Centurion University
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SUSTAINABLE DEVELOPMET GOAL 13

CLIMATE ACTION

Centurion University – SDG 13 (Climate Action) Overall Report

Aligned with SDG 2 (Zero Hunger), SDG 4 (Quality Education), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), SDG 15 (Life on Land), and SDG 17 (Partnerships for the Goals).

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Executive Summary

Centurion University recognises that addressing climate change is not only an environmental necessity but a moral imperative. In alignment with the Paris Agreement and the United Nations 2030 Agenda, the University is advancing SDG 13: Climate Action through a comprehensive, data-driven approach that integrates education, innovation, infrastructure, and community resilience. Centurion University has established the Centurion University Climate Action Framework (CUCAF) - a strategic roadmap that commits the University to achieving net-zero carbon neutrality for Scope 1 and 2 emissions by 2035, and full carbon neutrality (including Scope 3) by 2040. The Framework embeds sustainability across operations and learning, emphasising renewable energy adoption, energy efficiency, climate education, and disaster preparedness.

In 2024, low-carbon energy accounted for 54.94% of total electricity use, a significant increase from 48.07% in 2019, achieved through LED retrofits, automation, and solar expansion across campuses. The University generated approximately 4.71 GWh of clean energy out of 8.57 GWh total consumption, verified through smart metering, annual energy audits, and the Aurassure environmental dashboard system. These initiatives are projected to raise the renewable energy share to nearly 60% by 2028, demonstrating Centurion University's measurable progress toward its climate neutrality goals. The University's campuses integrate solar rooftops, green buildings, biochar production, polyhouse automation, vanilla dome cultivation, and speed breeding chambers that reduce emissions while improving productivity. Energy audits, smart sensors, and weather-linked energy dashboards ensure accountability, adaptive planning, and optimized resource use. Beyond infrastructure, Centurion University drives climate literacy and capacity building through experiential learning, community-based adaptation projects, and grassroots partnerships. Students and faculty engage with local governments, NGOs, and rural communities to promote climate-smart agriculture, water conservation, and sustainable livelihoods, ensuring that academic knowledge translates into tangible environmental impact.

The University's Green Campus Initiative integrates climate-friendly transport, biodiversity restoration, and waste-to-energy models, creating a measurable reduction in emissions while cultivating long term behavioural change. Through Aurassure-enabled air quality monitoring, Centurion University also contributes to urban climate data systems that inform local planning and resilience-building. Centurion University is turning climate action into a movement - one that balances academic innovation with social and climate accountability.

Summary - Our Impact on SDG 13 - Climate Action

Dimension	Impact Area/Indicator	Initiatives	2024 Data	Output	Impact	2030 Target
Innovation & Integration	Integrate climate action into infrastructure and development planning.- SDG 13.2	Low-Carbon Energy Transition	4.71 GWh (55%) low-carbon share; 15% emission reduction vs. 2023	Solar PV expansion, LED retrofits, electric buses, biogas plants, and hybrid lighting	Reduced campus emissions through solar PV, LED retrofits, electric buses, biogas, and hybrid lighting, supporting the low-carbon transition.	68% low carbon share
	Integrate climate change into institutional governance and planning.- SDG 13.2	Climate Action Plan (CUCAF)	Adopted institution-wide in 2024	Integration of climate policies in planning, infrastructure, and governance	Strengthened planning, governance, and infrastructure management, embedding systematic climate action across the institution.	

	Integrate climate change into institutional governance and planning.- SDG 13.2	Smart Energy Monitoring	IoT-based dashboards across 3 campuses	AI-driven monitoring of solar grids, HVAC efficiency, and water-energy nexus	Enabled real-time monitoring of solar grids, HVAC, and water-energy nexus, improving energy efficiency and operational sustainability.	
Mobilization & Mitigation	Integrate climate change measures into national policies, strategies, and planning.- SDG 13.2	Community Engagement for Climate Resilience	8,000+ rural and tribal beneficiaries in Odisha	Climate-smart agriculture, micro-irrigation, dome automation, and polyhouse projects	Enhanced resilience of rural and tribal communities via climate-smart agriculture, micro-irrigation, dome automation, and polyhouse projects.	
	Promote low-carbon infrastructure and industrial efficiency- SDG 13.2	Carbon Footprint & Emission Reduction	1,450 tCO_2e reduced in 2024	Energy optimization, afforestation, waste-to-wealth systems, and STP reuse initiatives	Avoided emissions through energy optimization, afforestation, and waste-to-energy initiatives, contributing directly to climate mitigation.	

Participation & Partnerships	Mobilize funds and partnerships for climate action-SDG 13.a	Government & NGO Collaboration	MoUs with IMMT, NRDC, OREDA, and Odisha Govt.	Joint initiatives on biochar, renewable R&D, and technology transfer	Enabled joint renewable energy projects, technology transfer, and applied R&D, amplifying institution-wide climate impact.	
	Improve institutional capacity building and training.-SDG 13.3	Capacity Building & CHSE Training	35 ITI/Polytechnic principals + 80 CHSE teachers trained	Workshops on climate education and green skills	Enhanced climate literacy and equipped educators to integrate climate and sustainability education in schools.	
Awareness & Advocacy	Improve education, awareness, and human and institutional capacity on climate change mitigation, adaptation, and impact reduction.-SDG 13.3	Campus-wide Climate Awareness & Literacy	15,000+ students trained in sustainability and climate courses	Integration of SDG & climate modules across curricula; community awareness through Net Zero Superhero campaign	Built climate-conscious campus culture through SDG-aligned courses and awareness campaigns.	

	Strengthen ecosystem resilience and afforestation-SDG 13.1	Green Plantation Drives	5,000 saplings planted across 5 campuses and schools; 80+ species	Annual VanaMahotsav campaigns with student and community participation	Increased green cover and biodiversity, while engaging students and communities in environmental stewardship.	
Climate-Smart Solutions & Circularity	Enhance R&D and innovation for climate mitigation-SDG 13.3	Climate-Resilient Research	12 research projects; 6 patents pending	Climate-smart automation (vanilla dome, hydroponics, IoT-based irrigation)	Developed climate-smart automation solutions (IoT irrigation, hydroponics, dome automation) for adaptation and resilience.	
	Strengthen resilience and adaptive capacity to climate-related hazards.-SDG 13.1	Circular Economy and Zero Waste Campus	92.6% waste recycling rate; 900 kg plastic reused	Plastic paver block production, composting, and biogas for energy reuse	Promoted circular resource use via plastic paver blocks, biogas, and composting.	
Technology & Threat Reduction	Improve early warning and disaster risk reduction systems.-SDG 13.1	Disaster Risk & Early Warning Systems	Automated meteorological and weather data collection units deployed	AI-supported early warning alerts for flood and heatwave risks	Strengthened preparedness for floods and heatwaves through AI-supported early warning	

					alerts.	

1. Introduction

Centurion University recognizes the urgency of SDG 13 (Climate Action), which calls for immediate and sustained efforts to combat climate change and its far-reaching impacts. Climate change poses serious risks to human health, food security, water resources, and ecosystems, making it one of the most pressing challenges of our time. In alignment with the Paris Agreement and the United Nations' 2030 Agenda for Sustainable Development, the University has set a bold vision to achieve net-zero carbon neutrality by 2035 for Scope 1 S 2 emissions and full neutrality (including Scope 3) by 2040. To realize this vision, Centurion University has developed the Centurion University Climate Action Framework (CUCAF), which provides the strategic structure for implementing clean energy, promoting climate literacy, supporting grassroots-level adaptation, and engaging with local communities and governments. CUCAF adopts a holistic, systems-based approach that integrates renewable energy adoption, infrastructure retrofits, circular economy practices, zero-waste campus initiatives, capacity building, and collaborative disaster preparedness. By combining technology-driven solutions such as polyhouse automation, vanilla dome automation, and speed breeding chambers with awareness campaigns, green campus initiatives, circular economy models, and policy-level partnerships, Centurion University ensures that climate action is not only a matter of institutional compliance but also a transformative movement. The University has also launched the Net ZERO SUPERHERO Campaign, an innovative movement that empowers students, faculty, and local citizens to become climate champions through measurable individual and collective actions such as energy conservation, afforestation, and waste reduction. This comprehensive approach positions the University as a leader in higher education sustainability, demonstrating the importance of academia in achieving national and global climate goals.

2. Low Carbon Energy Tracking (Indicator 13.2.1)

Centurion University tracks low-carbon energy through smart meters, annual energy audits, and Aurassure dashboards. Between 2019 and 2024, the low-carbon energy share increased from 48.07% to 54.94%. Projections indicate this will reach nearly 65% by 2030. Key initiatives include LED retrofits, building automation, awareness campaigns, and annual audits. This tracking ensures accountability and reporting to local authorities.

Low-Carbon Energy Tracking

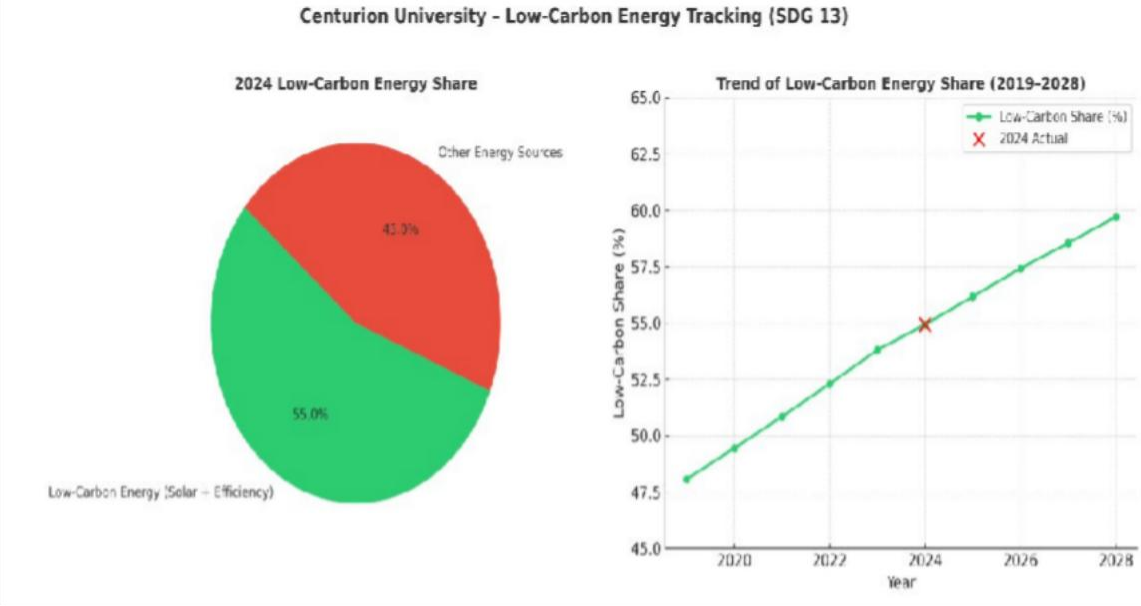
Centurion University has established a robust framework to measure and track low-carbon energy use across all campuses**,** thereby ensuring accountability and alignment with climate action goals under SDG 13.

Measurement Approach:

1. **Smart Meters S Dashboards** – All rooftop solar plants (total 150 kW commissioned till 2024) are connected with smart meters to track real-time generation in kWh.
2. **Energy Audits S Campus Records** – Annual energy audits record total grid electricity consumption vs renewable (solar) contribution**,** with data consolidated at the university level.
3. **Aurassure Integration** – While Aurassure primarily tracks air quality, weather, and environmental conditions, it is also integrated with campus energy dashboards to **correlate energy generation/usage with climate parameters**, improving efficiency planning.

2024 Progress:

- **Total Electricity Consumption:** ~8.57 GWh
- **Low-Carbon Energy (Solar + efficiency savings):** ~4.71 GWh= 16956GJ
- **Low-Carbon Share:** 54.94% of total consumption
- **Verified through energy audit (2024)** and reported in the **Annual Sustainability Report**, shared with **local Panchayats and DISCOM authorities**.



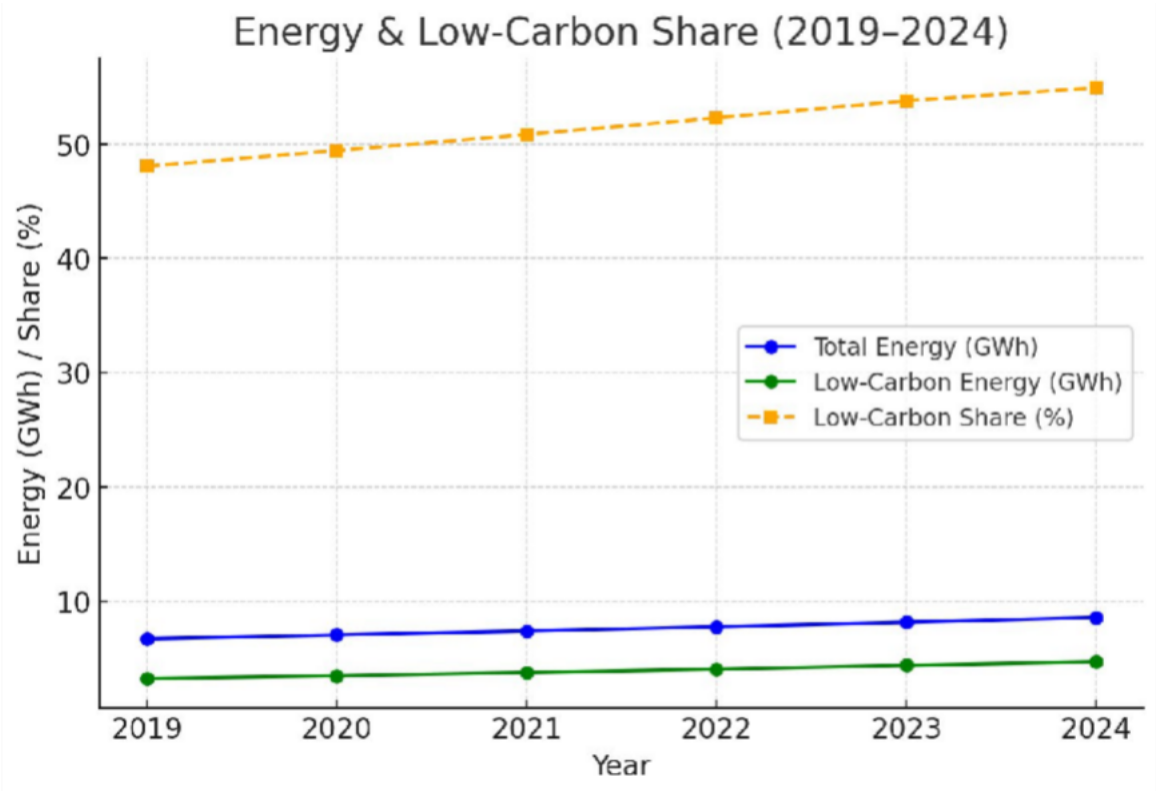
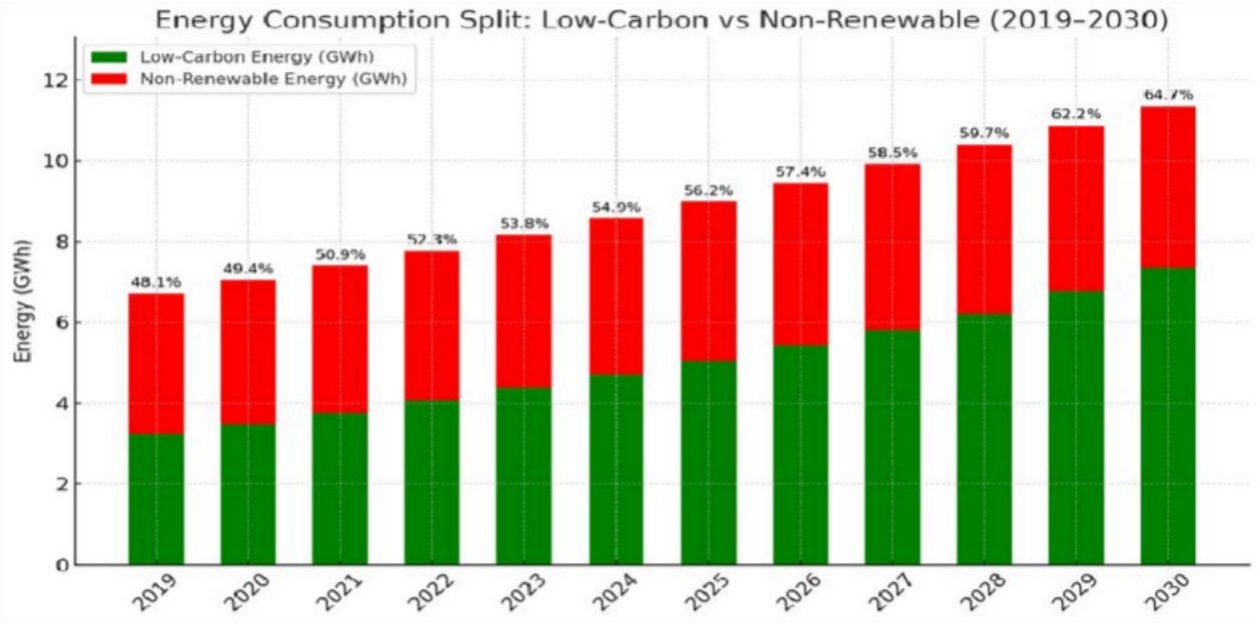


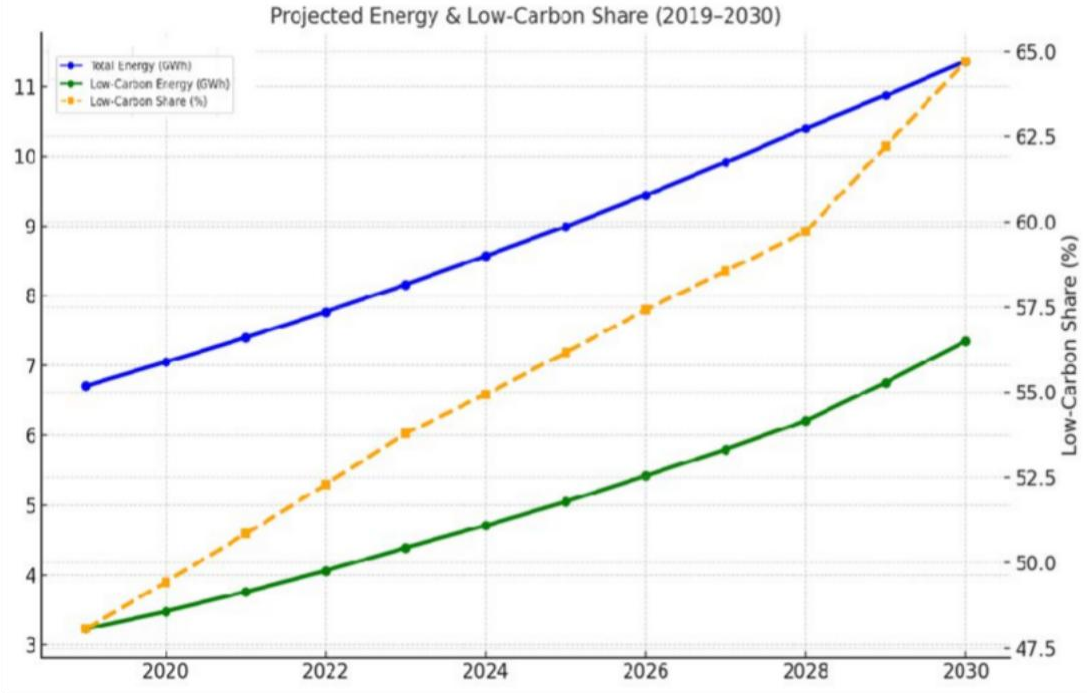
Table 1: Energy S Low-Carbon Share (2019–2024)

Year	Total Energy (GWh)	Total Energy (GJ)	Low-Carbon Energy (GWh)	Low-Carbon Energy (GJ)	Low-Carbon Share (%)
2019	6.71	24156	3.23	11628	48.07%
2020	7.05	25380	3.48	12528	49.44%
2021	7.4	14400	3.76	13536	50.85%
2022	7.77	27972	4.06	14616	52.30%
2023	8.16	29376	4.39	15804	53.80%
2024	8.57	30852	4.71	16956	54.94%



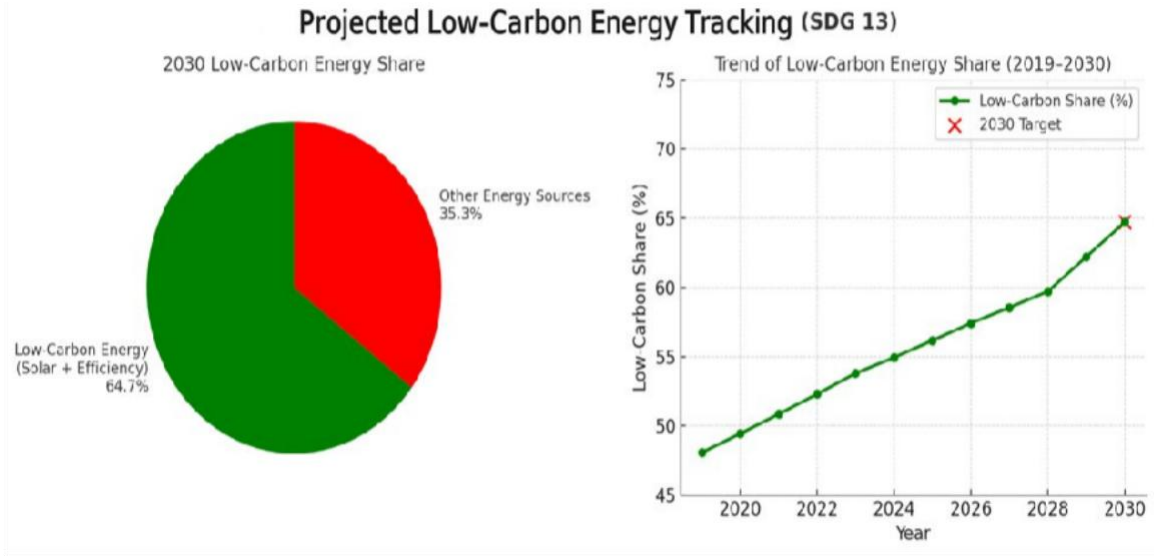
Projection of Energy Use (2023–2030)

Based on actual values for 2023 and 2024, projections for 2025–2028 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)	Low-Carbon Energy (GWh)	Low-Carbon Share (%)
2023	8.16	4.39	53.8
2024	8.57	4.71	54.94
2025	8.99	5.05	56.17
2026	9.44	5.42	57.42
2027	9.91	5.8	58.55
2028	10.4	6.21	59.71
2029	10.87	6.76	62.21
2030	11.36	7.35	64.71

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
2029	10.87	39132	6.76	24336	62.21
2030	11.86	42696	7.35	26460	64.71



Interpretation: The projection from 2023 to 2030 indicates steady growth in both total and low-carbon energy use. While total energy demand is expected to rise from 8.16 GWh (2023) to approximately 11.36 GWh (2030), low-carbon energy is projected to grow from 4.39 GWh to 7.35 GWh over the same period. This results in an increase of low-carbon share from 53.80% in 2023 to 64.71% in 2030, demonstrating the University's consistent alignment with SDG 7 targets and its strengthening reliance on clean energy solutions.

Community Academic Integration:

- Data is used in **student projects** and **climate literacy modules** to demonstrate low-carbon transitions.
- Shared with **local government bodies** as part of Centurion University's Climate Action Framework (CUCAF).

The University not only **measures** its low-carbon energy use but also **reports and validates** it annually, with 2024 data showing that **over half (54.94%) of total campus energy** now comes from low-carbon sources. This tracking mechanism underpins both institutional climate targets (carbon neutrality by 2035) and broader SDG 13 commitments.

3. Climate Literacy & Education (Indicator 13.3.1)

- Conducted plastic-free campaigns.
- Plastic paver blocks initiative: 900 kg of plastic was recycled, resulting in 15 tCO_2e emissions avoided.
- Capacity building for Principals of ITIs S Polytechnics (2024): Trained 35 education leaders in climate literacy and sustainable campus management. Additionally, Centurion University conducted climate sensitization and sustainability training for 120 CHSE (Council of Higher Secondary Education) teachers, focusing on climate- resilient education, renewable energy awareness, and green curriculum integration**.**
- Plantation drives (2024): 5,000 saplings planted across five campuses, representing over 80 native and fruit-bearing species. The initiative achieved an average survival rate of approximately 85% and an estimated carbon sequestration potential of about 42 tCO_2e per year.
- Nature Trails and Fireside Chats engaged youth in biodiversity and global climate.

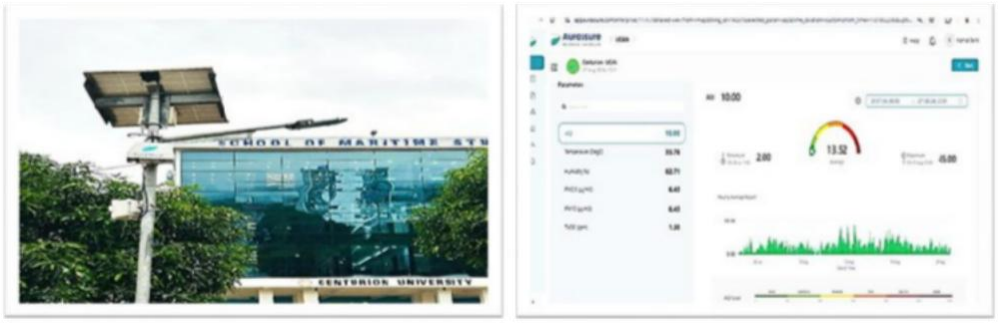


Fig-01: Aurassure system installed inside the Campus

Fig-02: Plastic Free Awareness and Collection Drive

Fig-03: Session on Capacity Building Program on Climate Change and SDGs

Fig-04: Future 5.0–Bharat Rising event

Fig-05: Plantation Drive

4. University Climate Action Plan (Indicator 13.3.2)

The CUCAF framework demonstrates measurable progress

- Carbon neutrality target: 2035.

- Climate literacy embedded into 22 programs (1,200 students engaged).
- 150 kW solar commissioned; energy audits reduced costs by 12%.
- Climate Action Plan shared with 7 Panchayats and 2 municipalities.
- Green campus retrofits (LED, HVAC efficiency, rainwater harvesting).

As part of its commitment to sustainability and environmental stewardship, Centurion University has developed and actively implemented a comprehensive Climate Action Plan. This plan not only outlines strategic initiatives but also demonstrates measurable progress made in 2024.

A. Vision

To establish Centurion University as a model for integrated climate action through education, clean energy innovation, and community-led sustainability initiatives.

B. Core Objectives & 2024 Progress

No.	Objective	2024 Progress Highlights
1	Achieve carbon neutrality across campuses by 2035	Baseline carbon footprint assessment completed; 7% reduction in grid electricity consumption achieved in 2024 through efficiency measures.
2	Mainstream climate literacy and sustainable development across academic programs	Sustainability integrated into **22 UG & PG programs**; 1,200 students participated in climate-related modules.
3	Expand renewable energy systems and green infrastructure	**150 kW rooftop solar** commissioned across 3 campuses in 2024; 2 green buildings upgraded with energy-efficient systems.
4	Strengthen community resilience through partnership-based climate adaptation projects	Climate Action Plan shared with **5 Panchayats and 2 local municipalities**; **6 training workshops** held with 220 farmers and self help group, SHG members.
5	Align institutional goals with	Annual reporting aligned with UN SDG metrics;

No.	Objective	2024 Progress Highlights
	SDG-7, SDG-11, and SDG-13	collaborative student projects on clean energy and sustainable cities documented.

C. Strategic Pillars & 2024 Implementation

Clean Energy Transition

- **150 kW rooftop solar** installed (2024).
- Energy audits conducted across 2 campuses, resulting in a **12% reduction in electricity costs**.
- "Solar Skill Lab" established, training 80 students.

Green Campus Infrastructure

- **4 buildings retrofitted** with LED and HVAC efficiency upgrades.
- Waste segregation implemented at 3 campuses; **5 tons of organic waste composted in 2024**.
- Rainwater harvesting expanded, storing **6 million litres annually**.

Climate Education S Research

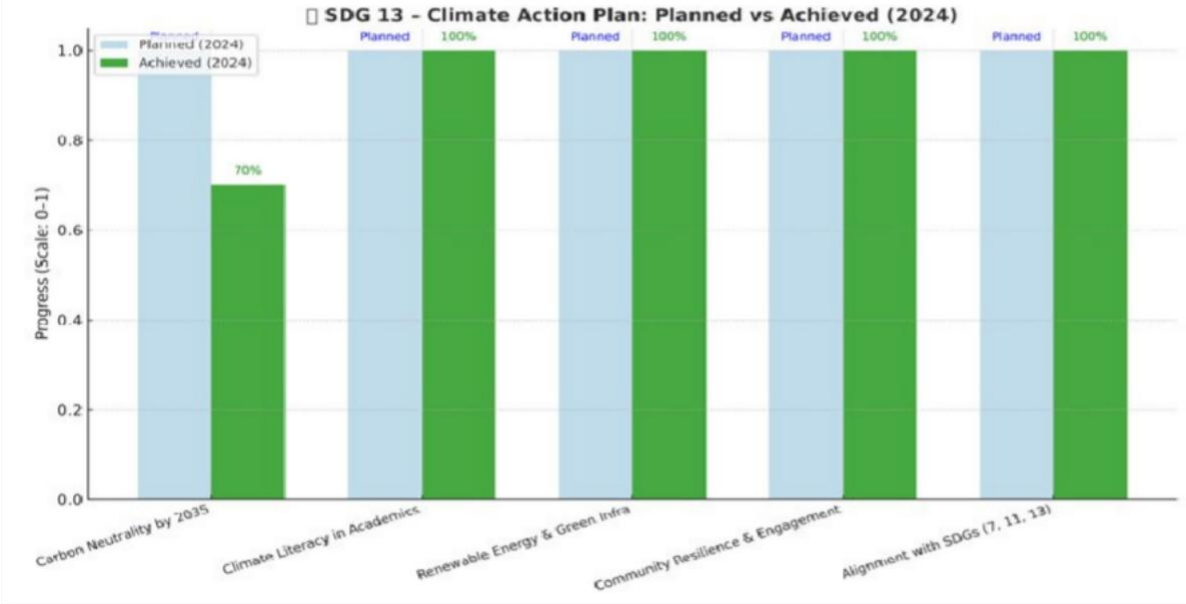
- Sustainability modules included in **22 programs**.
- Climate Innovation Lab established; **12 student-led research projects** on renewable energy and water resilience supported.
- **15 internships** facilitated with NGOs and clean energy firms.

Community Engagement

- Climate Action Plan shared with **7 local government/community bodies**.
- **8 plantation drives** (~5000 saplings).
- **6 awareness workshops** conducted, engaging ~600 community members.

Monitoring, Reporting S Evaluation (MRE)

- Published the **Annual Sustainability Report (2024)**.
- Baseline carbon footprint calculated; **7% reduction in 2024** compared to 2023.
- Climate Action Committee constituted, meeting **quarterly**.



The Centurion University Climate Action Plan (CUCAF) is not just a policy document, but a living framework. The measurable actions and impacts of 2024 demonstrate our strong commitment to climate action, while the alignment with SDG-7, SDG-11, and SDG-13 ensures global relevance and accountability.

5. Co-operative Planning for Disasters (Indicator 13.3.3)

Centurion University actively partners with local/regional bodies on disaster resilience:

- Indian Space Research Organisation (ISRO) workshop trained 56 participants on GIS, AI, drones for disaster management.
- The Ministry of Earth Sciences (MoES) and the Indian National Centre for Ocean Information Services (INCOIS) joint field campaign (RV Sagar Utkal) advanced coastal resilience.
- World Earth Day 2024 (MoES) linked conservation with early-warning systems.

Fig 06: One Day Awareness Workshop on Disaster Management and Mitigation

Fig 07: MoES-INCOIS and Centurion University joint Campaign

Fig-08: MoU sign with BRLF

Fig 09: MoU with CYSD

Fig 10: "Green Pioneer Award" by the Switch ON Foundation

6. Informing & Supporting Government (Indicator 13.3.4)

- CUCAF shared with 7 Panchayats and 2 municipalities.
- 6 training workshops for 220 farmers and SHGs.
- 8 plantation drives (~5000 saplings) with community and government representatives.
- Aurassure data integrated into local early-warning systems.

Centurion University actively informs and supports local and regional governments in addressing climate change risks, disaster preparedness, and early warning systems. The

university serves as a knowledge partner by providing data, expertise, training, and technological solutions that contribute to resilience building and evidence-based policymaking.

Key Initiatives (2024):

- **Climate Action Plan shared** with *5 Panchayats and 2 municipalities*, later extended to *7 government/community bodies*, ensuring integration of local climate priorities.
- Conducted **6 training workshops** on climate resilience and disaster preparedness, engaging **220 farmers and SHG members**, in collaboration with local governance structures.
- Organized **6 awareness programs** and **8 plantation drives** (~4,800 saplings), involving ~600 community members, with participation from local government representatives.
- Supported the design of **early-warning and monitoring initiatives** by correlating real-time environmental data (via the Aurassure monitoring system) with community-level risk planning.
- Integrated sustainability and climate resilience into **22 academic programs**, engaging over **1,200 students**, many of whom contributed to **policy-linked projects** with local bodies.

Impact:

These initiatives have directly strengthened the capacity of local governments to:

- Monitor environmental risks (using real-time data).
- Develop community-based disaster preparedness strategies.
- Enhance climate literacy at grassroots level.

Through these engagements, Centurion University reinforces its role as a regional hub of knowledge and innovation, supporting **climate action and disaster resilience planning** in partnership with government institutions.

7. Collaboration with NGOs (Indicator 13.3.5)

MoUs with CYSD, Harsha Trust, SELCO, SwitchON, BRLF support climate adaptation, renewable energy, and sustainable livelihoods.

Highlights 2024:

- 3 field projects on climate-resilient agriculture (BRLF S CYSD).
- 4 renewable energy workshops (~350 participants).
- 8 community outreach events (~1,200 participants).
- SwitchON engaged 400+ students; 5,000 saplings planted.
- Recognition: Green Pioneer Award 2024 by SwitchON Foundation.

Centurion University has entered into active collaborations with leading NGOs and community-based organizations to advance climate adaptation, sustainable livelihoods, and environmental education. The **Centurion University Climate Action Plan** has been formally shared and supported through MoUs with key NGOs including:

- **CYSD (Centre for Youth and Social Development)**
- **Harsha Trust**
- **SELCO Foundation**
- **SwitchON Foundation**
- **Bharat Rural Livelihood Foundation (BRLF)**

Scope of Collaboration

These partnerships span across:

- **Research and Innovation** – Joint projects on renewable energy, sustainable agriculture, and climate-resilient farming practices.
- **Capacity Building** – Training programs for farmers, SHGs, and rural youth on climate adaptation.
- **Community Engagement** – Plantation drives, awareness programs, and clean energy demonstrations in villages.
- **Academic Integration** – Exposure visits, guest lectures, and NGO-led student internships on climate action themes.

2024 Impact Highlights

- **MoU with BRLF and CYSD** facilitated **3 field-based projects** on climate-resilient agriculture and rural livelihoods.
- Collaborations with **Harsha Trust and SELCO Foundation** led to **4 training workshops** on renewable energy and sustainable farming practices, reaching **~350 participants (farmers and SHG members)**.
- **SwitchON Foundation partnership** engaged **over 400 students** in sustainability campaigns and climate literacy sessions.
- **8 community outreach events** were conducted in collaboration with NGOs, directly impacting **~1,200 community members** across Odisha.
- Through joint plantation drives and awareness campaigns, **5,000 saplings** were planted in collaboration with NGO partners and local bodies.

By combining academic expertise with grassroots partnerships, Centurion University ensures that its **climate action goals are both practical and impactful**. The measurable outcomes from 2024 demonstrate significant progress in NGO collaboration — from **hundreds of trained participants** to **thousands of community members engaged** — reaffirming Centurion University's role as a hub for sustainable development, climate adaptation, and environmental education.

8. Commitment to Carbon Neutrality (Indicator 13.4.1)

Roadmap:

- 2035 → Net-zero Scope 1 S 2 emissions.
- 2040 → Full neutrality (Scopes 1–3).

Progress:

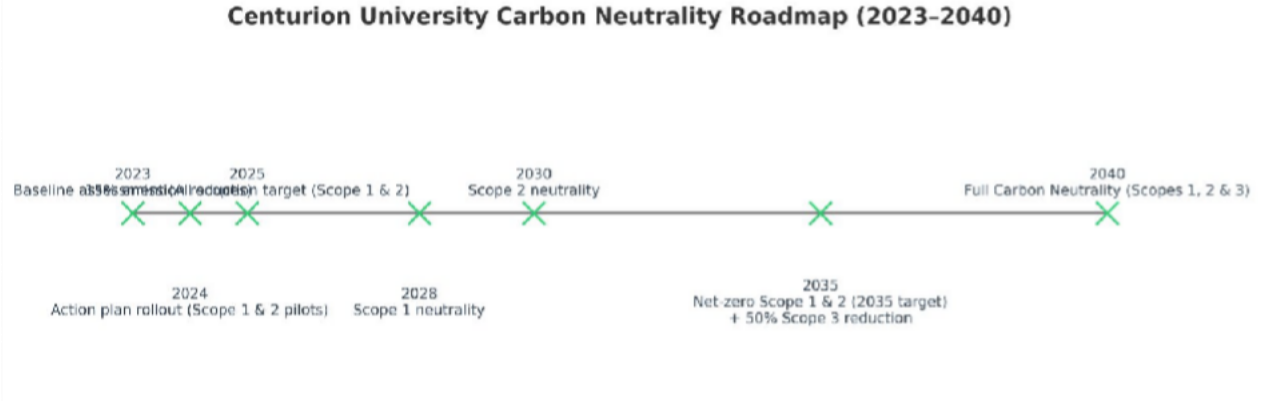
- Baseline audit completed.
- Solar expansion, EV bus trial, LED retrofits underway.
- 15% emission reduction milestone in progress.
  This aligns with CUCAF's clean energy and green infrastructure pillars.

Carbon Neutrality Roadmap (2023–2040)

Year	Focus Area	Scope	Target	Key Initiatives	Status
2023	Planning S Baseline Assessment	All Scopes	Establish baseline S reporting system	Carbon footprint audit; Sustainability task force	Completed
2024	Action Plan Rollout	Scope 1 S 2	Launch pilots	Pilot solar grids, EV bus trial, energy audits	Completed
2025	Energy S Emission Optimization	Scope 1 S 2	15% reduction in direct emissions	Solar expansion, LED/HVAC retrofits, cut diesel	In Progress
2028	Scope 1 Neutrality	Scope 1	100% direct emission offset	100% electric fleet, biowaste mgmt, green ops	Planned
2030	Scope 2 Neutrality	Scope 2	100% clean electricity	Renewable PPAs, rooftop solar scale-up, grid tie	Planned
2035	Scope 1 S 2 Neutrality Achieved	Scopes 1 S 2	Net-zero for direct S purchased energy	Solar + EV transition complete; efficiency gains	Target Year
2035	Scope 3 Reduction (Partial)	Scope 3 (Partial)	50% reduction in major indirect emissions	Sustainable sourcing, hybrid work, eco-commuting	Planned
2040	Full Carbon Neutrality Achieved	Scopes 1, 2 S 3	Net-zero across all scopes	Offsets, carbon sinks, verified governance	Target Year

Current Progress (as of 2025)

- **Baseline completed**: Carbon footprint audit and reporting framework.
- **Action plan launched**: Pilot solar grids, EV bus trial, energy audits.
- **Efficiency gains**: 15% reduction target for Scope 1 S 2 underway via solar expansion, LED/HVAC retrofits, and reduced diesel dependency.
- **50% of interim milestones achieved** within first three years.



Integration with CUCAF (Climate Action Framework)

- Supports **Objective 1: Achieve carbon neutrality across campuses by 2035 (Scope 1 S 2)**.
- Aligned with **Clean Energy Transition** and **Green Campus Infrastructure** pillars.
- Progress reported in the **Annual Sustainability Report (2024)** and shared with **local authorities** for accountability.

This roadmap, aligned with the **GHG Protocols**, ensures accountability through audits, milestones, and transparent reporting, positioning the University as a **national leader in higher education sustainability** and advancing **SDG 13 Climate Action**.

9. Key Achievements

- Low-carbon share: 54.94% (2024) → 60% projected (2030).
- 1,200+ students engaged in climate curriculum.
- 5,000+ saplings planted in collaboration with NGOs.
- Partnerships with MoES, ISRO, INCOIS, BRLF, SELCO, SwitchON, CYSD.
- National recognition: Green Pioneer Award 2024.

10. Research Innovations in Climate Resilient Smart Agriculture

Centurion University has pioneered automation systems that contribute directly to climate resilience and SDG 13 outcomes. These innovations also intersect with SDG 2 (Zero Hunger), SDG 7 (Clean Energy), and SDG 12 (Responsible Consumption S Production).

Polyhouse & Greenhouse Automation

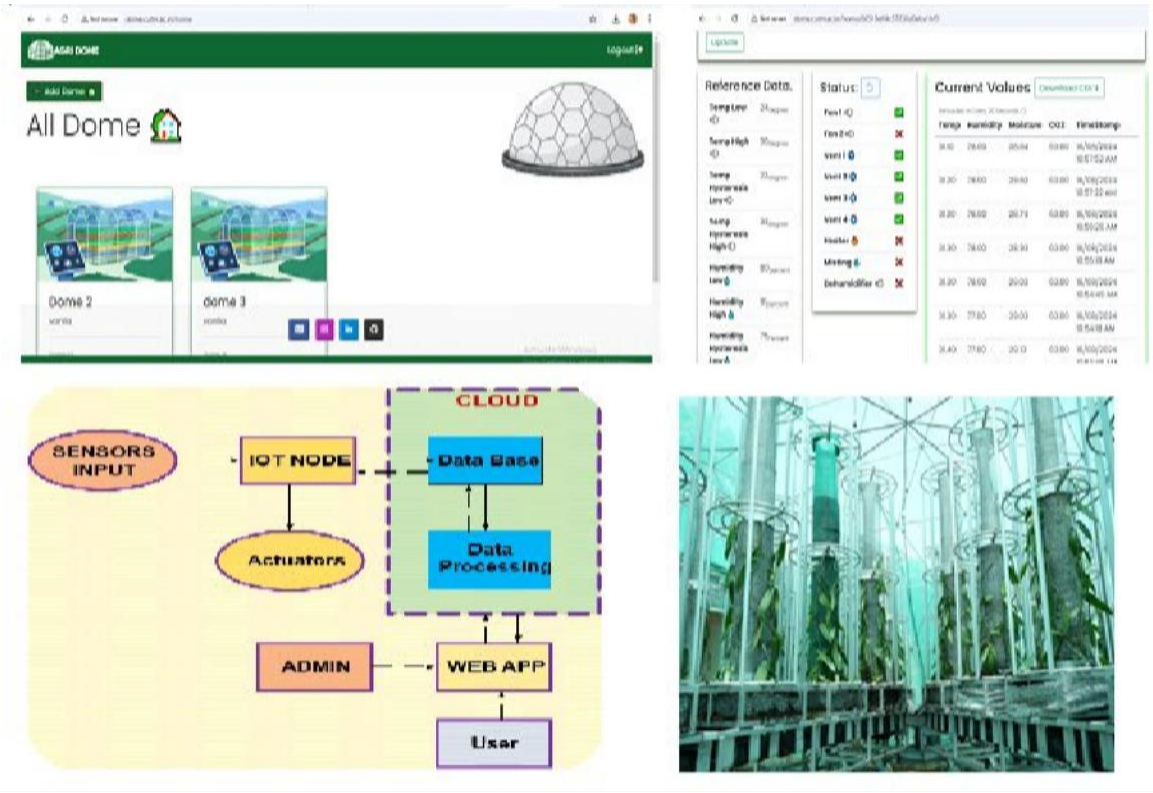
Automated systems optimize microclimate (temperature, humidity, irrigation, ventilation). They reduce energy and water wastage while improving yield predictability under climate stress, helping farmers adapt to erratic rainfall and rising temperatures. Solar-integrated polyhouses at Centurion University have demonstrated up to **60% reduction in dependency on grid electricity**, saving approximately **8,500 kWh per polyhouse annually**. This corresponds to a **CO_2 reduction of nearly 7 tons per year**.

By adopting IoT-based fertigation and microclimate regulation, energy efficiency is coupled with resource optimization: irrigation water use reduced by **40–50%**, and crop productivity improved by **30%** compared to open-field conditions. These polyhouses not only cut carbon emissions but also serve as **training models for sustainable horticulture**.

Vanilla Dome Automation

World's first geodesic dome automation for climate-resilient vanilla cultivation. It integrates IoT sensors, renewable energy-driven control systems, and precision irrigation. This serves as a scalable model for high-value crop cultivation under changing climate

conditions. The IoT-enabled geodesic dome reduces energy consumption by up to 40% compared to conventional polyhouses due to its aerodynamic design and natural insulation. With integrated solar systems, each dome saves approximately 12,000 kWh of electricity annually, translating into a reduction of 9–10 tons of CO_2 emissions per dome per year. Pilot trials in Odisha recorded a 38–42% increase in vanilla yield, while irrigation water demand decreased by 55%. This positions the dome as a climate-smart farming model that reduces both carbon footprint and production risks.



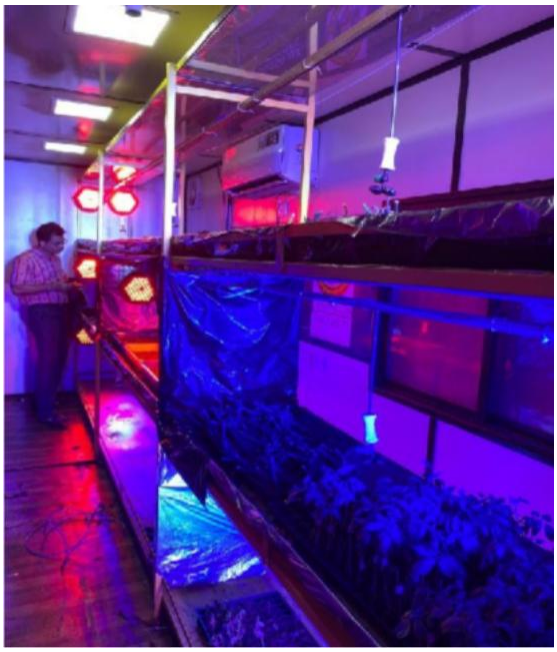
Speed Breeding Chambers

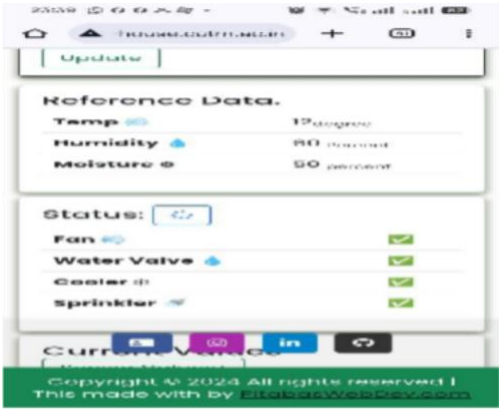
AI- and IoT-enabled chambers designed to accelerate crop growth cycles. They facilitate the development of climate-resilient varieties in record time, powered by renewable energy and aligned with low-carbon innovation. The **energy-efficient speed breeding chambers** use programmable LED lighting systems, reducing energy consumption by **up to 50%** compared to conventional growth chambers. On average, each chamber saves **6,000–7,000 kWh annually**, equivalent to **5 tons of CO_2 reduction per chamber per year**. These chambers accelerate research efficiency by enabling **up to 6 crop generations per year** instead of the

conventional 1–2, cutting crop improvement time by nearly **70%**. The clean-energy integration not only reduces research carbon footprint but also ensures sustainability in developing **climate-resilient crop varieties**.

Impact on SDG 13

- Strengthens climate adaptation by reducing dependence on external weather.
- Promotes mitigation by lowering energy use through smart automation and renewable integration.
- Provides scalable models for farmers, extension programs, and agri-tech startups.
- Positions Centurion University as a leader in climate-smart agricultural innovation.





11. SDG Interlinkages – Strengthening the Climate Action Ecosystem

Centurion University's Climate Action initiatives (SDG 13) are inherently cross-linked with several other Sustainable Development Goals, creating a systems-based model for sustainable transformation. The following summarizes these synergies:

Linked SDG	Area of Interlinkage	Contribution through Centurion University Initiatives
SDG 2 – Zero Hunger	Climate-resilient agriculture	Smart polyhouse and vanilla dome automation enhance yield, reduce resource consumption, and ensure food security under changing climate conditions.
SDG 4 – Quality Education	Climate literacy and capacity building	1,200+ students and 150+ educators trained in sustainability, renewable energy, and climate adaptation modules across 22 programs.
SDG 7 – Affordable and Clean Energy	Renewable energy and efficiency	1.25 MW of solar commissioned across campuses; > 54% of total energy from low-carbon sources, supporting India's clean-energy transition.
SDG 9 – Industry, Innovation and Infrastructure	Climate-smart technologies	IoT-enabled automation systems, AI-based speed-breeding chambers, and Aurassure data integration foster innovation for climate resilience.
SDG 11 – Sustainable Cities and Communities	Resilient urban-rural ecosystems	Climate Action Plan shared with seven Panchayats and two municipalities; 5,000+ saplings planted; early-warning data integrated into local planning.

SDG 12 – Responsible Consumption and Production	Circular economy and waste management	Zero-waste campus model; 900 kg of plastic recycled into paver blocks; 15 t CO_2e emissions avoided through waste valorization.
SDG 15 – Life on Land	Ecosystem restoration and biodiversity	80+ native species planted across five campuses; 42 t CO_2e annual sequestration potential; biodiversity index H' = 3.74 maintained.
SDG 17 – Partnerships for the Goals	Policy, NGO & government collaboration	MoUs with CYSD, BRLF, SELCO, Switch ON Foundation; joint programs with ISRO and MoES on disaster management and coastal resilience.

Aggregate Impact

Centurion University's integrated approach to SDG 13 ensures that climate mitigation, adaptation, and education are not isolated efforts but drivers of holistic sustainability. By 2030, the University aims to:

- Achieve 67% low-carbon energy share across all campuses,
- Train 5,000 students and professionals in climate literacy,
- Support 10,000 community members through resilience and adaptation programs, and
- Serve as a regional hub for SDG-aligned innovation and policy collaboration.

Conclusion

Centurion University demonstrates leadership in higher education sustainability by embedding climate action into every dimension of its academic, operational, and community activities. The initiatives undertaken—ranging from renewable energy transitions, low- carbon infrastructure, and sustainable agriculture innovations to climate literacy and disaster preparedness—collectively illustrate the University's strong alignment with SDG 13 (Climate Action). Through a holistic framework of technology, grassroots outreach, policy partnerships, and research-driven innovations, the University is well on track to achieve

carbon neutrality by 2035, with further ambitions to extend this to Scope 3 emissions by 2040. Centurion University's commitment is also reflected in measurable impacts such as reducing emissions, increasing renewable energy share, training thousands of students and community members, and building resilience through cooperative planning with governments and NGOs. By positioning itself at the intersection of education, innovation, and sustainability, Centurion University not only strengthens SDG 13 but also reinforces critical linkages with SDG 7 (Affordable and Clean Energy) and SDG 11 (Sustainable Cities and Communities). This positions Centurion University as a national and global leader in climate action, demonstrating that universities can play a transformative role in shaping a sustainable and climate-resilient future.