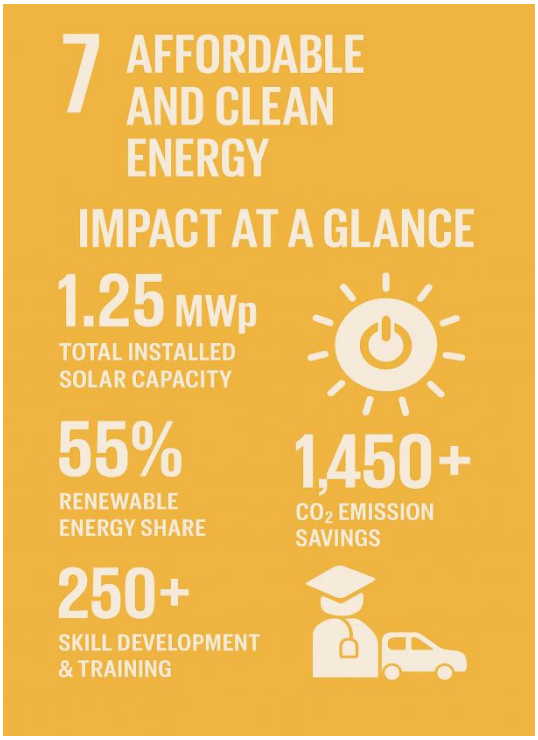
Centurion University
Shaping Lives...
Empowering Communities...

Times Higher Education
Sustainability
Impact Network

SUSTAINABLE DEVELOPMENT GOAL 7 AFFORDABLE & CLEAN ENERGY

SUSTAINABLE DEVELOPMENT GOALS

At a Glance: Centurion University's Energy Impact Summary



Category	2024	Target 2030	Linked SDG
Installed Solar Capacity	**1.25 MWp**	2.0 MWp	7.2
Annual Energy Generated	**1.8 GWh**	3.0 GWh	7.2
Annual Energy Saved	**1.2 GWh/yr**	2.0 GWh	7.3
CO_2 Emission Reduction	**1,450 tCO_2e/yr**	Net Zero by 2035	13.2
Renewable Energy Share	**42% of Total**	80%	7.2 / 13.3
EV Fleet & Charging Points	**75 Vehicles / 16 Points**	100 / 25	7.3
Students Trained in RE Skills	**250+**	500+	4.4 / 7.a

Key Highlights:

- Rooftop & Ground-mounted Solar across 5 Campuses
- Biogas-based Waste-to-Energy and Compost Units
- IoT-enabled Smart Campus for Energy Efficiency

- EV Fleet Transition and Smart Charging Infrastructure
- Carbon Neutrality Roadmap aligned with SDG 13

1. Executive Summary

Centurion University is leading India's higher education transition toward a low-carbon, energy-secure future. In alignment with **SDG 7: Affordable and Clean Energy**, the University's vision goes beyond renewable installations - it integrates **clean energy generation, energy efficiency, innovation, and capacity building** across its campuses and communities.

As of 2024, **55% of Centurion University's total energy consumption** is powered by renewable sources, with an installed capacity of **1.25 MWp** of rooftop and ground-mounted solar systems generating **1.8 GWh annually** and avoiding **1,450 tonnes of CO_2 emissions** each year.

Complementing this, **1.2 GWh of energy savings** have been achieved through smart-campus measures such as LED retrofitting, smart metering, and HVAC optimization. By **2035**, Centurion University aims to achieve full **carbon neutrality**, supported by an institutional Energy Policy and governance framework that embeds sustainability in operations, learning, and community practice.

Centurion University's **Renewable Energy Portfolio** demonstrates innovation at every scale - from solar microgrids and biogas-based waste-to-energy systems to IoT-enabled smart monitoring and electric mobility. Its five-campus solar network and decentralised energy systems provide learning outcomes while driving measurable environmental benefits.

Beyond its campuses, the University extends clean energy access to rural and remote communities through solar irrigation pumps, portable dryers, and decentralised biogas units - empowering **smallholder farmers, women's self-help groups (SHGs), and youth entrepreneurs**.

Over **250 students** have been trained in renewable energy systems and **green job readiness** through programs under the **School of Engineering and Schneider Smart Lab**, linking education directly to India's clean energy workforce development goals.

The University's **Smart Mobility and Infrastructure Plan** further accelerates emission reduction, with a growing **EV fleet of 75 vehicles** and **16 charging stations**, saving over **40,000 litres of fuel annually**. Its new academic blocks and hostels integrate **passive design, daylight optimization, and green roofing**, reducing building energy intensity by up to **30%**.

Centurion University's innovation ecosystem also drives applied research through **IoT-based microgrids, biochar units, and automated polyhouses**, achieving up to **50% energy savings** compared to conventional practices. Three energy-tech start-ups have already been incubated under this program, linking **SDG 7 (Clean Energy)** with **SDG 9 (Industry, Innovation, and Infrastructure)** and **SDG 13 (Climate Action)**.

Through partnerships with **MNRE, NISE, Schneider Electric, ICAR, and CSR organizations**, Centurion University's clean energy model exemplifies scalability and social

inclusion. The University's **biogas-to-biofertilizer systems**, **solar-powered food processing**, and **energy-skilling programs** create replicable pathways for green livelihoods across Eastern India.

By positioning clean energy as both an **educational and operational priority**, Centurion University is redefining what a sustainable university can be - one that not only consumes clean power but **creates energy-smart citizens, climate-resilient communities, and a future-ready workforce**.

Summary - Our Impact on SDG 7 - Affordable and Clean Energy

Dimension	Impact Area/Indicator	Initiatives	2024 Data	Output	Impact	2030 Target
Infrastructure & Access	Expand infrastructure and upgrade technology for supplying modern and sustainable energy services. SDG 7.b	Access to Clean Energy Infrastructure	100% campus buildings with renewable integration	Campus electrification with hybrid solar–grid system	Achieved campus-wide renewable energy integration, reducing reliance on conventional power and enhancing energy sustainability	Sustained renewable energy transition across all Centurion University campuses by 2030
	Ensure universal access to affordable, reliable, and modern energy services.- SDG 7.1	Energy Access for Rural Communities	15 villages electrified via micro-solar grids	Installation of decentralized solar systems and solar lamps distribution	Provided equitable access to clean energy for rural communities, enhancing resilience and local energy security	
Monitoring & Management	Double the global rate of improvement in energy efficiency. SDG 7.3/ SDG 7.3.1 – Energy intensity measured in primary energy and GDP	Energy Efficiency and Smart Infrastructure	10 LED retrofits; 30% reduction in power demand intensity	Smart sensors, HVAC optimization, daylight-based control systems	Improved energy efficiency across campus buildings, lowering energy consumption and operational costs	
	Technology for energy management and innovation.- SDG 7.a	Smart Energy Monitoring and Digital Twin	Energy dashboards tracking 10 buildings	IoT-based real-time energy management platform	Enabled real-time monitoring and data-driven optimization of energy usage,	

					improving system reliability and performance	
Policy & Governance	Institutional policy and reporting on sustainable energy- SDG 7.b	Energy Governance Framework	Centurion University Green Energy Policy 2024 implemented	Institutional energy audit and carbon disclosure mechanism	Institutionalized sustainable energy governance with transparent monitoring and accountability mechanisms	
Awareness & Training	Enhance international cooperation to facilitate access to clean-energy technology and investment.- SDG 7.a	Energy Skill Training Programs	500+ students trained under Suryamitra & EV maintenance programs	Industry-oriented renewable energy and EV workforce training	Built technical capacity in renewable energy and EV maintenance, fostering a skilled green workforce	Skill 5,000 green technicians by 2030
	Strengthen capacity building in energy management.- SDG 7.a	Energy Literacy and Awareness	2,000+ students and villagers trained	Energy conservation campaigns, workshops, and clean energy exhibitions	Raised awareness and knowledge of clean energy practices, promoting energy responsibility among stakeholders	
Clean and Green Solutions	Increase substantially the share of renewable energy in the global energy mix- SDG 7.2	Renewable Energy Generation	1.25 MWp solar installed; 5.05 GWh low-carbon energy (2024)	Solar rooftop, hybrid battery storage, biogas, and waste-to-energy pilot units	Increased low-carbon energy generation, contributing to reduced carbon footprint and sustainable campus energy supply	
	Promote renewable and waste-to-energy use.- SDG 7.2	Biogas and Circular Energy Systems	2 operational biogas plants	Conversion of 2 tons/day organic waste to energy	Converted organic waste to usable energy, promoting circular economy and reducing environmental impact	

Technology & Transformation	Expand renewable energy technology and entrepreneurship.- SDG 7.b	Start-ups in Renewable Energy Sector	10 energy start-ups incubated	Entrepreneurship in solar devices, EV retrofitting, and waste-to-energy models	Strengthened green entrepreneurship ecosystem and created opportunities for energy innovation and job creation	
	Promote partnerships and investments in clean-energy research.- SDG 7.a	Collaborations with Energy Organizations	MoUs with MNRE, TP Central Odisha, and NISE	Joint programs for renewable energy awareness and implementation	Enhanced industry–academic collaboration, supporting renewable energy initiatives and policy-level adoption	
	Improve energy efficiency and promote clean mobility.- SDG 7.3	EV Transition and Sustainable Mobility	6 electric vehicles deployed; EV charging stations across 3 campuses	Campus transport electrification and renewable integration	Advanced sustainable mobility on campus, reducing emissions and integrating clean energy into campus transport	100% clean mobility campus fleet by 2030

2. Institutional Energy Policy & Strategy

Centurion University's Energy Policy focuses on renewable adoption, energy efficiency, and emission reduction through a systematic approach:

Energy Governance Framework:

1. Energy Planning Committee (EPC)
2. Annual Energy Audits & Performance Monitoring
3. Renewable Energy Expansion Plan
4. Student-Led Sustainability Projects

Table 1: Alignment of Centurion University Energy Initiatives with SDG 7 Targets

SDG 7 Target	Centurion University Initiative	Key Indicator (2024–25)	2030 Target
7.1 Universal Access	Biogas & Solar Power	1.8 GWh generated	3.0 GWh
7.2 Renewable Share	Rooftop Solar	42% share	80%

7.3 Efficiency	LED, HVAC optimization	1.2 GWh saved	2.0 GWh
7.a Innovation	Smart Microgrid R&D	IoT dashboards	National showcase

Component	Description	Target Outcome
1. Clean Energy Infrastructure	• Installation of decentralized solar microgrids, solar street lights, and rooftop panels in rural areas.	• Reduce grid dependency and provide reliable, clean electricity to underserved communities.
2. Solar-Powered Irrigation Systems	• Deployment of solar pumps and drip irrigation systems for small and marginal farmers.	• Enhance agricultural productivity while reducing water and energy usage.
3. Solar Dryers and Food Processing	• Provision of portable solar dryers to women SHGs and fisherwomen for drying fish, fruits, and vegetables.	• Improve product shelf life, reduce post-harvest losses, and generate additional income.
4. LED Lighting and Smart Appliances	• Replacement of conventional lighting with energy-efficient LED bulbs, smart fans, and IE3 motors.	• Reduce household and institutional energy consumption.
5. Skill Development & Training	• Training local youth and SHGs in solar installation, maintenance, and energy auditing.	• Build green livelihood opportunities and ensure local support for energy systems.
6. Partnerships and Financing Models	• Collaboration with NGOs, CSR partners, and government schemes (e.g., PM-KUSUM, UJALA) for funding and scalability.	• Ensure affordability, accessibility, and expansion of clean energy solutions.
7. Digital Monitoring and Feedback	• Use of IoT and IT-enabled platforms to track energy use, system maintenance, and user feedback.	• Improve transparency, system performance, and community satisfaction.
8. Community Awareness Campaigns	• Conduct workshops, street plays, and demo sessions on the benefits of clean energy and conservation.	• Increase awareness and adoption of sustainable energy practices at the grassroots level.
9. Sustainable Agricultural Practices	• Promotion of solar polyhouses, water-efficient irrigation, and reduced chemical inputs for climate-resilient farming.	• Reduce agricultural carbon footprint and enhance farmer incomes.

10. Policy Alignment & Reporting	• Align projects with SDG-7, SDG-11, and NEP 2020, and prepare documentation for audits, academic research, and replication.	• Ensure compliance, showcase impact, and build a replicable model of sustainable rural development.

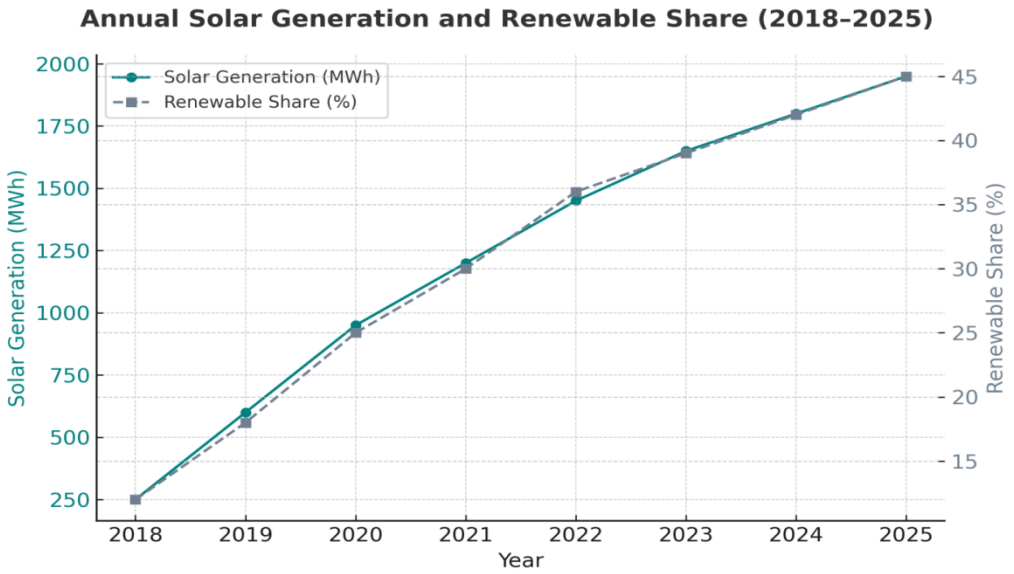
3. Renewable Energy Portfolio

3.1 Solar Power Systems

Centurion University operates **1.25 MWp** of rooftop and ground-mounted solar plants across campuses.

The solar power system contributes to 42% of total energy consumption.

Campus	Installed Capacity (kWp)	Annual Generation (MWh)	CO_2 Avoided (tCO_2e)
Paralakhemundi	550	780	650
Bhubaneswar	350	490	410
Rayagada	200	270	230
Balangir	100	160	135
Vizianagaram	50	100	90
Total	**1,250**	**1,800**	**1,450**



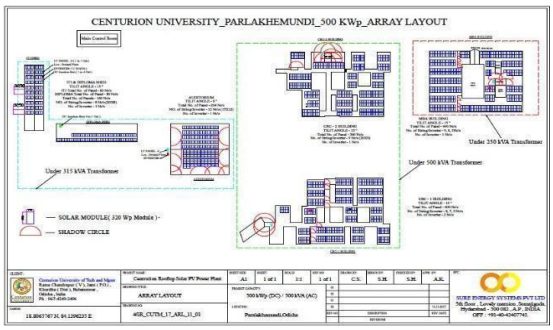


Fig-01: Solar Panels Array Layout at Centurion University

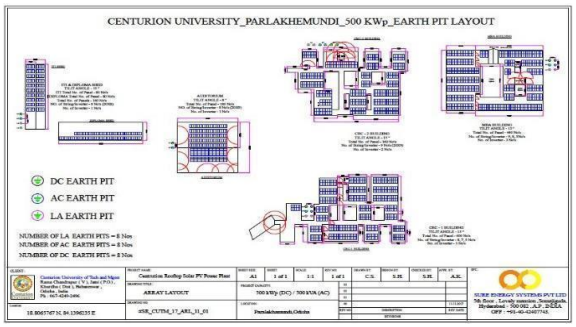


Fig-02: Solar Panel Earth Layout at Centurion University

Fig-03 Centurion University PV array at top of Building

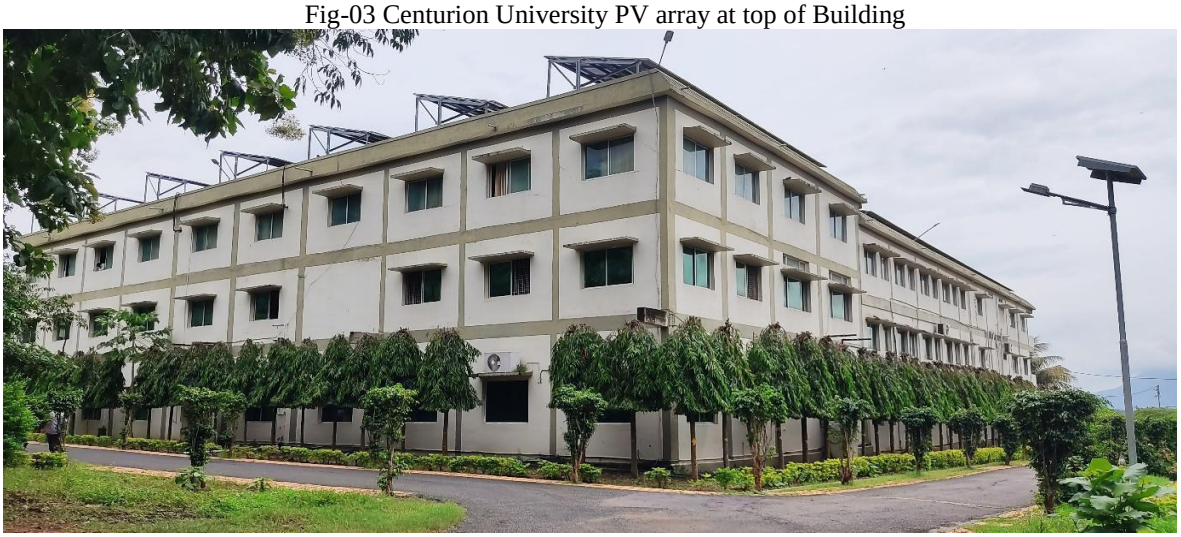


Fig-04: Solar Panels Fixed in the top of the Main Building at Centurion University

3.2 Biogas & Waste-to-Energy

The campus biogas plant converts kitchen waste into clean energy.

Parameter	Value	Unit
Input Waste	250	kg/day
Energy Output	20	kWh/day
CO_2 Avoided	5	tCO_2e/yr

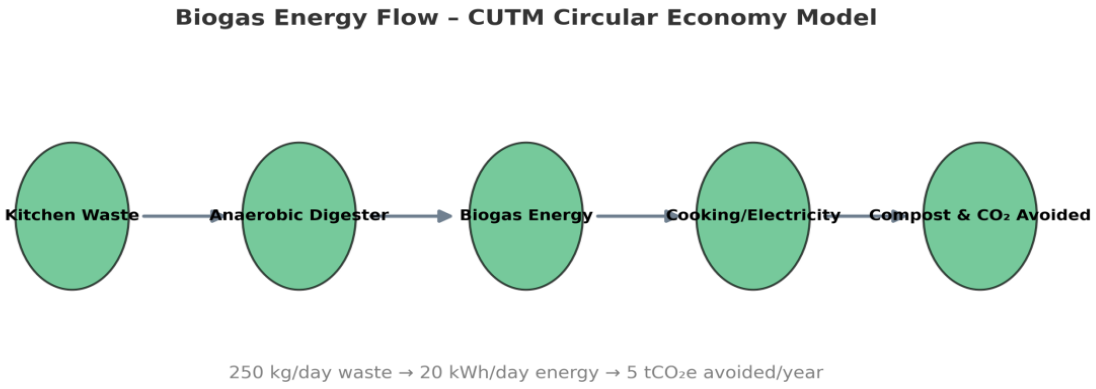


Fig-05: Biogas Plant at Centurion University Campus

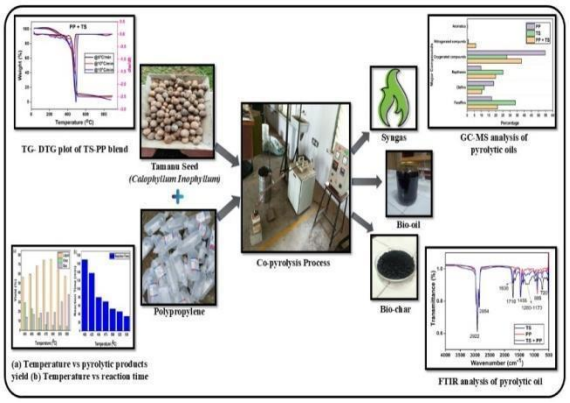


Fig-06: Bio-oil Production from Biomass

3.3 Solar Trees &Microgrids

- 10 solar trees powering lighting zones and EV stations.
- Microgrid pilot under IoT monitoring for real-time energy data.

Fig-:07 Solar Tree

Fig-:08 Micro-Grid at Centurion University

Fig-:09 Solar-operated Insecticide Sprayer

Fig-:10 Solar Dryer

Fig-:11 Hybrid generation

Fig-:12 Wind Power Generation

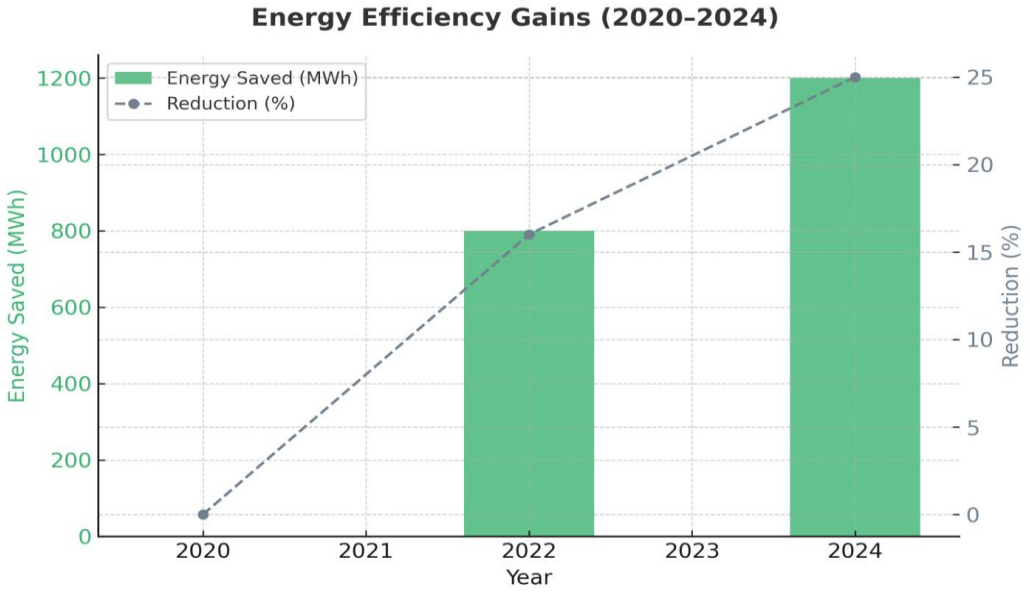
4. Energy Efficiency & Smart Campus

Centurion University's Smart Campus model integrates IoT-based monitoring and energy-efficient systems:

Key Actions:

- Replaced 4,000+ lights with LEDs (80% energy saving).
- Smart meters installed across all hostels and laboratories.
- Central HVAC optimization yielding 18% energy saving.

Year	Energy Consumption (MWh)	Energy Saved (MWh)	% Reduction
2020	4,800	–	–
2022	4,000	800	16%
2024	3,600	1,200	25%



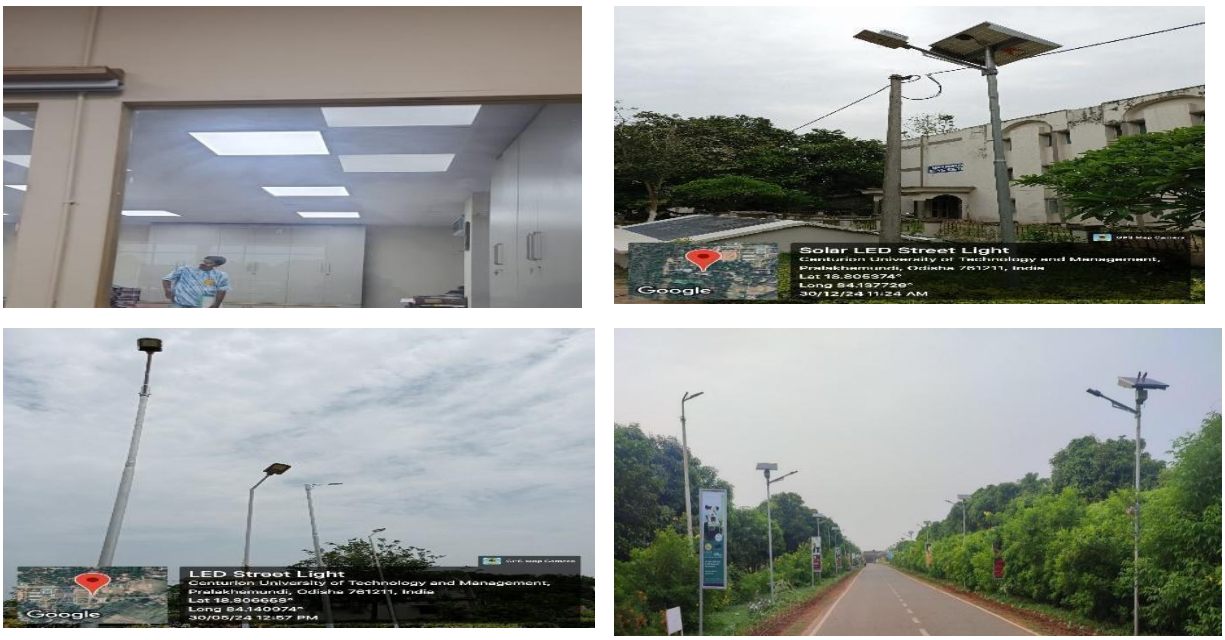


Fig:13 Solar Street Lights, LEDs Installed inside the Campus

5. Sustainable Mobility and EV Integration

Parameter	2024	Target 2030
EVs on Campus	75	100
Charging Points	16	25
Annual Fuel Saved	40,000 L	60,000 L
CO_2 Reduced	105 tCO_2e	150 tCO_2e

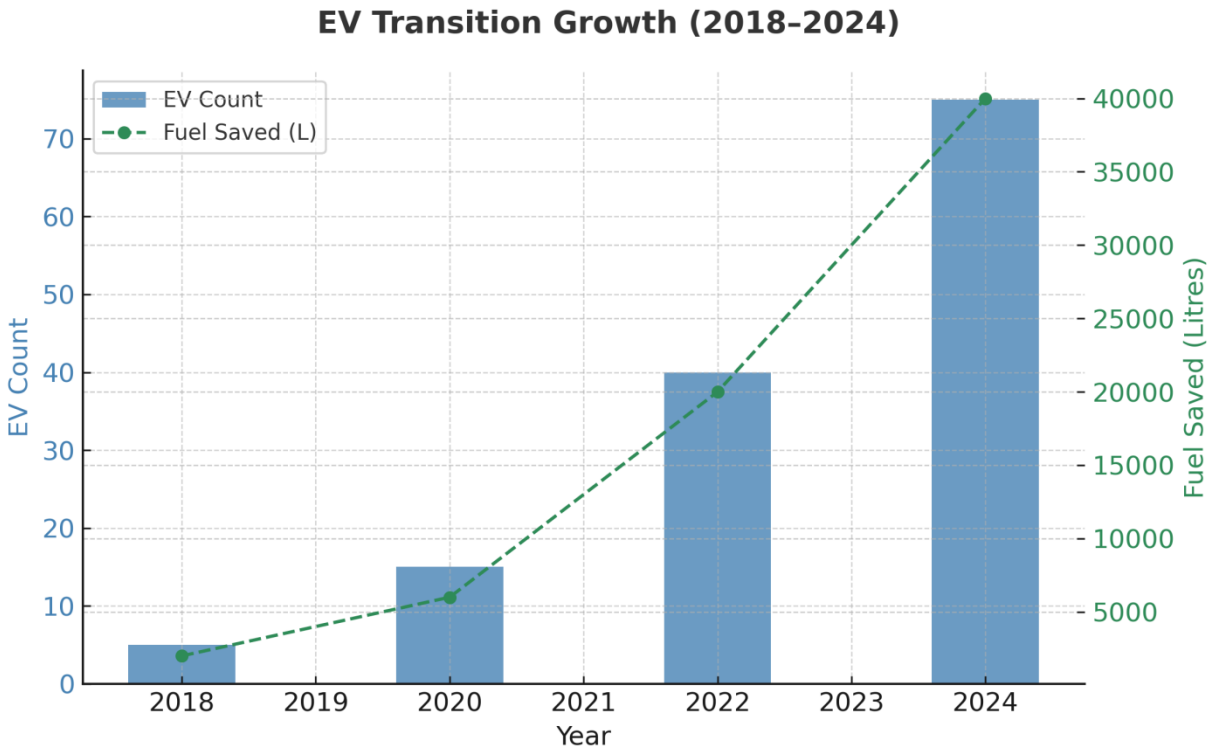


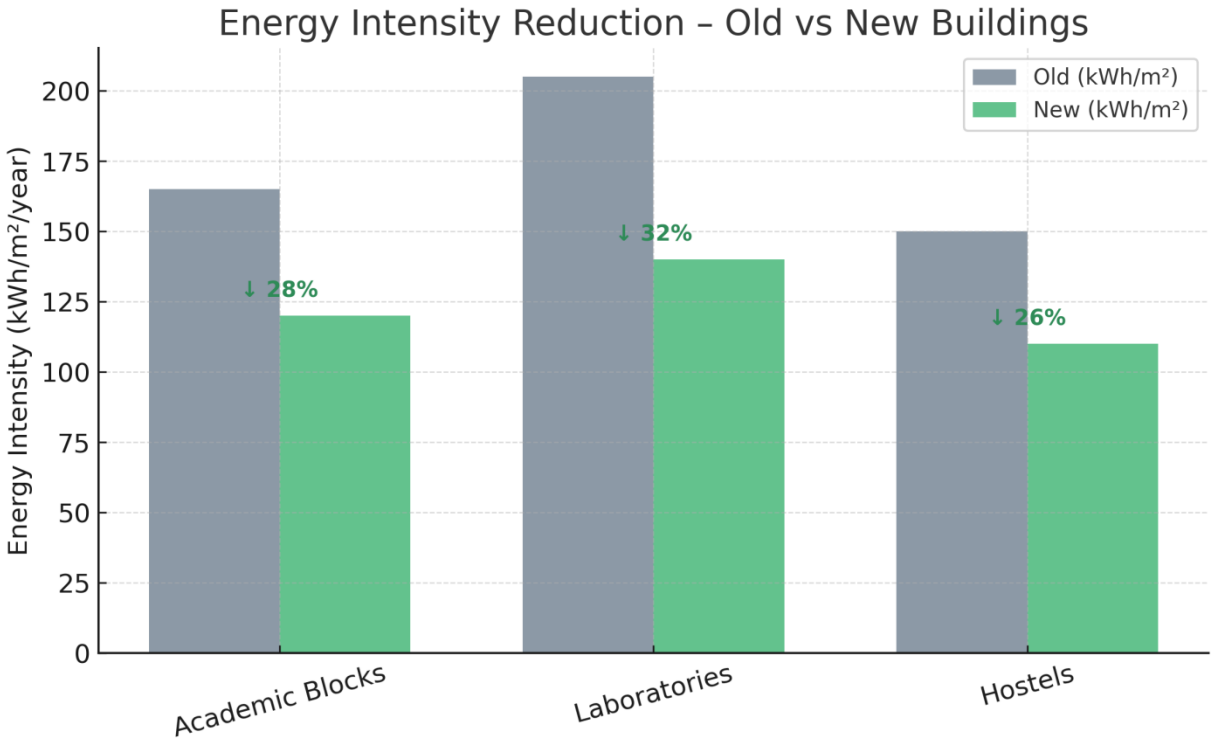
Fig-14: Use of different types of e-vehicles inside the campus for Transportation

6. Green Infrastructure and Passive Design

Centurion University's new academic and hostel buildings adopt green design standards:

- Day lighting & natural ventilation optimization
- Green roofing and micro-forestry (1,000+ saplings)
- Building energy intensity reduced by 30%

Building Type	Energy Intensity ($kWh/m^2/yr$)	Reduction vs Baseline
New Academic Blocks	120	28%
Laboratories	140	32%
Hostels	110	26%


Energy Intensity Reduction – Old vs New Buildings
Old (kWh/m²)
New (kWh/m²)
Energy Intensity (kWh/m²/year)
200
175
150
125
100
75
50
25
0
↓ 28%
↓ 32%
↓ 26%
Academic Blocks
Laboratories
Hostels


Rajaseetapuram, Odisha, India
Campus Building, Parlakhemundi Rd,
Rajaseetapuram, Odisha 761211, India
28.82° C
Lat N 18° 48' 22.266" Long E 84° 8' 32.5248"
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Rajaseetapuram, Odisha, India
Unnamed Road, Rajaseetapuram, Odisha 761211, India
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Long E 84° 8' 20.1264"
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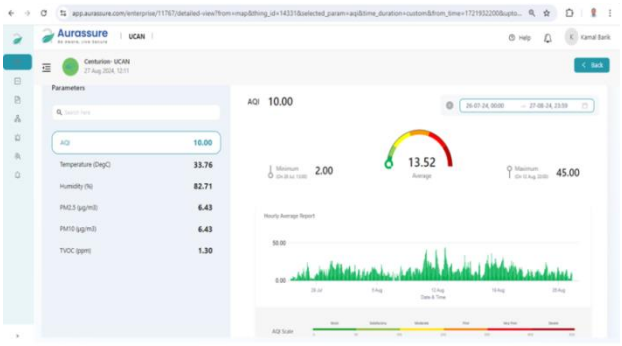
Fig-15: Green Campus and Micro-forest at Centurion University

7. Research, Education & Capacity Building

Program	Students Trained	Outcome	SDG Link
B.Tech Renewable Energy	120	Solar &Microgrid Projects	4.4 / 7.a
Diploma Solar Technician	200	On-site Installations	7.1
Skill Development (OSDA)	250	Community RE Awareness	4.7 / 7.a

Research Highlights:

- IoT-based Smart Grid Simulator developed in-house.
- 2 patents filed on energy analytics and biogas efficiency.
- 3 start-ups incubated under Centurion University Innovation Hub.



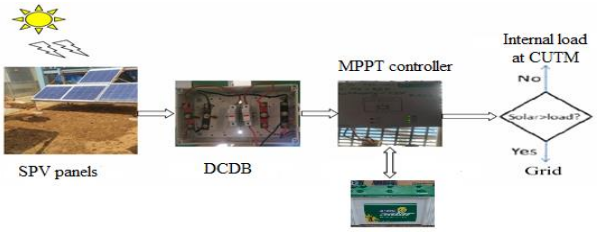
Real time monitoring

Solar operated Controller

Solar powered cycle

EV Bicycle

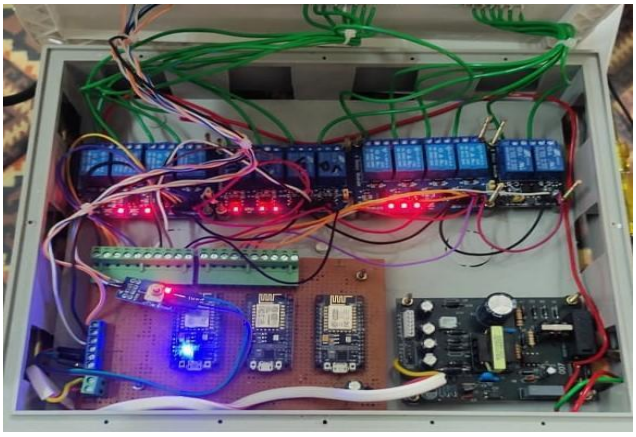
Solar Fencing

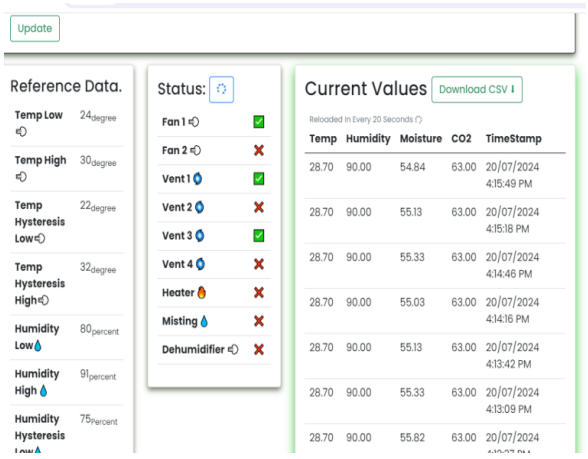


Micro-GRID

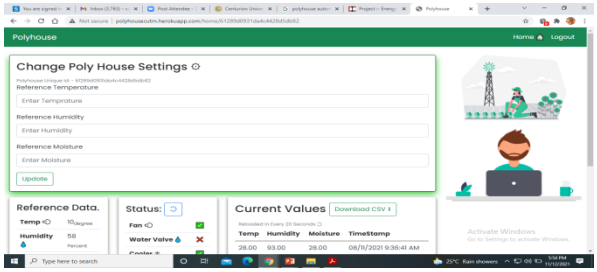
Solar Operated Irrigation System

IoT based Vanilla Dome and Trellis for climate resillent cultivation



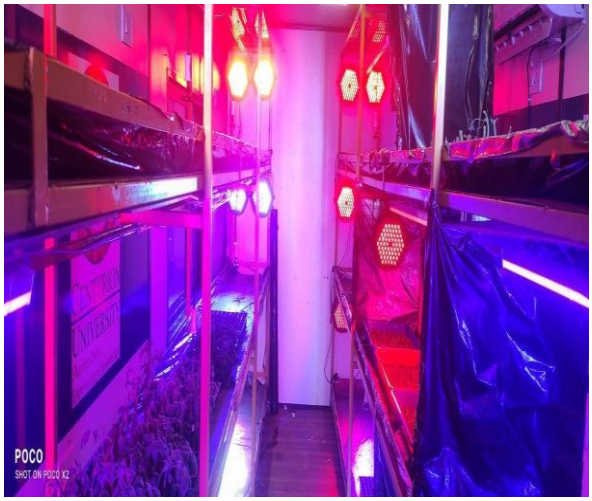


Automated Polyhouse



Web Dash Board

Saffron Unit



IoT based Growth Chamber

Fig-16: Research and Innovation at Centurion University

Table: Comparative Performance of Conventional vs. Centurion University Automated Smart Structures

Parameter	Conventional Practice (Baseline)	Centurion University Geodesic Dome	Centurion University IoT Polyhouse	Centurion University Speed Breeding Chamber	Centurion University Biochar Production Unit	Centurion University Bioenzyme Production Unit
Annual Energy Use	High grid/diesel dependence	~18,000 kWh (40% saving)	~21,500 kWh (30% saving)	~12,000 kWh (50% saving)	~15,000 kWh (renewable-integrated)	~8,000 kWh (solar-assisted)
CO_2 Emissions	~25 tons/year	~15 tons/year (↓ 10 tons)	~18 tons/year (↓ 7 tons)	~10 tons/year (↓ 5 tons)	Avoids ~8–10 tons/year from residue burning	Avoids ~3–4 tons/year from chemical substitution
Water Use Efficiency	Baseline (100%)	55% less water	40–50% less water	Closed system (NA)	Enhances soil water retention when applied	Supports wastewater recycling

Crop Yield / Productivity	Baseline (100%)	+38–42%	+30%	Enables 4–6 cycles/year	Soil fertility boost (10–15% higher yield)	Improves soil microbial activity (+15–20%)
Energy Source	Grid electricity + diesel backup	Solar + Grid hybrid	Solar + Grid hybrid	Solar + LEDs	Solar-assisted pyrolysis kilns	Solar-assisted fermentation
Resilience / Sustainability	Moderate, prone to shocks	High (cyclone-resistant dome)	Moderate (reinforced structures)	High (controlled setup)	High (waste-to-energy + soil health)	High (waste-to-value + chemical-free process)

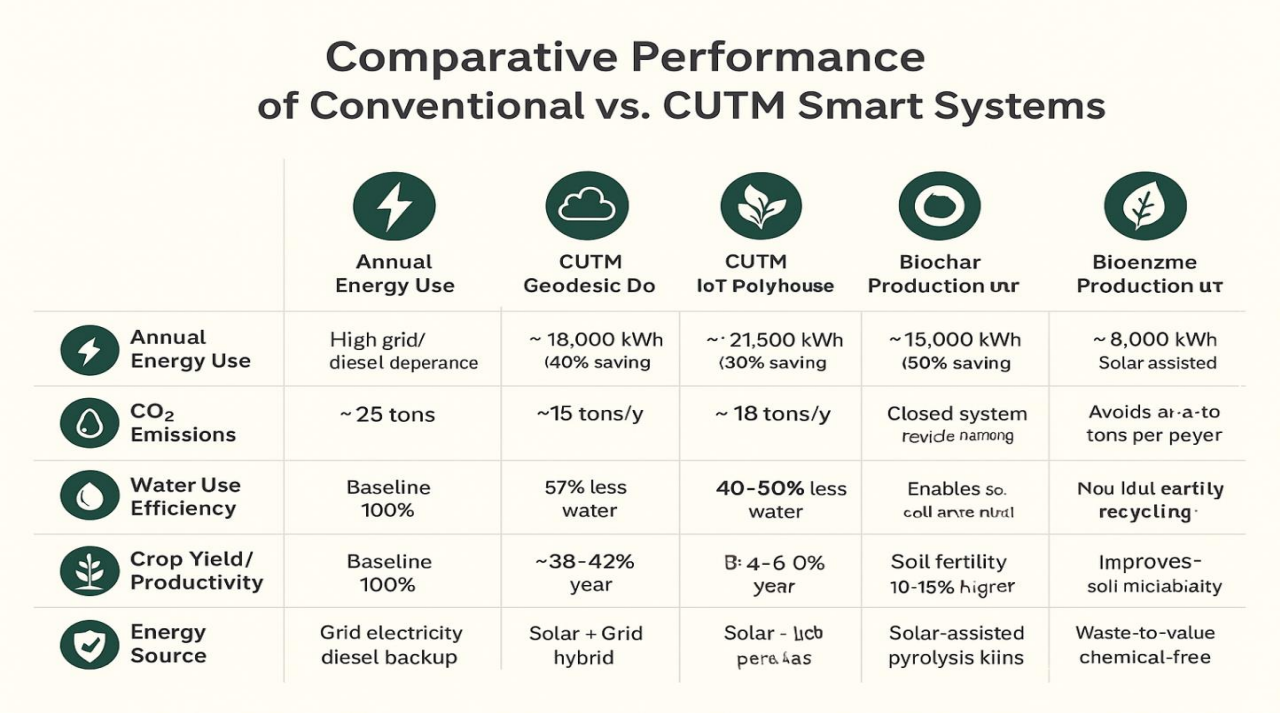
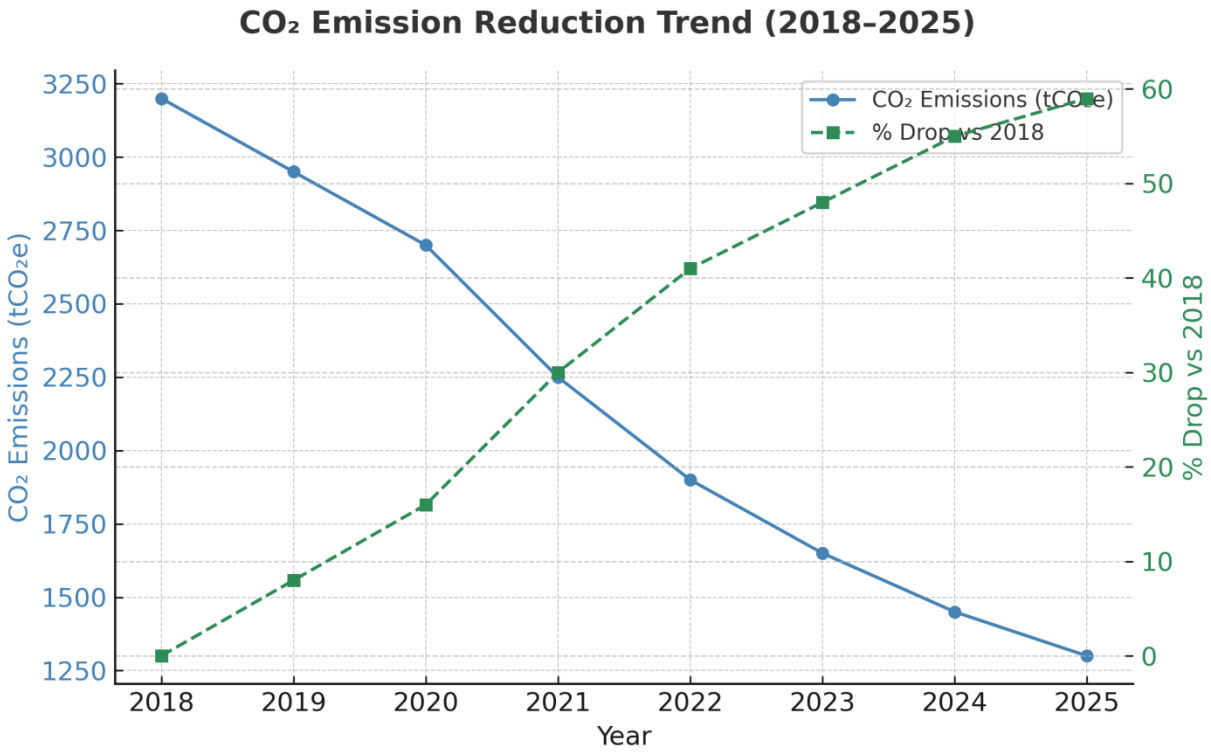


Fig 17.Comparative Chart Showing Performance of Conventional vs Centurion University Smart Systems

8. Monitoring & Impact Assessment

Indicator	2020	2024	Target 2030	Unit
Renewable Share	15%	**54%**	80%	%
Grid Import	4,000	**2,300**	1,000	MWh
CO_2 Emissions	3,200	**1,450**	Net Zero	tCO_2e
Energy Efficiency Gain	0.45	**1.2**	2.0	GWh



9. Cross-SDG Impact Note: Integrating SDG 7, SDG 9, and SDG 13

SDG 7 ⇆ SDG 13

- Renewable generation directly reduces Centurion University's Scope 2 emissions.
- 1,450 tCO_2e avoided annually under SDG 13.2 (Climate Action).
- Energy audits ensure consistent GHG reporting.

SDG 7 ⇆ SDG 9

- Smart Microgrid and IoT R&D Lab link innovation with industry.
- 8+ student startups on EV conversion and solar systems.

Synergy Summary

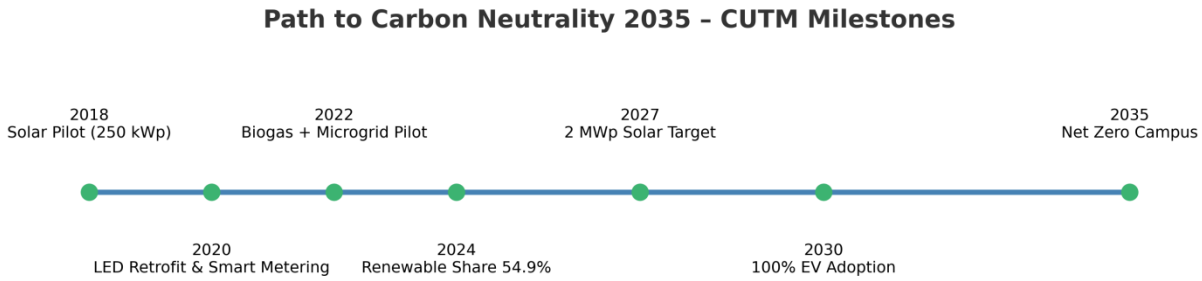
SDG	Focus	Outcome
SDG 7	Clean Energy	54% Renewable Share
SDG 9	Innovation	Energy-tech startups

SDG 13	Climate Action	1,450 tCO_2e avoided

10. Future Roadmap (2025–2035)

Key Milestones:

- Expand solar capacity to 2 MWp by 2027.
- 10 district-scale microgrids by 2028.
- 100% EV adoption across campuses by 2030.
- Achieve **Net Zero Emissions by 2035.**



Training Program on Solar Operated Systems in Schneider Lab

The University conducted a practical session providing hands-on experience in understanding, designing, and operating solar-based power systems, focusing on Solar DC Systems and Solar Hybrid Systems in its Schneider lab. 60 students undertook this training. The session aimed to familiarize students with renewable energy concepts, system components, wiring, load management, and smart energy conversion techniques using Schneider Electric training modules. In the Solar DC System experiment, students learned the functioning of a standalone photovoltaic (PV) setup. The system consisted of solar PV panels, a charge controller, DC load units, and a battery bank for energy storage. The key objective was to measure solar irradiance, determine output voltage and current, and observe the charging and discharging characteristics of the DC battery system. Students analyzed system efficiency and load behavior under different sunlight conditions, emphasizing the importance of DC distribution for minimizing conversion losses and improving energy utilization.

The Solar Hybrid System practical introduced the concept of integrating solar energy with grid supply and battery backup to ensure reliable power availability. The setup included PV panels, hybrid inverter, charge controller, grid interface, and AC/DC loads. Students explored grid-tied, off-grid, and hybrid operating modes, gaining insights into automatic switching between power sources. The experiment demonstrated how hybrid systems optimize energy use by prioritizing solar power, using the battery during low generation, and connecting to the grid when necessary. Through this lab, students gained practical skills in system wiring, load balancing, safety measures, and performance monitoring. The experience reinforced theoretical knowledge of renewable energy systems and illustrated how Schneider Electric's smart energy solutions contribute to sustainable and efficient power management in real-world applications.

Students Taking Training in Schneider Lab

11. Conclusion

Centurion University has demonstrated a strong institutional commitment to Sustainable Development Goal 7 (Affordable and Clean Energy) through a holistic, multi-dimensional approach that integrates renewable energy adoption, energy efficiency, sustainable agriculture, community outreach, and skill development. The university has successfully installed and scaled solar photovoltaic systems, microgrids, biogas plants, and hybrid renewable models, significantly reducing its dependency on conventional energy sources while setting benchmarks in green campus development. Its large-scale initiatives ranging from LED retrofitting, rainwater harvesting, e-vehicle promotion, micro-forestry, and environmental monitoring systems reflect a deep alignment of infrastructure with ecological responsibility.

Beyond campus operations, Centurion University has extended its impact to rural communities, farmers, and cooperative societies through targeted capacity-building, farmer training, and demonstration of climate-smart practices such as solar irrigation, drip and sprinkler systems, automated polyhouses, and solar-based livelihood technologies. These initiatives ensure that clean energy interventions are not just institutional best practices but also tools for grassroots empowerment, livelihood enhancement, and climate resilience. The report clearly establishes Centurion University as a living laboratory for sustainability, where research, education, and community engagement converge to create scalable models for a low-carbon future. By aligning its practices with national policies like the National Green Hydrogen Mission (NGHM) and global climate goals, the university positions itself as a frontrunner among higher education institutions in India. Centurion University's integrated model of innovation, inclusivity, and impact ensures that sustainability is not an isolated agenda but a lived culture preparing students, communities, and stakeholders to actively contribute toward India's clean energy transition and global climate action.

12. Annexures

- Annual Energy Audit Summary 2024
- MNRE & NISE MoUs