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Institutional Energy Efficiency and Consumption Reduction Strategy

CUCAF: Energy Efficiency & Consumption Reduction Plan

Centurion University of Technology and Management | Institutional Energy Management Plan

Under the Centurion University Climate Action Framework (CUCAF), the University implements a structured, measurable, and continuously reviewed plan to reduce overall energy consumption, improve energy efficiency, optimise operational costs, and minimise greenhouse gas emissions across its campuses. The plan is grounded in the 2025 energy audits conducted at the University campuses. It follows a six-stage cycle: establish the energy baseline, identify major consumption areas, implement efficiency measures, set reduction targets, monitor performance, and periodically review outcomes.

Energy efficiency action plan/measures

Action 1: HVAC optimisation

- Prioritised the energy-efficient inverter air conditioners and optimized operating schedules and temperature settings.
- Maintaining the filters and equipment, and avoiding cooling unoccupied rooms.
- Review HVAC energy consumption monthly.

Action 2: Lighting and electrical equipment

- Maintaining and expanding LED lighting adoption where conventional fixtures remain.
- Replaced conventional fans with BLDC fans in priority areas.
- Introduced shutdown protocols for computers, printers, projectors, and other equipment after use.

Action 3: Solar energy integration

- Synchronising existing solar installations with the electricity grid where technically feasible.
- Evaluating additional rooftop solar capacity based on load profiles and feasibility.
- Prioritising solar-hybrid systems for water pumping.

Action 4: Water pumping and utility management

- Assessing the pump efficiency and operating hours.
- Installing water-tank overflow controllers to prevent unnecessary pumping.

- Evaluate pump capacitors and other electrical improvements where justified by technical assessment.

Action 5: Green campus behaviour

- Implemented a Green Office programme and energy-saving guidelines.
- Assigned energy-saving responsibilities to departments and building coordinators.
- Conducted awareness campaigns and share campus-level energy performance.

Proposed Energy Consumption Reduction Targets, Projected

Based on actual values for 2025, projections for 2026–2028 have been developed using observed growth rates. This ensures consistency in reporting and provides a reliable estimate of total and low-carbon energy progression.

Year	Total Energy (GWh)	Total Energy (GJ)	Low-Carbon Energy (GWh)	Low-Carbon Energy (GJ)	Low-Carbon Share (%)
2023	8.16	29376	4.39	15804	53.8
2024	8.57	30852	4.71	16956	54.94
2025	8.99	32364	5.05	18180	56.17
2026	9.44	33984	5.42	19512	57.42
2027	9.91	35676	5.8	20880	58.55
2028	10.4	37440	6.21	22356	59.71

The projection from 2023 to 2028 indicates steady growth in both total and low-carbon energy use. While total energy demand is expected to rise from 29376GJ (2023) to approximately 37440GJ (2028), low-carbon energy is projected to grow from 15804GJ to 22356GJ over the same period. This results in an increase of low-carbon (Energy from renewable sources including solar installation) share from 53.80% in 2023 to 59.71% in 2028, demonstrating the University's consistent alignment with SDG 7 targets and its strengthening reliance on clean energy solutions.

Monitoring and Measurement & Verification (M&V)

The CUCAF coordination team maintains a central energy performance dashboard and reviews progress using the following indicators.

Indicator	Monitoring frequency
Electricity consumption (kWh) by campus and building	Monthly
Maximum demand and power factor	Monthly
HVAC, lighting, and pump performance	Quarterly

Renewable electricity generated and utilised	Monthly
Energy consumption per student and per square metre	Quarterly
Electricity expenditure and verified savings	Quarterly
Progress against projection/reduction targets	Quarterly and annually

By 2035, CUTM targets more than 75% low-carbon energy integration through a combination of solar expansion, smart energy management, energy-efficient infrastructure, and decentralized sustainable technologies. This transition will significantly reduce institutional greenhouse gas emissions, strengthen energy resilience, reduce dependence on conventional grid electricity, and support the University's long-term carbon neutrality and climate action commitments. The roadmap also supports experiential learning, sustainability research, and community demonstration models through the CUCAF framework and campus living laboratories.

These are based on:

- Campus infrastructure expansion trends
- Planned renewable energy installations
- Smart campus and EV integration plans
- Annual sustainability and carbon reduction targets
- Low-carbon technology deployment roadmap

These demonstrate Centurion University's commitment toward measurable, data-driven, and scalable climate action aligned with global sustainability frameworks and institutional carbon neutrality goals.

Energy Audit at Different Campuses of Centurion University

Centurion University had conducted a comprehensive Energy Audit across its campuses in 2025 (valid upto 3 years) as part of its commitment to improving energy efficiency and promoting sustainable operations. The audit involved a systematic evaluation of energy consumption patterns in academic buildings, laboratories, hostels, and administrative facilities. It identified key areas for energy optimization, including lighting systems, HVAC units, and equipment usage. Based on the findings, the university has implemented measures shown in the table given below.

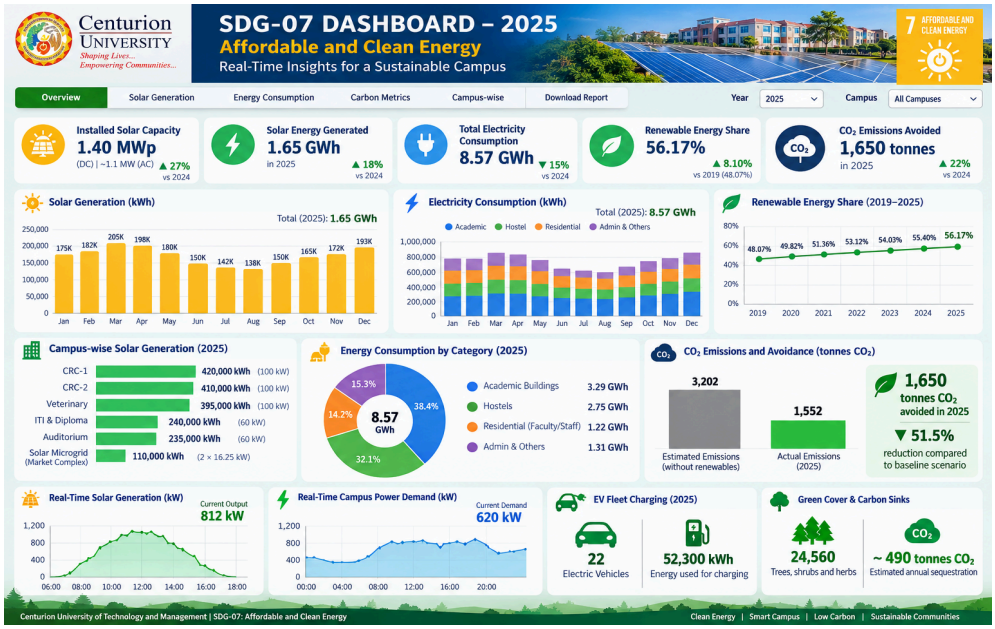
Energy Efficiency and Energy Wastage Reduction Plan

Sl. No.	Target Area	Measures Identified / Implemented	Location / Coverage	Timeline
1	Lighting systems	LED retrofitting and energy-efficient lighting	University buildings and facilities	Ongoing

2	HVAC systems	Optimisation of air-conditioning operation and maintenance	Academic and administrative buildings	Ongoing
3	Electrical equipment	Use of energy-efficient appliances and equipment	Offices, classrooms and laboratories	Phased implementation
4	Solar energy	Solar PV integration and grid synchronisation where required	Solar installations	Ongoing
5	Electricity demand	Review of contracted demand, peak loads and electricity consumption	Campus electrical connections	Regular reviews
6	Water pumping systems	Solar-hybrid pumping, pump capacitors and water-tank overflow controllers	Water supply systems	As recommended by energy audits
7	Energy wastage identification	Energy reviews to identify high-consumption areas, inefficient equipment and avoidable energy use	Across university facilities	Periodic reviews
8	Energy monitoring	Review of electricity bills, meter readings and energy-saving performance	University facilities	Monthly monitoring and annual assessment

3.3 IoT-Based Smart Energy Management

- Real-time dashboards for solar generation, energy consumption, and carbon metrics.
- Predictive maintenance alerts for grid stability and energy optimization.



Governance Mechanism:

- **Energy Planning Committee (EPC):** Annual audits and energy performance tracking.
- **Smart Campus Monitoring:** IoT-enabled dashboards across 6 campuses.
- **Green Procurement Policy:** Prioritization of high-efficiency electrical and HVAC systems.

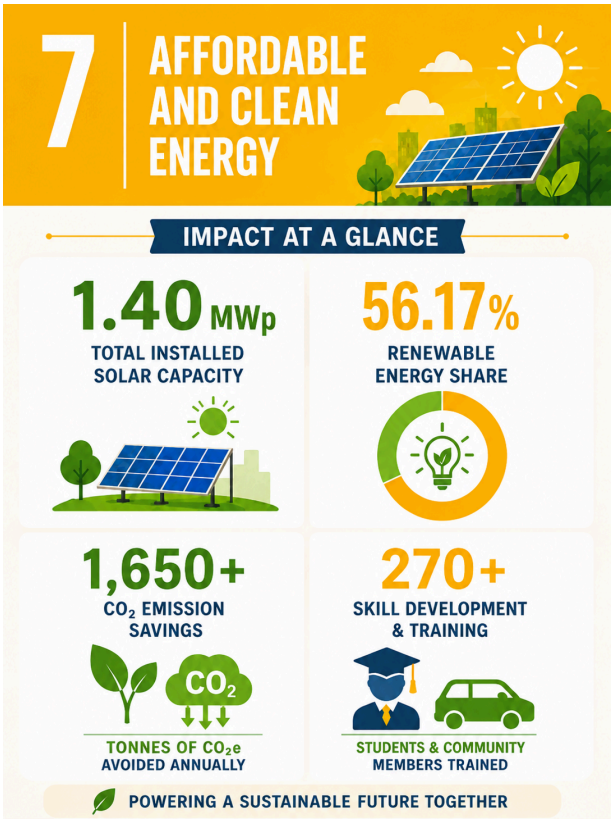
Scope Reporting:

CUTM adheres to the Business Responsibility and Sustainability Reporting framework for Scope 1 & 2 emissions under India's Corporate Carbon Target System (CCTS).

- Scope 1 (Direct Emissions): Campus generators, biogas plants, and vehicles.
- Scope 2 (Indirect): Purchased electricity.
- Scope 3 (Value Chain): Monitored under pilot study (2025 onwards).

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.

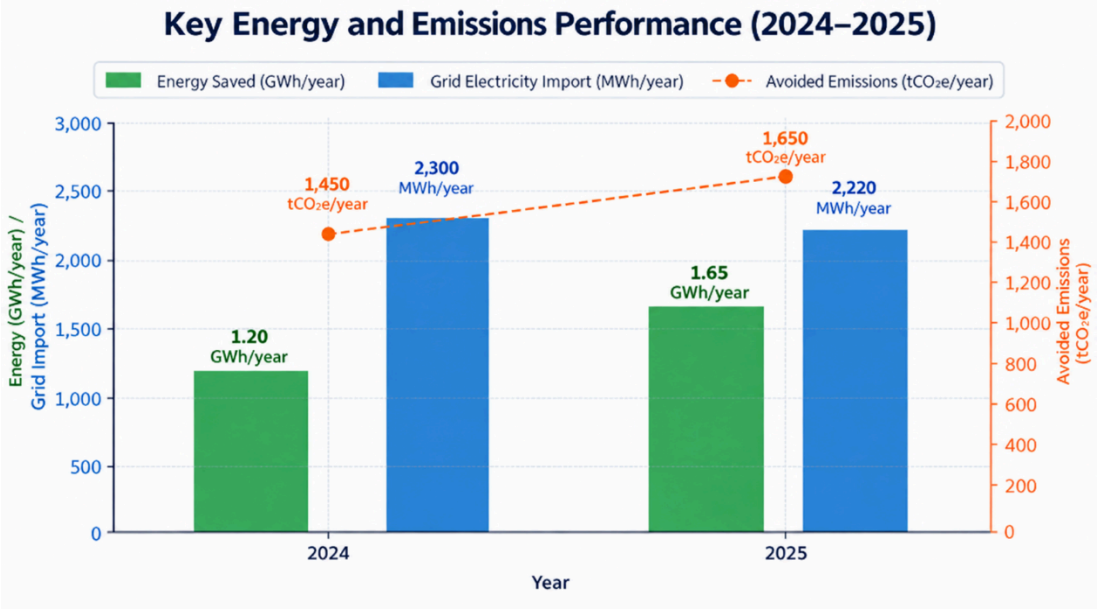


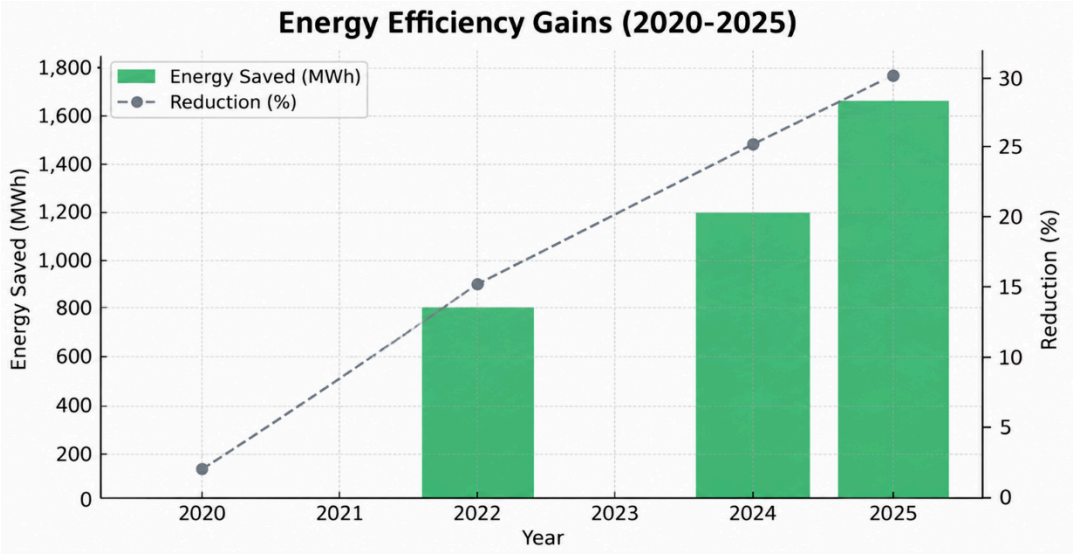
2024–2025 Performance Trend

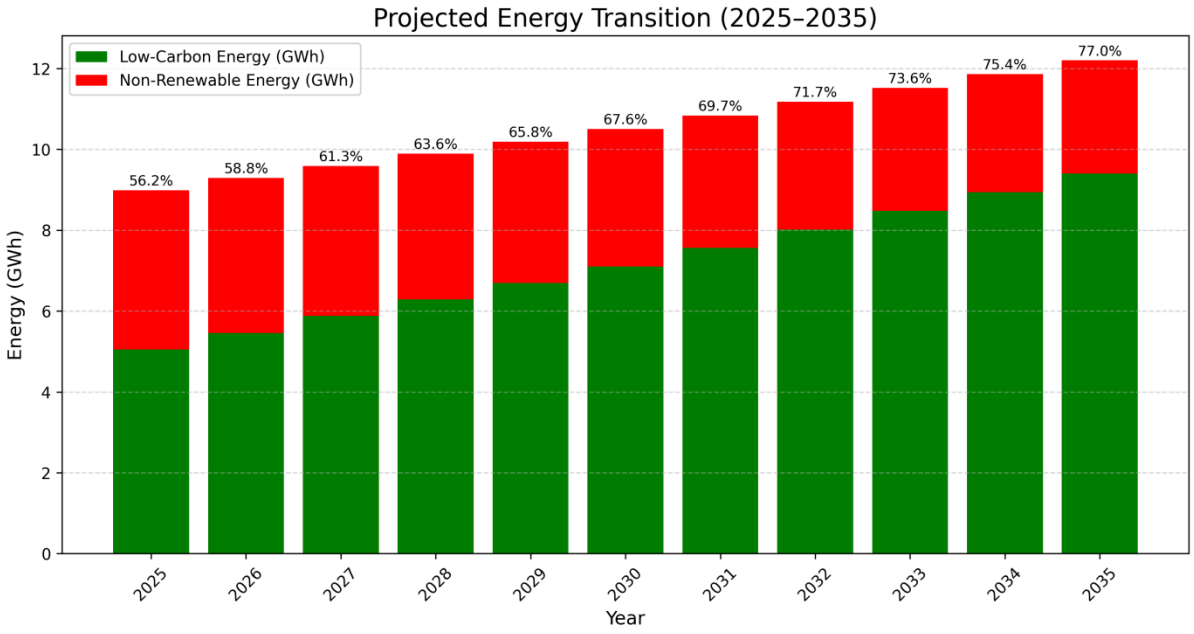
The current-year plan builds on the 2024 baseline. The comparison below reflects figures reported in the two versions; confirm that campus coverage, reporting periods, and calculation methods are consistent before external submission.

Indicator	2024	2025	Trend / validation note
Installed solar capacity	1.25 MWp	1.40 MWp	Increase of 0.15 MWp (+12%);
Renewable energy share	55%	56.17%	Increase
Energy saved through LEDs/HVAC/smart controls	1.20 GWh/year	1.65 GWh/year	Increase of 0.07 GWh/year (+5.8%)
Annual avoided emissions	1,450 tCO_2e/year	1,650 tCO_2e/year	Increase of 200 tCO_2e/year (+13.8%)
EV integration	75 EVs / 16 charging points	80+ EVs / 17 charging points	Reported fleet growth and one additional charging point
Solar trees	10 functional	11 functional	Increase of one functional solar tree
Biogas throughput and output	50 kg/day; 12 kWh/day; ~1 tCO_2e/year avoided	150 kg/day; 36 kWh/day; ~3 tCO_2e/year avoided	Validate through feedstock, generation, and emissions calculation logs.
Solar-powered agricultural systems	20+ irrigation systems; 10 solar dryers	27+ irrigation systems; 14 solar dryers	Reported expansion

Smart polyhouse energy reduction	40–50%	45–55%	Specify baseline, measurement period, and calculation method.
Students trained in renewable energy	250+	270+	Increase of at least 20 participants
Campus monitoring coverage	5 campuses	6 campuses	Verified
Grid electricity import	2,300 MWh	2,220 MWh	Reduction of 80 MWh (3.5%)







Monitoring & Impact Summary (2025)

Indicator	2020 Baseline	2025 Value	Target 2030	Unit	% Change (2020–2025)
Renewable Share	49.44%	56.17%	80%	%	+ 6.73%
Energy Saved	0.2	1.65	2.0	GWh	34.5%

Grid Import	4,000	2,220	1,000	MWh	−44.5%
CO_2 Avoided	500	1,650	Net Zero	tCO_2e/yr	+230%
EV Integration	10	80+	100	Vehicles	+700% or more

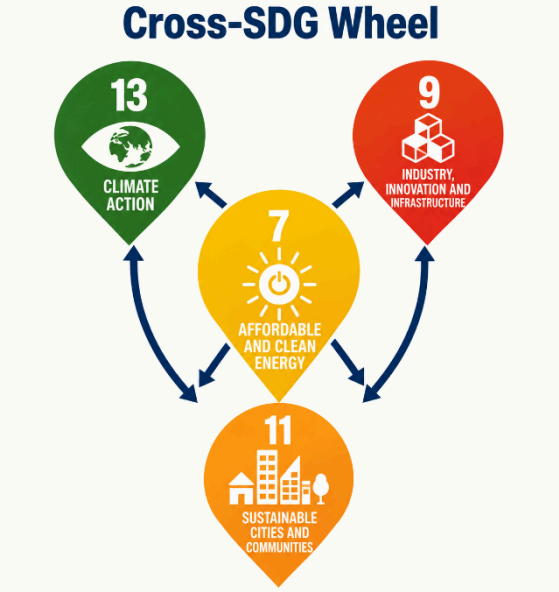
6. Cross-SDG Integration

SDG 7 ↔ SDG 9 (Innovation):
Smart Microgrid R&D Lab, 9 clean-tech start-ups incubated.

SDG 7 ↔ SDG 13 (Climate Action):
Renewable generation avoids 1,650 tCO_2e annually under the university's Carbon Neutrality Roadmap (2035).

SDG 7 ↔ SDG 11 (Sustainable Cities and Communities)

Integration of renewable energy solutions, solar-powered street lighting, electric mobility, and energy-efficient campus infrastructure to promote sustainable, low-carbon, and climate-resilient communities.



7. Future Roadmap (2025–2035)

- 2 MWp Solar by 2030.
- Full EV campus fleet by 2030.
- Carbon-neutral certification by 2035.

Annual Energy Efficiency Management Cycle

CUTM's energy-efficiency plan should follow a documented annual cycle: establish a campus-wise energy baseline; collect electricity, solar-generation, fuel, and operating-hour data; identify high-consumption buildings and equipment; prioritize LED, HVAC, motor, control, and renewable-energy interventions; monitor monthly performance through meters and dashboards; conduct an annual energy audit; and record corrective actions and verified savings. Report measured savings separately from modeled estimates and avoid double-counting overlapping interventions.

Evidence to Retain for Annual Reporting

Retain the approved energy plan and audit reports; campus-wise electricity bills and meter logs; solar-generation records; retrofit and commissioning records; EV/charger registers; biogas feedstock and generation logs; training attendance; and calculation sheets for energy savings and tCO_2e avoided. Apply the same reporting boundary and emission factors in year-on-year comparisons.

8. Conclusion

CUTM's institutional energy efficiency plan demonstrates a data-driven, multi-layered approach integrating technology, education, and outreach. With measurable progress toward renewable energy, reduced grid dependency, and emission mitigation, the university stands as a national model for energy-smart campuses advancing SDG 7 and its interlinked goals.