c	60®c
No. of Solar Collectors	1 set, 28 Collectors	1 set, 28 Collectors	1 set, 28 Collectors	1 set, 28 Collectors	1 set, 28 Collectors	1 set, 28 Collectors
Circulation and its Space	Natural Gravity Circulation System Space required 60 m^2 for 3500 LPD System					
Application	Hot Water					
Electrical back-up heater	Auxiliary Heating With Electrical Supply of 4 kW with thermostat					
Tank Capacity	3500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision	3500 Lts with air vent provision
Tank Type	Stainless steel storage tanks insulated with Glass wool Cladded with aluminium, Cage type Stainless steel Heat exchanger					
Support stands for tank and collector	Mounted on Concrete floor with steel frame and Anchoring bolts					

95 KW GRID TIED SOLAR POWER PLANT IN MAIN BUILDING

The 95 kW Grid – Tied Solar Power Plant was installed on July 1st 2016 in admin Block of the Karunya Institute of Technology and Sciences. The type of Solar panel is Poly crystalline and around 312 panels are connected through four inverters to the Distribution Board from where the Power is drawn to the load. In addition, the Power generation is monitored through online monitoring unit from the inverters.

Salient Features of Solar Power Plant.

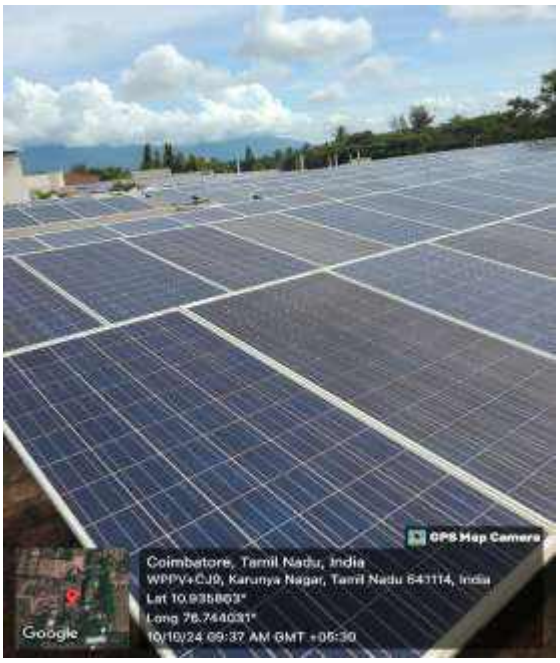
1. Grid – Tied 95kW Photo Voltaic Poly Crystalline Solar Power Plant
2. 25 kW Capacity of Inverter of 4 Nos – Make – SMA
3. No of Inverters – 4 Nos
4. No of Strings in each Inverter – 4 Nos
5. No of Solar panels connected in each inverter – 84 Panels (Except 4th inverter - 60 Nos)
6. Total No of Modules (Panels) – 312 Nos (Each – 310 Watts) – Make – EMMVEE

20 KW GRID TIED SOLAR POWER PLANT IN LADIES HOSTEL [EVR BLOCK] BUILDING

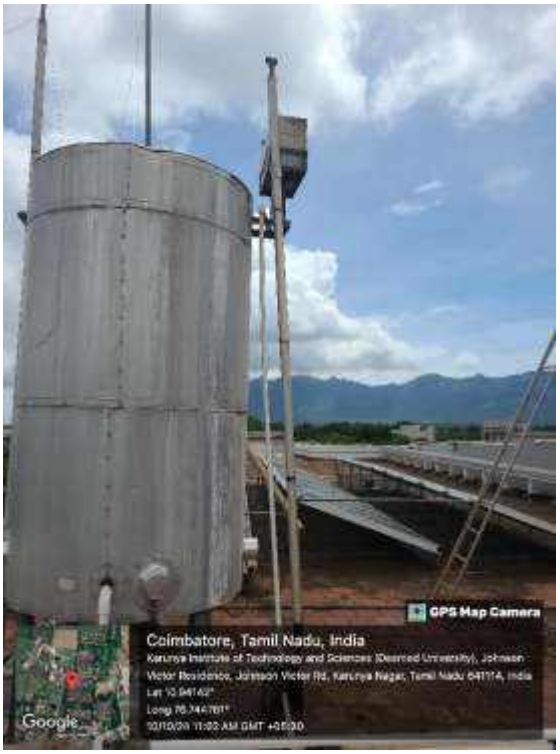
Salient Features of Solar Power Plant.

Grid – Tied 20kW Photo Voltaic Poly Crystalline Solar Power Plant
25 kW Capacity of Inverter of 1 No – Make – SMA
No of Inverters – 1 Nos
No of Strings in each Inverter – 4 Nos
No of Solar panels connected in each inverter – 66 Panels
Total No of Modules (Panels) – 16 Nos (Each – 310 Watts) – Make – EMMVEE

95kW Solar Power Plant in Admin Block: 87,473.71 kWh



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



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

Biogas

- A biogas plant is a decentralized energy system, which leads to self-sufficiency in heat and power needs, and at the same time reduces environmental pollution.
- Biogas is a gas mixture of carbon dioxide (CO2) and methane (CH4), which is generated when organic compounds are fermented in the absence of air (anaerobic fermentation).
- Organic matter such as manure (human or animal) is composed and used to feed the plant.

Biogas plants in Karunya Campus

Being a residential campus, the night soil and food waste generated in the Student Residences of Karunya Campus are treated in the biogas plant installed in the following locations:

Sl. No.	Location	Capacity of the Bio-gas Plant	Year of Installation	Cost of the Plant (in Lakhs)	Savings in terms of LPG Cylinders (19Kg) /Day
1	FDR Campus	$100m^3$	2017	32.0	2 Nos.
2	JMR Campus	$80m^3$	2010	26.0	2 Nos.
3	Ladies Hostel (PRG Campus)	$100m^3$	2017	32.0	2 Nos.
4	Ladies Hostel (EVR Campus)	$80m^3$	2017	26.0	1.5 Nos.

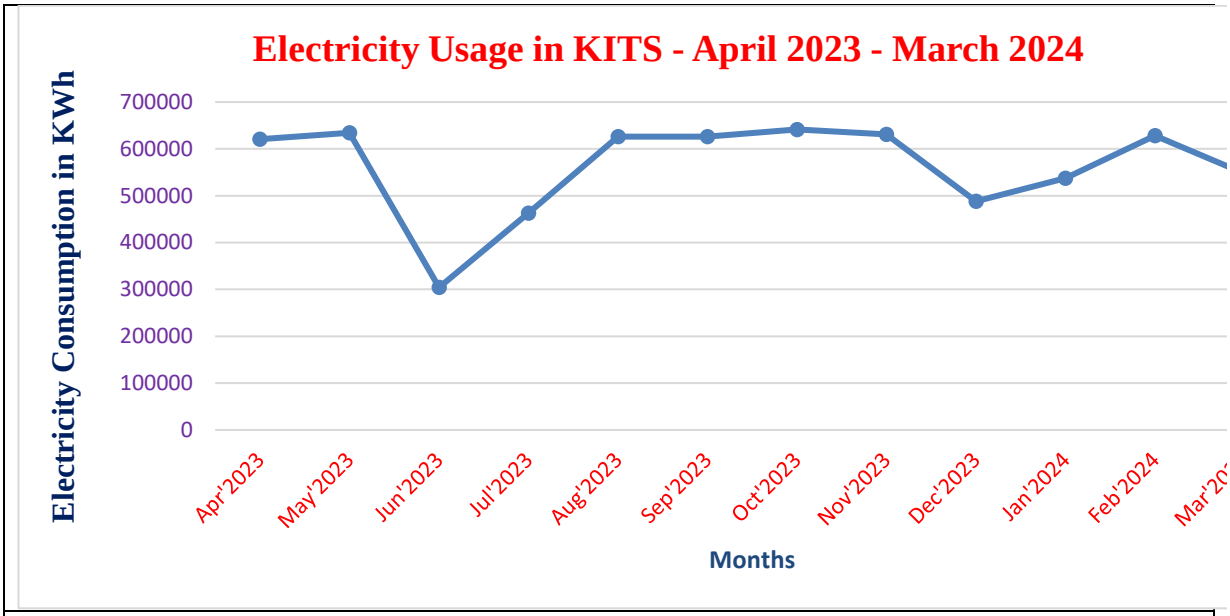
The treated effluent from the biogas plant is diverted to the STP for storage and utilization for irrigation/gardening. This reduces the organic load coming to two STPs of a capacity of 6 and 4.5 lakh litres of sewage and their operational and maintenance cost.

7.2.4 Plan to reduce energy consumption. Have an energy efficiency plan in place to reduce overall energy consumption

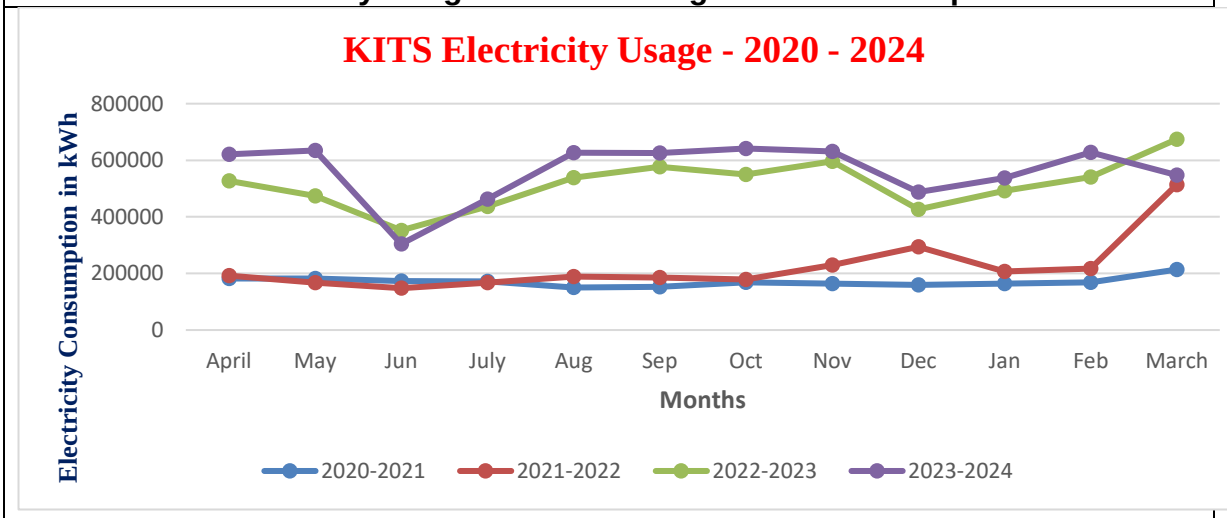
KITS has installed solar PV systems, solar water heaters and waste to energy conversion plants. Energy efficiency criteria have been followed for lighting and other appliances. Green audit is carried out regularly. With the support of this policy, efforts will be taken to reduce greenhousegas emission and support the environment to improve the climate. The Institution is committedto zero emission from the Campus to be achieved by 2060.

Sl.No	Energy Efficient Appliances	
1	Conversion of conventional Tube lights & Street lights to LED Tube lights & LED Street lights	97%
2	Star Rated Air conditioners	65%
3	Energy Efficient Computers	55%
3	Passenger & Goods Lifts	65%

4	Motors & Pumps controlled through wireless water level controller & Capacitors for Energy savings	95%
	Average in Total	**75.4 %**



Total Electricity Usage in KITS during March 2023 – April 2024



Electricity Usage (kWh) of KITS during 2020 - 2024

The total electricity usage of Karunya Institute of Technology and Sciences (KITS) during **April 2023 to March 2024 is 67,48,167 kWh**. It include the power consumption through Electricity Board (EB) and GenSet. On the main campus area, electricity is used for lighting, cooling, heating and laboratory purposes.

Energy Consumption during March 2023 - April 2024

Sl.No	Month	Electricity Consumption in kWh
1	Apr'2023	620978
2	May'2023	634642
3	Jun'2023	304255
4	Jul'2023	463100

5	Aug'2023	626315
6	Sep'2023	626004
7	Oct'2023	641491
8	Nov'2023	630763
9	Dec'2023	487955
10	Jan'2024	537387
11	Feb'2024	627956
12	Mar'2024	547321
Total		**67,48,167**

7.2.5 - Energy Inspection/Audit to Identify Areas of Energy Wastage

The University ensures a comprehensive and systematic approach to energy management and safety through regular inspections and audits. An Annual Energy Inspection is carried out by the Chief Electrical Inspectorate, Government of Tamil Nadu, focusing on evaluating safety standards and the reliability of the electrical supply system across the campus. During this inspection, any defects, non-conformities, or potential safety hazards identified by the inspection team are formally reported to the Institution. The University treats these findings with utmost priority, ensuring that all recommended corrective actions are promptly implemented to maintain compliance and operational safety.

Annual Energy Inspection for measures relating to safety and electrical supply is being conducted by Chief Electrical Inspectorate, Govt of Tamil Nadu. The defects identified by the team will be notified to the Institution for rectification on priority.

Apart from this inspection, Energy Audit by Professional External Agency is being conducted periodically to arrive at strategy for minimizing the waste of energy.

Based on such audits the areas where energy may be conserved have been identified as follows:

1. Replacement of Conventional Tube Lights with LED Tube Lights:

The existing fluorescent tube lights with electromagnetic chokes shall be replaced with energy-efficient LED tube lights. This will significantly reduce power consumption, enhance illumination quality, and extend the service life of the lighting system. LEDs also reduce maintenance costs and improve the overall power factor due to lower reactive power demand.

2. **Upgradation of Street Lighting from Sodium Vapour Lamps to LED Lights:**

All sodium vapour street lights on campus shall be systematically replaced with LED street lights. LED luminaires offer better luminosity, uniform light distribution, instant start, and lower power consumption. They also enhance safety and visibility on campus while cutting down energy usage by nearly 50%.

3. Installation of Capacitor Banks for Motors and Pumps:

Motors and pumps across water supply, HVAC, and sewage systems will be equipped with automatic power factor correction (APFC) capacitor banks. This helps maintain unity power factor, reduce reactive power draw, improve voltage regulation, and minimize overall power losses in the distribution system.

4. **Optimization of Air Conditioner Temperature Settings:**

Air conditioners in offices, laboratories, and residential areas shall be operated at a temperature setting between 22°C and 24°C. This optimal range ensures occupant comfort while minimizing the compressor's load, resulting in significant energy savings and increased equipment longevity.

5. **Use of Automatic Water Level Controllers in Sumps and Overhead Tanks:**

Automatic water level controllers shall be installed to regulate pump operations based on the actual water level in sumps and tanks. This prevents dry running of motors, minimizes wastage of water and electricity, and reduces manual intervention.

6. **Installation of Energy Monitoring and Management Systems (EMMS):**

Smart energy meters shall be installed in all academic blocks, hostels, administrative buildings, and STP plants. The collected data will be integrated into a centralized Energy Monitoring Dashboard for real-time tracking, analysis, and optimization of energy consumption trends. Periodic audits will be conducted based on this data.

7. Adoption of Motion Sensor-Based Lighting Systems:

To reduce wastage of electricity in low-occupancy areas such as corridors, restrooms, and staircases, motion-sensor-controlled LED lighting systems shall be implemented. These systems automatically turn lights on or off based on human presence, ensuring effective energy conservation.

8. Energy Conservation Awareness Programs:

Regular awareness campaigns, workshops, and competitions shall be conducted for students, faculty, and staff to promote sustainable practices. Training on efficient energy use, renewable energy adoption, and behavioral changes will be a part of the campus sustainability drive.

9. **Replacement of Conventional Fans with HVLS Fans in Auditoriums and Large Halls:**

High Volume Low Speed (HVLS) fans shall replace traditional ceiling fans in large spaces such as auditoriums, dining halls, and gymnasiums. HVLS fans move large volumes of air at low speed, providing superior air circulation and reducing the dependency on air conditioners.

10. Balancing of Phase Currents in MV and SSB Panels:

Periodic checks shall be conducted to identify and correct phase current imbalances in Main and Sub Switch Boards. Maintaining load balance across phases helps in minimizing neutral losses, improving efficiency, and preventing overheating of electrical equipment.

11. Regular Preventive Maintenance of Electrical Installations:

Routine inspection and preventive maintenance of electrical panels, cables, and distribution boards shall be carried out to detect faults early, ensure operational safety, and maintain system efficiency.

12. Integration of Renewable Energy Sources:

Solar photovoltaic (PV) panels shall be installed on rooftops of academic and residential buildings to harness clean energy and offset grid power consumption. This initiative will move the institution toward achieving carbon neutrality.

13. Energy-Efficient Equipment Procurement Policy:

All future procurement of electrical appliances such as refrigerators, air conditioners, fans, and lighting systems shall comply with BEE 4-star or 5-star rating standards to ensure optimal energy performance.

14. Periodic Energy Audit:

A comprehensive energy audit shall be carried out annually by a certified agency to identify energy-saving opportunities, benchmark performance, and implement corrective actions for continual improvement.

Through these initiatives, the University demonstrates its strong commitment to energy efficiency, safety, and sustainable campus operations, aligning with its broader environmental and clean energy goals.

Energy Inspection Reports are given below:

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.

23/3/24

Electrical Inspector
Coimbatore South

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

Safety Inspection for Lifts by Chief Electrical Inspectorate, GoI

FORM F

[See rules 4(2) and 5(2) and 6]

LICENCE TO WORK A LIFT

(This Licence is not transferable or assignable to any person, company, body of individuals or firm. This Licence is to be renewed once in three years and must be produced to the Licensing Authority when called for)

Registration No.: **30289/L/F/CBES/Dt:14/06/2018**

Under sub-section (3) of Section 5 of the Tamil Nadu Lifts and Escalators Act, 1997 (Tamil Nadu Act 35 of 1997) Thiru. Karunya University, are hereby Renewed Licence to work or cause to be worked or allow the working of the Lift erected at the premises No.Karunya Univesity Science And AddminBlok Karunya Nagar , Coimbatore-641114, subject to the provisions of the Tamil Nadu Lifts and Escalators Act, 1997 (Tamil Nadu Act 35 of 1997) and the Tamil Nadu Lifts and Escalators Rules, 1997 the particulars of which are given below:-

The Licence shall remain valid **from 14-06-2018 to 13-06-2019** and is issued subject to the conditions set out on the below:-

Particulars

1.	Make of Lift and Serial No.	Johnson and L J 4707
2.	Type of Lift	Passenger
3.	Type of Control	Simplex Selective Collective Control
4.	Capacity	8Persons

Date of Inspection	Valid From	Valid UpTo	Signature of the Officer Renewing the Licence
29-11-2019	14-06-2019	13-06-2022	
11-11-2022	14-06-2022	13-06-2025	

Page 1/3

17.4.2 Promote a public pledge toward 100% renewable energy beyond the university

Empowering Our Future: Join the Renewable Energy Revolution

In a world grappling with the looming crisis of climate change, it is imperative for us, as individuals, to take proactive steps to transition to cleaner and more sustainable energy sources. Renewable energy is at the forefront of this transition, offering a beacon of hope for a brighter and more sustainable future. To spread awareness and encourage collective action, we have organized an "*Awareness Pledge on 100% Renewable Energy*" for common people beyond our university. In this write-up, we will explore the various features and significance of renewable energy, as well as general practices that anyone can adopt to make a difference. We will conclude with a short pledge that you can take to make a commitment towards a more sustainable future.

Features of Renewable Energy

Renewable energy sources are characterized by their ability to naturally replenish, making them a sustainable alternative to fossil fuels. Here are some key features of renewable energy:

1. Clean and Green: Unlike fossil fuels, renewable energy sources, such as solar, wind, and hydropower, produce little to no harmful emissions. This significantly reduces air pollution and greenhouse gas emissions, mitigating the adverse effects of climate change.

2. Endless Supply: Renewable energy sources are virtually inexhaustible. The sun will continue to shine, the wind will always blow, and rivers will flow, ensuring a constant and reliable energy supply.

3. Reduced Energy Costs: Over time, investing in renewable energy can lead to lower energy bills. Solar panels, for instance, can provide significant savings on electricity expenses.

4. Job Creation: The renewable energy sector is a major source of job opportunities. It stimulates economic growth while reducing our dependence on fossil fuels.

Significance of Renewable Energy

The transition to 100% renewable energy is not merely an environmental concern; it holds immense significance in multiple aspects of our lives.

1. Climate Change Mitigation: By reducing carbon emissions, renewable energy plays a pivotal role in mitigating climate change. This helps to safeguard the planet for future generations.

2. Energy Independence: Relying on renewable energy sources reduces dependence on foreign oil and gas, enhancing national and local energy security.

3. Health Benefits: Cleaner air and reduced pollution levels lead to improved public health.

Respiratory illnesses and other health issues related to air pollution are significantly reduced.

4. Sustainable Development: Investing in renewable energy fosters economic development, promotes innovation, and creates new job opportunities in emerging industries.

Practical Steps for Individuals

You might be wondering how you, as an ordinary person, can contribute to the renewable energy revolution. Some general practices that you can incorporate into your daily life:

1. Energy Efficiency: Enhance your home's energy efficiency by sealing drafts, using energy-efficient appliances, and switching to LED lighting. Reducing energy consumption is a crucial step.

2. Solar Power: Consider installing solar panels on your property. They can generate clean electricity and potentially reduce or even eliminate your energy bills.

3. Wind Power: If you have the space, small wind turbines can be an excellent source of renewable energy for your home.

4. Green Transportation: Opt for electric vehicles (EVs) or hybrids to reduce your carbon footprint while commuting.

5. Reduce, Reuse, Recycle: Support the circular economy by minimizing waste, reusing items, and recycling materials whenever possible.

6. Advocate for Change: Engage with local and national policymakers to promote renewable energy initiatives, such as incentives and tax breaks for renewable energy adoption.

The Awareness Pledge on 100% Renewable Energy

To solidify your commitment to renewable energy and a sustainable future, consider taking the following pledge:

“100% புதுப்பிக்கத்தக்க எரிசக்தி மாறுதல்களை, நான் முழு மனதுடன் ஆதரிப்பேன் என உறுதியளிக்கிறேன்”

"I pledge to wholeheartedly support the shift to 100% renewable energy."

“என் தினசரி வாழ்க்கையில், கார்பன் அதிகரிப்பை குறைக்க முயற்சிப்பேன், மற்றும் நிலையான ஆற்றல் மூலங்களை எனது அன்றாட வாழ்வில் தழுவுவதற்கும் நான் உறுதி கூறுகிறேன்”

"I commit to reducing my carbon footprint and embracing clean, sustainable energy sources in my daily life."

“நான் ஆற்றல் செயல்திறனை அதிகரிக்க முயற்சிப்பேன், சூரிய அல்லது காற்றாலை மின்சக்தி விருப்பங்களைக் கருத்தில் கொள்வேன், மேலும் சுற்றுச்சூழலுக்கு உகந்த போக்குவரத்தைத் தேர்ந்தெடுப்பேன்”

"I will strive to maximize energy efficiency, consider solar or wind power options, and opt for eco-friendly transportation."

“நான் குறைந்த, மறுபயன்பாடு, மற்றும் மறுசுழற்சி போன்ற வழிமுறைகளை பின்பற்றி, ஒரு சுகாதாரமான பொருளாதாரத்தை மேம்படுத்துவதாக உறுதியளிக்கிறேன்”

"I promise to reduce, reuse, and recycle, promoting a circular economy."

“பசுமையான எதிர்காலத்திற்கு முன்னுரிமை அழிக்கும் வகையில் ,உள்ளூர் மற்றும் தேசிய அளவிலான புதுப்பிக்கத்தக்க எரிசக்தி மையங்களை உருவாக்க முயற்சி செய்வேன் என உறுதி கூறுகிறேன்”

"I will actively advocate for renewable energy initiatives at the local and national levels, urging policymakers to prioritize a greener future."

“இந்த உறுதி மொழியின் மூலமாக தற்போதைய மற்றும் எதிர்கால சந்ததியினருக்கு, பாதுகாப்பான, தூய்மையான, நிலையான சுற்றுச்சூழலை உருவாக்குவேன் என உறுதி கூறுகிறேன்”

"With this pledge, I'm taking a step towards a cleaner, more sustainable world, safeguarding the environment for present and future generations."

“நாம் எல்லோரும் இனைந்து கணிசமான சுற்றுசூழல் மாற்றங்களை ஏற்படுத்துவோம் என முழுமையாக என்னுகிறேன்”

"I believe in the power of individual actions, and together, we can make a substantial difference."

“இம்முயற்சியில் அனைவருக்கும் ஒன்றிணைந்து,பிரகாசமான, பசுமையான மற்றும் வளமான எதிர்காலத்தை உருவாக்குவோம் என உறுதியளிப்போம்”

"Let us unite in our commitment to renewable energy and collectively work towards a brighter, greener, and more prosperous future for all."


Karunya
NATIONAL SERVICE SCHEME
Not Me But You

Conclusion

The transition to 100% renewable energy is not a distant dream; it's a goal that we can collectively achieve. By understanding the need and significance of renewable energy and adopting practical measures in our daily lives, we can make a profound impact on the environment and community. Making the community to take the pledge on a regular basis imparts awareness on maintaining a clean environment which will be treasure to the future generation. Together, we can empower our world with clean, renewable energy.

Energy and Community

7.4.3 Energy efficiency services for industry Provide direct services to local industry aimed at improving energy efficiency and clean energy

1. As part of Industry - Academia interaction through "**Smart Vehicle Mission**", and Division of EEE a MoA was signed on 07.08.2024 with M/s. E-Royce Motors Pvt. Ltd., Coimbatore.

2. A team of EEE faculty, staff and 10 students conducted a Hands-on Training on "**Basic Electrical Wiring and Repairing**" for the Prisoners of the Central Prison, Coimbatore during 19th – 23rd August 2024.

3. Fire Safety Training Session

Title*:* *Hands-on Fire Safety Awareness and Equipment Handling*
Date: *August 9th (Monday), 2024*
Subject: *DIY Skills for Engineers*
Faculty-in-Charge: Dr. J. Jayakumar, Professor / EEE

Hands on fire safety Awareness On August 4th, we attended a fire safety hands-

on training session led by Mr. Jaikumar. Experts from ABC Fire Services taught us about five types of fire extinguishers and their uses. We learned to identify fire classes and practiced using extinguishers with the PASS technique. We also saw a live demo of the water hose reel system used during building fires. The session improved our safety awareness and gave us confidence to handle fire emergencies.

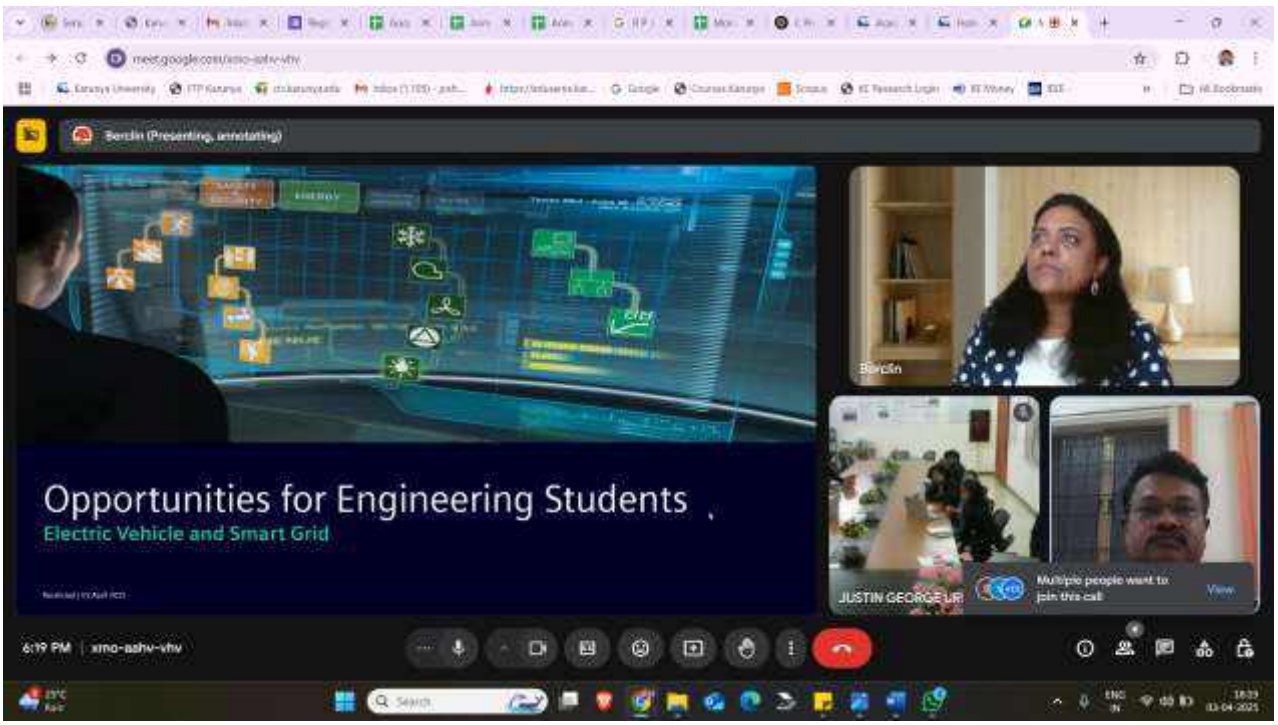
OBJECTIVE, TRAINING CONTENT AND DEMONSTRATION:

The main objectives of this session were:

- To educate students about fire risks and prevention methods.
- To familiarize students with different types of fire extinguishers and their uses.
- To provide hands-on practice in operating fire safety tools.
- To promote safety awareness and emergency preparedness in students.

Demonstration by ABC fire service team

International Webinar was conducted on “Opportunities for Engineering Students in EV and Smart Grids in the Current Scenario” through our IEEE Power Electronics Society (PELS) Student Chapter (SBC31061A) and Smart Vehicle Mission, Division of EEE for our students 03.04.2025 (Thursday)



7.4.4 - University as a body support government in clean energy and energy-efficient technology policy development

Karunya Institute of Technology and Sciences (KITS) actively drives cutting-edge research in clean energy and energy-efficient technologies through prestigious Government-funded projects. Research outcomes are disseminated through high-impact journals and international conferences, and meaningful policy recommendations are submitted to agencies shaping India's sustainable energy agenda.

A flagship initiative is the **Thin Film Batteries Laboratory**, dedicated to next-generation solid-state micro-batteries suitable for IoT devices, biomedical implants, RFID tags, and wearable electronics. With support from **SERB-DST (₹44.35 lakhs)** and **DAE-BRNS (₹19 lakhs)**, the lab has established state-of-the-art facilities including an **MBraun glovebox (O_2 & H_2O < 1 ppm)** for coin-cell fabrication and testing. Breakthroughs include **LiV_3O_8 thin-film nanorod cathodes** and vertically aligned lithium trivanadate films developed using **Pulsed Laser Deposition and Spray Pyrolysis**. The research has led to **2 patents**, **28 publications**, and laboratory-scale **2016-type coin cells (~3 V, 200 mAh/g)**.

KITS has also established a **low-temperature MED desalination pilot plant** funded by the **Ministry of Earth Sciences (₹4.47 crores)** to produce fresh water using innovative heat recovery, shell-and-tube systems, and vacuum-assisted evaporation. The plant supports high-quality research, promotes industry–academia collaboration, and advances **SDG-6: Clean Water and Sanitation**.

Additionally, KITS has developed a **2 TPD Rotary Kiln Gasification Pilot Plant** (DST, ₹6.12 crores) for converting non-recyclable plastics into high-calorific syngas, aligned with **Swachh Bharat Mission** and waste-to-energy goals. The project has sparked national interest, leading to partnerships with **CSIR-CMERI, IIT Roorkee, ICT Mumbai**, and various government bodies.

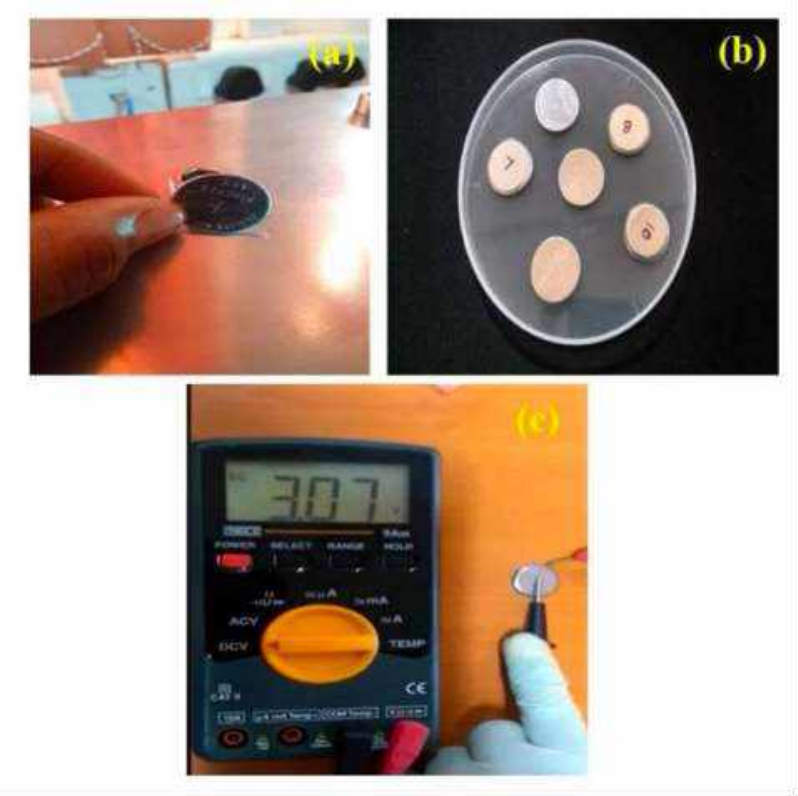
Through pioneering research, patents, prototypes, and national collaborations, KITS continues to contribute to India's clean-energy ecosystem and empowers the nation's transition towards sustainable battery technologies, freshwater production, and circular waste-to-energy solutions.

Products

1. Thin Film Battery - Coin type batteries

CELL CONSTRUCTION TYPE: 2016 COIN CELL VOLTAGE: ~ 3 V

Cathode: LiV3O8 thin film nanorod by pulsed laser deposition method



Anode:

Name of the Investigator	Project No.	Funding Agency	Title of the project and duration	Amount sanctioned
Dr.A.Sakunthala Dr.S.Rajesh Division of Physical Sciences	EMR/2017/003227 dated 16.7.2018	Science and Engineering Research Board Department of Science and Technology SERB-DSTEMR	Pulsed laser deposition grown thin/thick film of LiV3O8 nanorods for lithium metal battery applications Just completed 5.8.2018-5.8.2021 Three years	₹ 44,35,844

Lithium metal **Electrolyte:** 1 M LiPF6 in EC & PC, **Specific capacity: 200 mAh/g**

Images of the coin cells constructed in automatic MBraun Glove box, with moisture and oxygen less than 1 ppm and its direct voltage output using a multimeter.

Number of Patents filed from the projects: 2

- Lithium Trivanadate Thin Film Nanorods by Pulsed Laser Deposition Technique - File No: 202041024467

- Method of Making Vertically Aligned LiV3O8 Thin Films - File No: 202141009407

Total Publications from funded projects: 28

- Highly crystalline V2O5 and V6O13 thin films by PLD and a study on morphology transition of V2O5 by post annealing, Vacuum Letters, 187, 110097, 2021 **IMPACT FACTOR: 3.62**

- Thin film LiV3O8 nanorod formation through Pulsed Laser Deposition and the effect of heat treatment, Vacuum Letters, 182, 109722, 2021 **IMPACT FACTOR: 3.62**

Research Fellows worked under project

Mr. Rojin Varghese and Mr.Shobin Vijay worked as the project assistants in DST-SERB project. The students filed two patents based on their work and explored on the growth of vertically aligned nanorods on flexible stainless steel conducting current collecting electrodes.

Project Outcomes from Funded Project

Energy Storage Devices are always in demand for zero carbon emission environment. The funded projects on energy devices focus on "**Solid State Batteries**" which is the next generation battery for powering small size devices like pace makers, other medical devices, IoT applications to the large sized Electric Vehicles. The Solid State Batteries are extremely of high energy density and safety in nature. The funded projects to the tune of ₹ 44,35,844 from the Science and Engineering Research Board-Department of Science and Technology (SERB-DST-EMR), on the Energy Devices has resulted in the outcomes on patents, publications and products.


2. A Novel Low Temperature MED Desalination Technology

Equipment

1. Shell & Tube Heat Exchanger
2. Separator & Condenser
3. Vacuum Pump, Brine Water Pump, Distillate Water Pump, HP LR Pump, LP LR Pump, Feed Water Pump, Cold Water Pump.
4. Chiller Unit
5. Valves & Strainer for MED Pilot Plant
6. Support Structure for the Plant
7.Instruments (Pressure, Temperature, Flow Rates etc.) required for Electrical Systems.

Name of the Investigator	Project No.	Funding Agency	Title of the project and duration	Amount sanctioned
Dr. L. Godson Asirvatham Dr.B.Jefferson Raja Bose Dr.Justin Robert Paden	**MoES/PAMC/DOM/ 152/2023(E-14411)**	Ministry of Earth Science	Experimental Investigation of a Novel Low Temperature MED DESALINATION TECHNOLOGY (1ST July 2024-31July 2026)	**4,47,45,160**

Research Fellows worked under project

Mr. Abhishek K (Senior Project Associate), Mr. Monish Mohan (Project Associate -1). Mr. S. Starling Raju and Mr. R. Sam has been working as the project assistants in MoES project. The students are writing research papers based on their work and exploring the advanced features of renewable energy.

Project Outcomes from Funded Project

Experimental data from the pilot plant will help in the scale-up design of the proposed desalination technology.

i) Test facility helps the research scholar's in generating additional data and help in pursuing higher studies, high-quality research papers in reputable journals and conferences. Also enhance the academic institutions and industry partnerships.

ii) The successful completion of the pilot study for this new desalination process holds the potential to boost the economy by implementing commercial-scale desalination plants, aligning with our country's "Make in India" initiative and create more employment opportunities.

iii) The achievement and deployment of the pilot plant utilizing innovative desalination technology will meet the criteria outlined in one of the United Nations Sustainable Development Goals (Goal 6), which aims to "Ensure availability and Sustainable

Management of Water and Sanitation for All" a commitment to addressing human challenges.

3. Design of 2 Ton/day Rotary Kiln Gasification Pilot Plant with high Calorific Value Syngas Production

R&D prototype of 2 TPD Rotary Kiln Gasification Pilot Plant for converting non-recyclable plastic waste into high quality syngas for generating steam is set up at Karunya Institute of Technology and Sciences (KITS), Coimbatore. The rotary kiln gasification plant disposes 2 TPD of non-bio degradable waste to produce high calorific syngas, which will be used to produce steam. This project is being done by KITS in collaboration with its industry partner, Techurja, Trivandrum and the institutional partner, Central Mechanical Engineering Research Institute, Durgapur. The project has come up with most economical solution for waste management and renewable energy.

DST File No: DST/TDT/WM/2019/09(G)

Duration of Project: March 23, 2021 to June 22, 2025

Principal Investigator: Dr. Madhu Ganesh, Division of Aerospace Engineering, KITS

Co-Principal Investigators: Shri. Partha Das, CMERI, Dr. Joseph John Marshal, Division of Mechanical Engineering, KITS

Total Project Cost: Rs.6.12 crore

Specific Benefits/Outcome

- Integration of the Rotary Kiln TurnW2E gasifier with steam or power generator to treat hazardous and certain non-hazardous waste while complying to PCB norms.
- Demonstration of sustainable solid waste to syngas production by rotary kiln gasification to achieve the goals of the Swachh Bharat Mission. The plant will process 2 TPD of non- biodegradable solid waste. Moisture level will be adjusted to meet process requirements.
- Creation of a technology platform and facility for pilot and techno-economic analysis.
- Develop faculty and manpower in waste management and waste to energy conversion.

List of Publications arising from the Project:

- Madhu Ganesh, Joseph John Marshal, Partha Das. ‘Design of 2 Ton/day Rotary Kiln Gasification Pilot Plant with high Calorific Value Syngas Production’ Poster at Envision

2023 Conference at IIT Madras Research Park.

Impact:

- ICT Mumbai, and IIT Roorkee have shown interest in collaborating with us to develop new projects.
- Industry and corporations have shown interest in learning this technology.
- CSIR-CMERI has been appointed for consultancy services for solid waste management by

1. Panchayat & Rural Development Department, Govt. of West Bengal
2. Urban & Housing Development Department, Govt. of Jharkhand
3. Damodar Valley Corporation, Maithon
4. Maithon Power Ltd, Tata Power
5. Indian Space Research Organization- Satish Dhawan Space Centre, Sriharikota

Figure 1. Fully Installed and Commissioned Plant

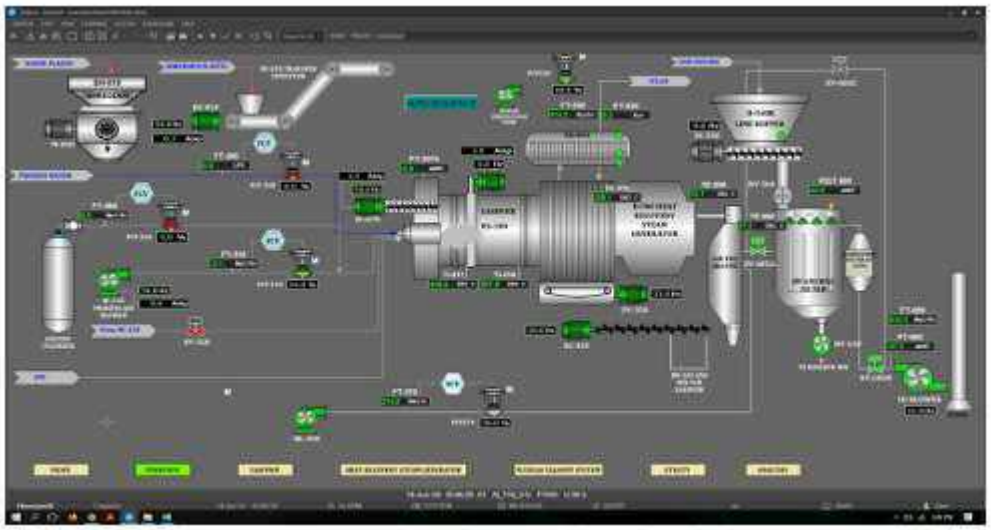


Figure 2. Screen Shot of SCADA interface during run

Figure 3.Shredded Waste Storage and Manual Feeding

7.4.5 - The University as a body assists Start-ups that foster and support a Low-Carbon Economy/ Technology

Karunya Institute of Technology and Sciences (KITS) nurtures a vibrant innovation ecosystem through active incubation support for students, faculty, and industry partners. The institute currently hosts 31 student startups, ranging across domains such as AI & IT, Biomedical devices, Robotics, Aero-tech, Eco-friendly products, Social innovation, and Women-safety solutions, progressing from TRL 1 to TRL 6. Alongside, 17 faculty-led startups are developing solutions in agri-tech, environmental technology, biomedical research, and mechanical innovation. Further, 14 industry incubates collaborate with KITS, focusing on biofuel systems, biosensors, software solutions, medical devices, food technologies, and sustainable materials. This integrated incubation environment strengthens innovation, entrepreneurship, and commercialization, driving technology-based societal impact.

KITS Policy on Innovation, Incubation and Entrepreneurship:
https://www.karunya.edu/ktbip/policy

Karunya Technology Business Incubation Park (K-TBIP) Incubates List

1. List of Student Incubates

Sl.No	Startup Title	Founder(s) Name	Startup Sector	TRL
1	Autonomous Golf Cart (Self Driven EV)	Mr. Kevin. J (URK22CO3003) Mr. Jeffrey Chris (URK22CO3009) Mr. Selvavignesh G (URK22AI1031) Dr. A.M. Anusha Bamini Asst.Prof,CSE	IT	TRL 2
2	Wonder Workers (Web Developer)	Mr. Dhuruv Swamy R (URK22AI1016) Mr. Aron Jose A (URK22AI1017) Mr. Hariharan K (URK22AI1048) Mr. Samnaveen Kumar V (URK22AI1043)	IT	TRL 6

3	UV object sanitizer	Ms. Letitia Nimshi, (URK22BM3001) Ms. G. Venika, (URK22BM2008) Dr. P. Manimegalai - BME	Bio - Medical	TRL 3
4	Reverse vending machine	Ms. Janina Mr. Avisa Crispus Samuel Praneeth Ms. Regulla Mallika Priya Harshini Ms. Fidelia Francis Fernandes Mr. Arpit Lazaras Gaikwad Mr. Joshan Moorikottu Cherian	Social	TRL 1
5	Mensch Robotics Private Limited	Mr. Bibin Thomas, Founder - Mensch Robotics	Robotics	TRL 5
6	Nex-Dynamics	Mr. Kabilan KB, (ULK20RA1008)	Autonomous vehicles	TRL 4
7	Teshuvah Bionics	Mr. Immanuel John Mathew (URK21RA1007)	Bio Medical	TRL 4
8	Pyrolysis of Biowaste to Composite	Mr. Dinesh K	Social	TRL 1
9	(Zephyr) Empowering Women's Safety Through Smart Technology	Mr. Thomas Chandy Ms. Rachana C Nair	Women Safety	TRL 2
10	A low Cost CPAP for wide-speed usage	Ms. Sowmya Sudhakar, (URK19BM1001)	Bio Medical	TRL 4
11	Healo Packs (Lakshmi Print and Pack)	Mr. C.L. Brijesh (URK22BT1030)	Biology	TRL 2
12	Extraction and Evaluation of Anti-Lice Efficacy of Sphaeranthus Indicus Linn for infestation of lice	Ms. Litta Roy (URK22BT1032)	Herbal	TRL 2
13	GS Smart Table	Mr. Aron Jose A (URK22AI1017)	IT	TRL 1
14	An AI-powered online platform aiming to create entrepreneurs	Mr. Sharvesh. P.P, (URK21AE1024)	IT	TRL 1
15	Herbal E-ball	Ms. TP. Tryphena, (URK21AC1267)	Herbal	TRL 3
16	Artiflex	Ms. Regulla Mallika Priya Harshini, (URK23AI1026)	Bio Medical	TRL 2
17	Edible Cutlery	Mr. T.S. Harish Theriraja, (URK23FP2009)	Eco Friendly	TRL 1
18	Baby Bites	Ms. Pavithra Reji, (URK23FP2014)	Bio Medical	TRL 1
19	Banana- Cellulose Based Bio composites	Mr. A. Mohammed Suhail, (URK23BT3008)	Eco Friendly	TRL 2
20	Rapha Medtech Solutions	Mr. Aashish Samuel, (URK22BM2032) Mr. V. Karthikeyan, (URK22BM3004) Mr. Arpit Chauhan, (URK22BM3008)	Bio Medical	TRL 3

21	AI Sentinel	Mr. Abin Shaji Thomas, (URK24CS6007)	IT	TRL 1
22	PermaSpark	Mr. Chris Jaron, (URK21CS2001)	IT	TRL 1
23	Repairon	Mr. G. Shri Vishal, (URK23AE1019) Mr. K. Santhosh Kumar, (URK23AE1018) Mr. S. Darish, (URK23AE1025) Mr. S. Rahuram, (URK23AE1012)	Aero Tech	TRL 1
24	Trulife	Mr. Mohammed Haneefa Jafar, (URK22AI1057) Mr. A. Mohamed Riyaz, (URK22AI1041) Mr. W. Benidict Rejones, (URK22AI1087)	Social	TRL 1
25	Custom Multi-Purpose Drone Manufacturing	Mr. Solomon P A (URK22AE1040)	Aero Tech	TRL 1
26	Lead Healthy Life	Mr. RAAJ VISANTH M S (PRK24MS1022)	Social	TRL 1
27	Advanced Portable Raman Spectroscopy Device for Breast Cancer Detection	Ms. MIRACLEIN SHEBA J P (PRK24BM1001) Mr. Kavi Nilavan (RRK22PH1002)	Bio Medical	TRL 2
28	Forensic Kit	Mr. Rohith Sugu S (URK22FS1007) Ms. K. Iyeswarya, (PRK24FS1004) Ms. Anitha Mary A (PRK24FS1008)	Criminoloy	TRL 3
29	Mine Detector (Thiru Chakshu)	Mr. Joel Manu Alexander (URK24EE1001) Ms. Chitra Ranjit Nair (URK24AE3001) Ms. Angeleena Philip (URK24AE1003) Ms. Krishna Kamleshbhai Solanki (URK24AE3009) Mr. Darshan Samuel Nayak (URK24EC8004) Mr. A. Prathap Joel (URK24EC8009)	Mines	TRL 1
30	Biomass Briquettes (eco-friendly fuel alternatives)	Mr. Dinesh T Mr. Madesh T	Eco Friendly	TRL 1
31	Smart wind mill transportation	Mr. Keerthivasan (URK23ME6021) Mr. Richard Albert K M (URK21RA2007)	Eco Friendly	TRL 1

II List of Faculty / Staff Incubates

Sl.No	Start-up Name	Founder(s) Name	Startup Sector	TRL
1	Culex Mosquito Trap	Dr. R. Philip Sridhar, Agriculture Dr. Anitha Mary X, Robotics Engg Dr. P. Rajalakhsmi, Robotics Engg	Social Tech	TRL 4

2	Mayim Chayim	Dr. P. Jegathambal, WI	Environmental	TRL 3
3	Nitrate Sensor	Dr. M.Suguna Devakumari, Agriculture	Environmental	TRL 3
4	Refuah Herbals	Dr. David Paul Raj, Biotechlogy	Biomedical	TRL 5
5	Anti-Theft Device for Fishing net	Mr. Gerard Joe Nigel K, Robotics Engg	Social Tech	TRL 2
6	Development of Probiotic based on millet to address cognitive impairment / (ADHD)	Dr. Gobikrishnan S, Food Processing Technology	Biomedical	TRL 2
7	HR Recruitment Service	Mr. B. Jai Ganesh, MBA	IT	TRL 1
8	ZOE Cloud Services & Smart System Development	Dr. J. Jaya Kumar, EEE	IT	TRL 4
9	Tendon Tissue Engineering in preclinical Sheep model	Dr. Rebu Sundar, Biotechnology	Science	TRL 2
10	Advanced Passive Cooling Solutions	Dr. A. Brusly Solomon, Mechanical Engg	Mechanical	TRL 4
11	ALGAE MOKSH	Dr. Jibu Tomas, Head, Biotechnology	Biology	TRL 4
12	Naari Nestam	Dr. G. Babu Rao, Mechanical Engineering	Biomedical	
13	Smart Honey extration	Dr.R. Priscilla Joy, CSE Dr. Immanuel John Raja, CSE Dr. P . Sam Paul, Mechanical Engg Dr. Catherine Joy, ECE	Eco Friendly	TRL 1
14	Four I Tech R&D solutions pvt ltd	Dr. S. Rajesh, Physical Sciences	Eco Friendly	TRL 4
		Dr. R. Nandhakumar, Physical Sciences		
		Dr. B. Vidhya, Physical Sciences		
		Dr. A. Sakunthala, Physical Sciences		
15	Rubic cubes	Dr. S. Jebasingh, Mathematics	Science	TRL 4
16	RADO ++	Dr. Sugumar D, ECE	Science	TRL 2
		Dr. Anita Jones Mary T, ECE		
		Mr. Jebavaram J, Lab Technician, ECE		
17	Abaya Security	Dr. Siva Mangai, ECE	IT	TRL 2

III. List of Industry Incubates

Sl. No	Names	Industry	Theme/Product
1	Dr. Dileep Kumar. R	M/s Indriyam Biologics	*INDHAN* - A fully automated bio diesel processor, *V-SENS* - Snake venom detection biosensor.
2	Mr. Varoon Damodaran	M/s Birchwood Pets	Pet Foods
3	Dr. G. Paul Robinson Gnanaraj	M/s Mapusoft Technologies	Operating Systems
4	Mr. Santosh D	M/s. WisRight Tech Private Limited	Business Development with Internships
5	Mr. Renious Charles	M/s Truleaf Private Ltd	R&D of bakery products and multi varieties of breads
6	Mr. Lokesh. Allibilli	M/s. Ujasravanthi Indothermal Technologies Pvt Ltd	Design and Development of loop heat pipe technology [LHP]
7	Mr. Nagaraj	M/s. NuStartZ	Development of software services and IT support
8	Mr. Joshy Varkey	Bio Vastum Solutions Private Limited	CML biotech Ltd. (Medical disposable manufacturing
9	Mr. Vinothkumar Rathinakumar	i6 Sec Solutions Private Limited	Threat Lift
10	Mr. M.N. Samy	Sri Selvanayakiamman Traders Private Limited	Bio-char Production
11	Mr. Ramesh Kumar	Astravue Technologies Pvt Ltd	Software esolutions
12	Mr. Jeetu Mayani	Nasanta Food & Drink Pvt Ltd	R&D of food products
13	Mr. Jackson Alex	Falconretech Pvt Ltd	Medical software
14	Mr. Sriveera	Aparoks Pvt Ltd	Development of software services and IT support