SAINT LOUIS UNIVERSITY

Baguio City, Philippines

Metric 7.4 Energy and the community



7 AFFORDABLE AND CLEAN ENERGY

Times Higher Education Sustainability Impact Ratings

AY 2025-2026

SAINT LOUIS UNIVERSITY

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Indicator 7.4.3 Energy efficiency services for industry



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Energy efficiency services for industry

SLU PROVIDES ENERGY EFFICIENCY SERVICES FOR INDUSTRY

Saint Louis University (SLU), through the School of Engineering and Architecture (SEA) and its institutional Undergraduate Research and Innovation Programs (UGRIP), delivers direct applied engineering solutions, assessments, and prototype innovations targeting local and regional industry decarbonization, energy efficiency, and renewable energy adoption.

Operating in Baguio City and the wider Cordillera Administrative Region (CAR), SLU bridges academic applied research with the technical demands of local micro-, small-, and medium-sized enterprises (MSMEs), municipal public markets, transit networks, and agricultural producers. For the reporting cycle August 2025 – July 2026, SLU SEA mobilized multi-departmental expertise across Chemical, Mining, Electrical, and Mechanical Engineering to deliver direct technical services and applied engineering options categorized into three primary operational pillars:

Pillar 1: Industrial Waste-to-Energy Assessments & Biomass Valorization
Pillar 2: Thermal Heat Recovery & Mechanical Energy Efficiency
Pillar 3: Clean Energy Systems, Storage Recovery & Decarbonized Infrastructure



Energy efficiency services for industry

PILLAR 1: INDUSTRIAL WASTE-TO-ENERGY ASSESSMENTS & BIOMASS VALORIZATION

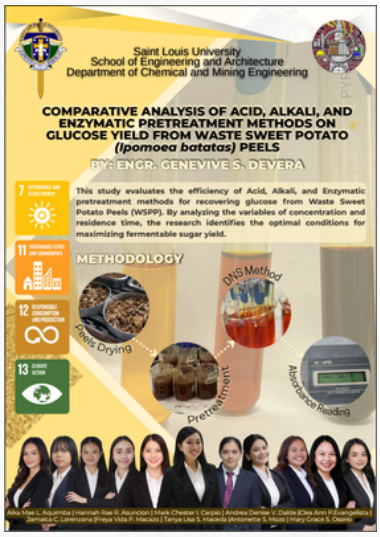
SLU engineers and students conducted empirical assessments to convert municipal, agro-industrial, and local processing wastes into usable clean energy and solid biofuels, directly reducing fossil fuel reliance and grid burdens:

- **Commercial Organic Waste-to-Energy Upcycling:** Technical investigation into converting municipal market waste from Baguio City Market via hydrothermal carbonization (HTC) to produce hydrochar and assess process by-products as sustainable alternative industrial solid fuels.

- **Agro-Industrial By-Product Valorization:** Evaluation of multi-route pretreatment methods (acid, alkali, and enzymatic) on sweet potato (Ipomoea batatas) residues to optimize glucose and fermentable sugar recovery for local bioethanol production.

- **Decentralized Agricultural Briquetting Systems:** Engineering design, prototyping, and performance assessment of an automated, solar-powered rice husk briquetting system tailored for off-grid processing enterprises and farming communities in Kapangan, Benguet.







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PILLAR 2: THERMAL HEAT RECOVERY & MECHANICAL ENERGY EFFICIENCY







SLU provides technical models and prototype optimizations directly targeting waste energy recovery and thermal building performance:

- **Industrial Steam Turbine & Waste Heat Recovery (WHR):** Retrofitting and redesign of small-scale WHR steam generators, integrating turbine nozzle redesigns and upscaled DC motor generators to maximize electricity generation from low-grade industrial exhaust/flue heat.

- **Passive Natural Ventilation & Industrial Cooling:** Computational Fluid Dynamics (CFD / ANSYS Fluent) simulation studies modeling multi-geometry wind towers integrated with zeolite humidity control to slash HVAC electrical demand in standardized modular structures under Philippine climatic conditions.

- **Secondary Thermal-to-Electric Harvesting**: Design and bench-testing of small-scale food waste anaerobic digesters coupled with Seebeck-effect thermoelectric generators (TEGs) to recover thermal combustion gradients into usable low-power electrical output.

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PILLAR 3: CLEAN ENERGY SYSTEMS, STORAGE RECOVERY & DECARBONIZED INFRASTRUCTURE

SLU extends engineering advisory, modeling, and renewable integration services for local public infrastructure, battery logistics, and clean fuel alternatives:

- **Municipal EV Infrastructure Feasibility:** Systematic literature synthesis and engineering system modeling (using the PRISMA 2020 framework) to design a hybrid renewable electric vehicle (EV) charging station tailored for localized public transport in Cresencia Village, Baguio City.
- **Battery Lifecycle & Residual Energy Harvesting**: Development and algorithmic validation of a Self-Adaptive Pulse Discharge (SAPD) and supercapacitor energy recovery system, reclaiming 13%–50% residual capacity from discarded primary dry cells to power IoT monitoring modules and minimize toxic electronic waste.
- **Solar-Powered Green Hydrogen Generation**: Development and parameter testing of a solar PV-driven Proton Exchange Membrane (PEM) electrolyzer utilizing pretreated, harvested rainwater from SLU catchment facilities to evaluate energy return on investment (EROI) and local zero-carbon fuel viability.
- **Kinetic Road Harvesters for Traffic Safety**: Prototyping and laboratory simulation of road-embedded Triboelectric Nanogenerators (V-TENG) with self-healing polyurethane wear layers to harness vehicular traffic pressure and sustainably power municipal road delineators ("cat's eyes").











The SLU SDG Report 2026