



CARAGA STATE UNIVERSITY



GREEN CAMPUS ENERGY PLAN



SUBMITTED TO: UNIVERSITY EXECUTIVES

DRAFT VERSION

SUSTAINABLE DEVELOPMENT GOALS

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7 AFFORDABLE AND CLEAN ENERGY



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GREEN CAMPUS ENERGY PLAN

2025
DRAFT VERSION

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Executive Summary

Caraga State University (CSU) is committed to transforming its campuses into models of energy efficiency and sustainability. This Green Campus Energy Plan 2024–2028 outlines CSU’s vision of an energy-efficient, renewable-powered university in alignment with national laws and Sustainable Development Goal (SDG) 7 on clean energy. It provides a policy-aligned roadmap for reducing energy consumption, shifting to renewable energy sources, and fostering a culture of conservation among students and staff. The plan was formulated in compliance with the Philippines’ Energy Efficiency and Conservation Act (Republic Act No. 11285) and Renewable Energy Act of 2008 (Republic Act No. 9513), ensuring that CSU’s initiatives support national mandates and global sustainability targets.

Key goals of the plan include cutting campus energy use and costs, sourcing a significant portion of electricity from renewable sources, and institutionalizing energy management practices. By 2030, CSU aims to source at least 50% of its electricity from renewables and reduce overall energy consumption by 15% relative to the baseline, thereby lowering greenhouse gas emissions and utility expenditures. Achieving these targets will involve a combination of capital projects (such as solar photovoltaic installations and infrastructure retrofits) and management measures (like energy audits, performance monitoring, and community engagement). An interdisciplinary Energy Management Committee will oversee implementation, track key performance indicators (KPIs), and ensure continuous improvement. In summary, this document serves as a comprehensive guide for CSU’s journey toward an energy-resilient and environmentally responsible campus, detailing the strategies, investments, timelines, and governance needed to realize the university’s green energy vision.



Main Goals

Reach

₱ **15 million**

commulative cost savings by 2030.

Share of campus electricity supplied by renewable energy with

50 %
increase by 2030.

Expand clean energy initiatives and build the sustainability culture by

2030

LEGAL AND POLICY FRAMEWORK

CSU's energy plan is grounded in the Philippine legal framework on energy conservation and renewable energy, as well as international sustainability commitments. Republic Act No. 11285 (Energy Efficiency and Conservation Act of 2019) provides the primary mandate for institutions to pursue efficiency measures. It declares the policy of the State to “institutionalize energy efficiency and conservation as a national way of life” by implementing energy conservation plans and programs. Under RA 11285, organizations above certain energy usage are deemed “designated establishments” and are required to manage energy use rigorously – including employing certified energy managers and submitting regular energy consumption reports. As a state university with substantial energy demand, CSU aligns its plan with this law by establishing a formal energy management system and complying with all requirements. RA 11285's Implementing Rules and the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC) likewise mandate government entities (including state universities) to adopt efficient technologies and practices. In fact, IAEECC Resolution No. 11 (s.2025) directs all agencies to procure only appliances and equipment that meet the Department of Energy's Minimum Energy Performance (MEPP) standards and carry Philippine Energy Labeling (PELP) certifications. This plan incorporates those standards in CSU's purchasing and retrofit policies, ensuring that only energy-efficient lights, air-conditioning units, and other devices are used on campus.

Complementing the efficiency mandate, Republic Act No. 9513 (Renewable Energy Act of 2008) establishes the national policy framework for advancing renewable energy (RE). It set in motion the Philippine National Renewable Energy Program (NREP), which outlines strategic targets to drastically increase the country's renewable capacity by 2030. RA 9513 provides incentives for RE development – including tax breaks and net metering provisions that allow institutions to feed excess solar power to the grid for credit. CSU's plan heeds this call by integrating on-site renewable generation (solar photovoltaic systems) and leveraging programs like net metering to maximize their value. The Renewable Energy Act's goal of improving energy security and access to clean energy is mirrored in CSU's campus-level targets for solar power adoption and reduced reliance on fossil-fueled electricity. Through RA 9513's incentives (e.g. duty-free importation of RE equipment and potential government grants), the university can reduce project costs and accelerate renewable installations.

Finally, the plan supports the broader sustainable development agenda, notably United Nations SDG 7: Affordable and Clean Energy. SDG 7 calls for improving energy efficiency and substantially increasing the share of renewables by 2030. CSU explicitly linked its initiatives to SDG 7 when it installed its first solar power system in 2025, signaling the university's contribution to "Affordable and Clean Energy" goals. By aligning with SDG 7 and national energy policies, CSU ensures that its campus energy efforts reinforce the Philippines' climate commitments and the global push for sustainable energy. This policy framework section underscores that the CSU Green Campus Energy Plan 2024–2028 is not only an institutional roadmap but also a fulfillment of legal obligations (RA 11285 and RA 9513) and a proactive step toward national and international energy objectives. The plan was formulated with guidance from these laws and policies to ensure full compliance and to access available support mechanisms (such as the Government Energy Management Program and DOE incentive programs). Notably, under the Government Energy Management Program (GEMP) administered by the DOE, all government entities are mandated to cut energy consumption by at least 10% as a model to the public. CSU's targets meet or exceed this minimum, demonstrating leadership in energy stewardship consistent with government directives.

CAMPUS BASELINE ENERGY PROFILE

A clear understanding of CSU's current energy usage is the foundation of this plan. Baseline energy audits and utility data analyses have been conducted to establish the university's energy profile prior to the implementation of major interventions. CSU operates two campuses (the main campus in Butuan City and a satellite campus in Cabadbaran City) with multiple academic buildings, laboratories, offices, dormitories, and support facilities. According to a detailed audit of the CSU Cabadbaran Campus, annual electricity consumption in 2017 was 157,048 kWh, costing about ₱1.34 million. The main campus in Butuan – being larger with more facilities – has a significantly higher consumption with an average monthly cost of ₱2 million. In total, CSU's combined electricity use in recent years is estimated to be on the order of 1.5–2.0 million kWh per year, which firmly puts the university in the category of a Type 1 designated establishment under RA 11285 (threshold: >500,000 kWh/year). This consumption corresponds to an energy use intensity of roughly **~120 kWh per square meter per year (assuming the total floor area of all buildings)**, though certain buildings and times of year see much higher intensities due to air-conditioning loads. Peak demand occurs during class hours on hot days when cooling systems and equipment run simultaneously, straining both campus transformers and the local grid.

Energy use by end-use category reveals where efficiency efforts should focus. The audits show that the majority of electricity is consumed by equipment and cooling systems, with relatively little by lighting. For example, at the CSU Cabadbaran Campus, it was found that roughly 58% of the total electrical load was from “Other Equipment and Devices” (computers, laboratory apparatus, etc.), 33% from Ventilation and Air Conditioning (HVAC), and only 9% from Lighting. This indicates that while upgrading lighting to LEDs is important, the larger opportunities for saving energy lie in managing HVAC and plug-load efficiency. The top five energy-consuming buildings at CSU (by daily kWh usage) are the main Administration Building, major classroom buildings (e.g. a large two-story building and the Science

building and the Science Building), the IT/Engineering laboratories, and student dormitories. These key structures have high occupancy and host energy-intensive activities (such as computer use and air-conditioned classes), resulting in energy use densities substantially above campus average. Electricity bills form a substantial portion of CSU's operating expenses, with Philippine power rates fluctuating around ₱10–₱15 per kWh (among the highest in Asia). Volatility in energy prices directly impacts the university's finances, underscoring the need for consumption control and alternative energy sources.

It is also noted that prior to this plan, CSU had a University guidelines for conservation measures in place and significant room for improvement in institutional practices. A 2018 study of the Cabadbaran campus revealed that most common energy-saving initiatives were “Not Observed” by faculty and staff – e.g. no formal energy policy, no regular energy audits, limited awareness programs – leading to steadily rising consumption. In other words, the university historically lacked a comprehensive energy management system, which this plan now establishes. Despite this, some positive steps have already been taken as of the baseline year 2023: for instance, inefficient fluorescent lights have gradually been replaced with LEDs when they burn out, and faculty/staff generally turn off lights and devices when not in use (one of the few fully observed conservation behaviors). Importantly, in mid-2025 CSU completed the installation of a 221-kilowatt peak (kWp) solar photovoltaic system on several rooftops (Hinang, Masawa, and Hiraya buildings) on the main campus. This solar PV project – part of the baseline scenario for this plan – is expected to reduce the university's grid electricity consumption by about 15% per month. At current consumption levels, that translates into substantial savings and emission reductions. The baseline energy profile, therefore, is characterized by high but reducible energy intensity, dominance of HVAC and equipment loads, significant cost burdens from electricity, and initial investments (like solar panels) that begin to curb consumption. These baseline findings guide the plan's targets and priority actions, ensuring that strategies address the most critical areas of waste and opportunity.

The Green Campus Vision & Mission



Vision

As a model of community-empowered and sustainability-driven university advancing in resource efficiency, resiliency, and environmental innovation by 2030.

Mission

To lead in the green transformation by empowering the community to be a problem solvers and value creators, actively contributing to the development and preservation of a green, resilient, and inclusive learning environment.

Goals and Targets

To drive CSU's energy transition, the plan sets forth clear and measurable goals for the five-year period 2024–2028. These targets align with national requirements (e.g. GEMP's 10% reduction mandate and the university's own vision of sustainability).



Renewable Energy Share

50%

Percentage increase in the share of campus electricity supplied by renewable energy by 2028.



Energy Consumption Reduction

15%

Percentage reduction in total electricity consumption (kWh per year) by 2028



Green Energy Management and Compliance

Campus

Efficient Procurement

100%

of new electrical equipment and appliances purchased are

energy-efficient models and DOE compliant

Campus

Financial Savings

₱15 Million

commulative cost savings by 2028 through

annual energy consumption reduction

Campus

Efficiency & Conservation Culture

80%

awareness and participation rate in energy-saving campaigns among students, faculty, and staff for an

energy-conscious campus culture

Strategic Action Plan

Achieving CSU's energy goals requires a portfolio of strategic actions across infrastructure, operations, and community behavior. The following major strategies and projects will be pursued between 2024 and 2028



CSU officials and engineers standing atop the new solar photovoltaic array installed on campus (221 kWp system). This on-site solar installation is a cornerstone of CSU's shift towards renewable energy, providing hands-on learning opportunities while cutting electricity costs by ~15%

Renewable Energy Deployment



CSU will significantly expand its solar energy capacity. Building on the successful commissioning of 221 kW of rooftop solar PV in 2025 the university plans to install additional solar arrays on available rooftops and grounds in a phased manner. By the end of 2028, CSU will have one of the largest campus-based solar deployments in the Caraga region, visibly symbolizing our commitment to clean energy.



Deployment Across Campuses

By 2026, an additional 100 kWp system will be installed at the Main Campus (e.g. on the new Ladies' Dormitory) and 100 kWp at the Cabadbaran Campus, projects which were already in procurement as of 2025. These will bring total installed capacity to around 421 kW.



Phased Implementation

By 2028, the goal is to reach roughly 500–600 kWp total solar capacity across campuses, enough to supply about half of daytime electricity needs. All solar grid-tied installations will be implemented annually and enrolled in the net metering program so that any excess generation can earn credits or revenue for CSU.



Establish “Living Laboratory and Enhance Resilience

To enhance resilience, the university will explore adding battery energy storage for critical buildings (e.g. data centers or clinics) to store solar power and provide backup during outages. The solar PV expansion not only reduces utility costs but also serves academic purposes: the arrays act as a “living laboratory” for engineering and environmental science students to study renewable energy systems.



Strengthen Partnerships

Partnerships with Department of Energy and industry will be sought for technical support, and operations & maintenance will be ensured by training our faculty and staff.

LED Retrofit Program

A campus-wide lighting retrofit will be executed to replace all remaining inefficient lamps with Light-Emitting Diode (LED) technology. This initiative targets classrooms, offices, libraries, laboratories, dormitories, and outdoor areas (street and perimeter lights). The audit found that while lighting is a smaller share of energy use ($\approx 9\%$ at Cabadbaran campus), the savings from LEDs are straightforward and come with improved illumination quality.



STRATEGIES

GREEN PROCUREMENT

By 2026, CSU will strictly adhere to procure energy-efficient lights for bulk purchase of LED tube lights, bulbs, and fixtures by choosing high efficacy LED products (with at least 50–60% lower wattage than fluorescent equivalents).

BY-PHASED IMPLEMENTATION

Retrofit in phases: high-usage areas (lecture halls, main offices, library) by 2026–2027, then remaining classrooms and support areas by 2028. In total, an estimated 2,000 lighting fixtures will be upgraded.

SMART CONTROLS

Occupancy sensors and daylight sensors will be installed in selected locations (conference rooms, restrooms, lobbies) to automatically turn off or dim lights when not needed.

LIGHTING-ENERGY CONSUMPTION CUT

Reduction of lighting energy consumption by 50% or more, yielding approximately a 5% reduction in overall campus electricity use.

 **100%**
LED Retrofitting by
2028.

 **5%**
lighting-energy
consumption reduction.



HVAC Optimization and Upgrades

Air conditioning is one of the largest energy drains on campus (accounting for one-third or more of total consumption). To address this, CSU will implement a comprehensive HVAC efficiency program. This program will focus on several key areas to ensure optimal performance and energy savings.

STRATEGIES

SYSTEM OPTIMIZATION AND UPGRADES

By 2028, CSU has implemented a comprehensive HVAC efficiency program. As an ongoing program, CSU prioritized aging and energy-intensive air conditioners units in continuous-use areas (e.g. computer labs, administration offices, and libraries) for replacement with high-efficiency models.

SMART CONTROLS AND PREVENTIVE MAINTENANCE

Optimize usage through enhanced controls, implementing temperature setpoint policies, and exploiting natural ventilation. Preventive maintenance of HVAC systems will be intensified – filters cleaned monthly, refrigerant levels checked – to maintain peak performance.

SYSTEM MONITORING AND AUDIT

Starting 2026, CSU will institutionalize annual energy audits for each campus that will analyze building systems, identify inefficiencies, and recommend specific energy conservation measures each year and submit the Annual Campus Energy Consumption and Conservation Report (ECCR).

BEHAVIORAL AND AWARENESS CAMPAIGN

Target change of daily habits of the campus community. CSU will roll out an extensive energy education and behavior change campaign to foster a culture of conservation; thus will conduct at least one major symposium or webinar per year.

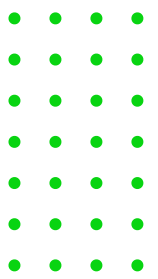
 **85%**

**HVAC Retrofitting by
2028.**

 **15%**

**HVAC-energy
consumption reduction.**

Institutional Management and Policy Measures



Caraga State University (CSU) currently lacks a formal governance mechanism to oversee and institutionalize energy efficiency and conservation practices across campuses. Without structured leadership and consistent policy enforcement, past initiatives have been fragmented and unsustainable—resulting in energy waste, higher operational costs, and missed opportunities for compliance and funding.

CSU will formally establish an Energy Management Committee (EMC) through an Administrative Order from the University President by early 2024. This body will serve as the central decision-making and monitoring unit for campus energy management, in full alignment with Republic Act No. 11285 and national energy mandates for government institutions.



Governance Structure

CSU will formally establish an Energy Management Committee (EMC) by early 2026. This committee, will be chaired by VP for Administration and Finance and will be composed of technical personnel from ECO, GSO, and faculty with expertise from Colleges. The EMC's mandate is to plan, implement, and monitor energy initiatives and to enforce energy policies on campus.



Knowledge Management and Policy Measures

CSU will strengthen its energy governance through robust knowledge management and policy measures by developing a centralized repository—both physical and digital—that houses energy audit reports, project records, baseline consumption data, procurement benchmarks, and DOE advisories. The university will institutionalize standardized data collection and reporting protocols, assigning specific units to monitor metrics such as kWh per square meter, operating hours, and peak demand, while ensuring documentation continuity across administrative cycles. To reinforce implementation, CSU will deploy a policy enforcement toolkit comprising operational standards for HVAC, lighting, procurement, and behavioral guidelines, along with decision-making checklists for energy-integrated projects and an annual Energy Management Committee report submitted to top administration for review and policy updates.



Compliance Monitoring and Evaluation

To ensure compliance and performance, CSU will adopt a structured monitoring and evaluation (M&E) system anchored on key performance indicators (KPIs), with quarterly EMC reviews and corrective action planning, supplemented by annual assessments aligned with this Green Campus Energy Plan.



Cost Projections and Financial Development Plan

The table below presents a summary of the key energy initiatives under CSU's Green Campus Energy Plan 2024–2030, detailing the estimated investment costs, potential funding sources, and projected annual energy savings for each. These initiatives aim to reduce CSU's energy costs, enhance sustainability, and position the university as a regional model for energy-conscious governance.

Initiative	Estimated Cost (₱)	Funding Sources	Projected Annual Savings (₱)	ROI Period
LED Lighting Retrofits (all major buildings)	3,500,000	GAA Capital Outlay, CHED IDIG, Internal CSU Budget	1,000,000	3.5 years
Solar PV System (100kWp phase)	6,000,000	DOE RE Program, Public-Private Partnership (PPP)	1,500,000	4 years
HVAC Upgrade & Scheduling Automation	2,000,000	DBM, Internal Fund	600,000	3.3 years
Energy Monitoring System	1,200,000	CHED Grants, CSU ICT Infrastructure Fund	250,000	4.8 years
Energy Management Training & Capacity	600,000	DOE Technical Assistance, CSU HRD Fund	Non-monetary (performance gains)	—
Policy Rollout & IEC Campaigns	400,000	Internal Budget, External Donor Support (e.g. GIZ)	Indirect savings (behavioral)	—
7. Green Procurement Implementation Tools	300,000	Internal Procurement Reform Budget	Indirect savings	—

