WALAILAK UNIVERSITY

SDG REPORT 2025-2026



Times Higher Education Sustainability Impact Ratings 2026

SUSTAINABLE DEVELOPMENT GOALS

7 AFFORDABLE AND CLEAN ENERGY

WU SDG MOVE



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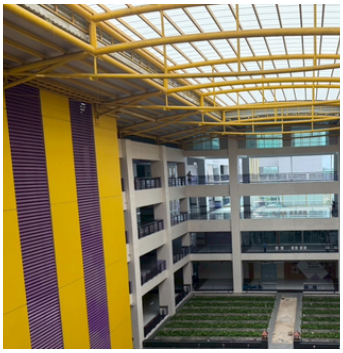
7 AFFORDABLE AND CLEAN ENERGY

SDG 7 : AFFORDABLE AND CLEAN ENERGY

WU IMPLEMENTS A BUILDING RETROFIT PLAN TO ENHANCE ENERGY EFFICIENCY ACROSS EXISTING BUILDINGS

WU is committed to improving energy efficiency and reducing environmental impacts through the implementation of a comprehensive building retrofit plan for existing buildings. The university has established a long-term strategy to upgrade existing buildings to higher energy efficiency in accordance with Energy Efficient Building (EIT) standards, supporting institutional sustainability goals and contributing to greenhouse gas emission reduction.

As part of this initiative, the university has undertaken a series of improvements to building components that significantly influence energy performance. One of the major upgrades includes replacing conventional roofing materials with metal sheet roofing, which provides superior heat reflectance and reduces heat accumulation inside buildings. In addition, translucent roof panels have been installed to maximize the use of natural daylight during daytime hours, thereby reducing electricity consumption for artificial lighting.





Furthermore, the university has upgraded all indoor lighting systems by replacing conventional light fixtures with high-efficiency LED lighting, which consumes significantly less electricity while providing improved illumination. To further optimize energy consumption, automatic lighting and air-conditioning control systems have been installed, allowing electrical equipment to operate according to actual occupancy schedules and building usage patterns.



Besides, motion sensors have been installed in appropriate areas to automatically switch lighting on and off based on occupancy, eliminating unnecessary electricity consumption in unoccupied spaces and improving overall higher energy efficiency.

To strengthen energy management, Walailak University has integrated Information and Communication Technology (ICT) into its energy management system. ICT-based technologies are used to monitor renewable energy systems, collect and analyze building energy consumption data, and support evidence-based planning and operational decision-making. This digital energy management approach enables the university to optimize energy use, improve operational efficiency, and continuously monitor building performance.



The implementation of upgrade existing buildings plan demonstrates WU's commitment to enhancing the energy performance of existing buildings through integrated design improvements, energy-efficient technologies, and intelligent energy management systems. These measures contribute to reduced electricity consumption, improved resource efficiency, and lower greenhouse gas emissions while supporting the university's long-term sustainability objectives.

By combining energy-efficient building materials, advanced lighting technologies, automated control systems, occupancy sensors, and ICT-based energy management, Walailak University continues to transform its existing infrastructure into a more sustainable and environmentally responsible learning environment. This achievement contributed to Walailak University being ranked 1st in Thailand in the Infrastructure category of UI GreenMetric World University Rankings for 5 consecutive years.

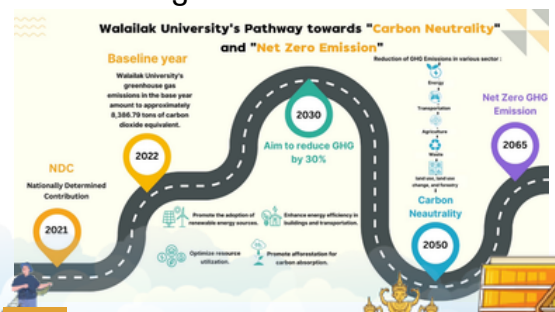
CARBON MANAGEMENT AND EMISSION REDUCTION PROCESES AT WALAILAK UNIVERSITY

WU recognizes the environmental impacts associated with greenhouse gas emissions from its operations and has established a systematic process for carbon management and emission reduction. The process begins with assessing the sources and volume of greenhouse gas emissions from university activities across Scope 1, Scope 2, and Scope 3. The assessment identified total emissions of 11,075 tCO_2e, comprising 3,628 tCO_2e from Scope 1, 5,215 tCO_2e from Scope 2, and 2,232 tCO_2e from Scope 3. These emission data provide a baseline for identifying major emission sources and developing appropriate measures to reduce the university's carbon footprint.





Based on this assessment, Walailak University established a policy framework through the Announcement of Walailak University Re: Climate Action Policy B.E. 2567 (2024), which provides a clear direction for climate action and greenhouse gas emission reduction. To ensure effective implementation and institutional oversight, the university established dedicated governance mechanisms, including the Committee for Driving Missions in Response to Sustainable Development and the Carbon Neutrality Steering Committee. These committees are responsible for coordinating, monitoring, and driving actions across relevant university units to ensure that operational activities are aligned with the university's sustainability and carbon reduction goals.



Under this framework, the university has implemented a range of measures targeting energy use, transportation, resource consumption, and operational practices. Key measures include reducing plastic use, promoting the use of electric vehicles, improving

energy efficiency through the use of energy-efficient electrical equipment, and replacing conventional diesel with B7 diesel in all backup generators.

These measures are implemented under the supervision and monitoring of the relevant committees, ensuring that carbon reduction is integrated into the university's operational management rather than being treated as a stand-alone activity.

The university also promotes engagement among relevant departments and personnel in implementing carbon reduction measures. Actions are translated from institutional policy into practical activities across the university, encouraging changes in energy consumption, transportation, resource use, and material management. This approach enables carbon management to be embedded in day-to-day university operations and encourages collective responsibility for reducing greenhouse gas emissions.



The effectiveness of these measures is assessed through quantitative monitoring of greenhouse gas emissions. As a result of implementing the university's carbon management policy and related measures, Walailak University achieved a total estimated reduction of 1,717.85 tCO_2e per year, comprising 2.28 tCO_2e/year from Scope 1, 1,585 tCO_2e/year from Scope 2, and 49.75 tCO_2e/year from Scope 3. These results demonstrate measurable progress in reducing greenhouse gas emissions and provide evidence for evaluating the effectiveness of the implemented carbon reduction measures.


T-VER

The Ministry of Natural Resources and Environment
with
The Thailand Greenhouse Gas Management Organization
(Public Organization)

This Certificate of Honor is hereby awarded to

Walailak University

to certify that

Solar Rooftop Leasing Project for the Center for Scientific and Technological Equipment Buildings at Walailak University

registered as
Standard Thailand Voluntary Emission Reduction Program
(Standard T-VER)

With an expected greenhouse gas reduction/removal amount of

1,585 tCO_2eq/year

Crediting period of the project is from 1 May 2025 – 30 April 2032

Issued on 23 September 2025

Nakorn.

Mr.Nakorn Tangavirapat
Executive Director,
Thailand Greenhouse Gas Management Organization

The university's carbon reduction efforts have also been recognized through its receipt of T-VER certification/recognition, providing further evidence of its concrete action on greenhouse gas reduction. Overall, Walailak University's approach demonstrates a continuous carbon management process that connects emission assessment and identification of major sources, policy development and institutional governance, implementation of practical reduction measures, stakeholder engagement, and quantitative monitoring of outcomes. This systematic approach provides an established process for managing carbon emissions and reducing greenhouse gas emissions across university operations.

THE COMMUNITY OUTREACH PROGRAMMES FOR ENERGY EFFICIENCY AND CLEAN ENERGY

Walailak University has established community outreach programmes that provide local communities with opportunities to learn about the importance of energy efficiency and clean energy and apply appropriate energy technologies in their daily lives and livelihoods. The programmes respond to community needs in areas such as household energy use, ecotourism, fisheries, marine tourism, and livestock production, with the aim of reducing unnecessary energy consumption, lowering energy costs, and increasing the adoption of renewable energy.



The programmes begin with diagnosing local energy-related challenges and identifying opportunities to improve energy efficiency. Community activities focus on understanding patterns of energy consumption, reducing unnecessary energy losses, and encouraging behavioural changes toward more efficient energy use. Particular attention is given to tourism-related activities, where energy efficiency can contribute to both lower operating costs and environmentally responsible ecotourism. Through community learning activities, participants are encouraged to understand the relationship between energy efficiency, environmental conservation, and sustainable community development.



Based on these needs, the university develops and delivers practical learning programmes on clean energy, particularly solar energy and biomass energy. One programme provides knowledge and practical demonstrations on the use of solar energy for aquatic animal holding ponds. A solar power system is installed to replace fossil-fuel-based energy, together with an energy storage system that enables continuous energy use when sunlight is unavailable.



The university also provides community outreach and knowledge transfer on solar energy for fishing boats and tourism boats. Community members and local operators learn about the importance of clean energy and the potential to replace conventional energy sources with solar power, including the use of solar energy for lighting systems on boats. This practical approach enables local stakeholders to understand how clean energy technologies can be adapted to their specific activities and potentially reduce fossil fuel consumption.



Another programme focuses on biomass energy and renewable energy in the livestock sector. The university provides local communities with knowledge on environmental management and renewable energy, including the installation and maintenance of a biogas production system using pig manure. Participants are able to learn from and observe the system through actual implementation and operation. This approach demonstrates how livestock waste can be transformed into a useful energy resource while simultaneously addressing waste management and environmental impacts.

Engagement is an essential component of these programmes. Rather than providing information solely through lectures, the university connects local communities with practical demonstrations, technology installation, hands-on learning, and real-world applications. Communities are therefore able to participate in the learning process and explore how energy efficiency and clean energy solutions can be integrated into their own activities.

The university uses practical implementation and operational outcomes to measure the effectiveness and applicability of the programmes. Evidence includes the implementation of solar energy systems, energy storage systems, solar applications for boats, and biogas systems for livestock operations. These activities provide tangible evidence that community outreach goes beyond awareness raising and results in the practical application of energy efficiency and renewable energy technologies.

Through this systematic process, Walailak University demonstrates an established local community outreach programme for energy efficiency and clean energy that connects diagnosing local needs, developing appropriate programmes and technologies, engaging community stakeholders, and measuring practical implementation and outcomes. The programmes strengthen community knowledge and capacity to reduce energy waste, adopt renewable energy, reduce dependence on fossil fuels, and support environmentally sustainable livelihoods and ecotourism.

WALAILAK UNIVERSITY'S ASSISTANCE TO LOW-CARBON INNOVATION AND START-UPS

Walailak University provides assistance to start-ups and community-based enterprises that foster and support a low-carbon economy and low-carbon technologies. The university acts as a source of academic knowledge, technical support, and innovation development, helping local start-up identify opportunities to reduce carbon emissions, adopt clean energy, enhance carbon sequestration, and create economic value from local resources. Through this approach, low-carbon innovation is connected with practical community-based economic activities.



The process begins by diagnosing the needs, challenges, and potential of local start-up and community enterprises whose activities have the potential to contribute to a low-carbon economy. The university identifies opportunities where knowledge, technology, and innovation can reduce dependence on fossil fuels or strengthen natural carbon sinks. Two examples of supported community-based start-ups are the Nai Thung Local Fishing Association and the Ban Bang Talumpho Integrated Nipa Palm Ecosystem Learning Center.



For the Nai Thung Local Fishing Association, the university provides assistance through knowledge transfer on the importance and application of clean energy in local fishing activities. The association promotes the use of solar panels to provide lighting on fishing boats, creating an opportunity to replace conventional fossil-fuel-based energy with renewable energy. The university supports the community by providing knowledge on clean energy and its potential applications, enabling local fishers to understand how solar energy can be integrated into their existing operations.



For the Ban Bang Talumpho Integrated Nipa Palm Ecosystem Learning Center, the university supports a different form of low-carbon innovation by focusing on carbon sequestration in nipa palm ecosystems. The university provides assistance in assessing the value of carbon sequestration and supports the development of products derived from nipa palm resources. These products are intended to create additional economic value while supporting a tourism model based on net-zero-carbon tourism. This approach connects ecosystem conservation, carbon management, local economic development, and sustainable tourism.

Following the identification of community needs, the university develops and provides targeted assistance that is appropriate to each start-up's context. The support goes beyond general awareness raising by connecting academic expertise with practical applications. For the fishing community, assistance focuses on clean-energy knowledge and the practical potential of solar-powered boat lighting. For the nipa palm ecosystem learning center, assistance focuses on carbon sequestration assessment, carbon-related value creation, and product development for emerging low-carbon tourism markets.



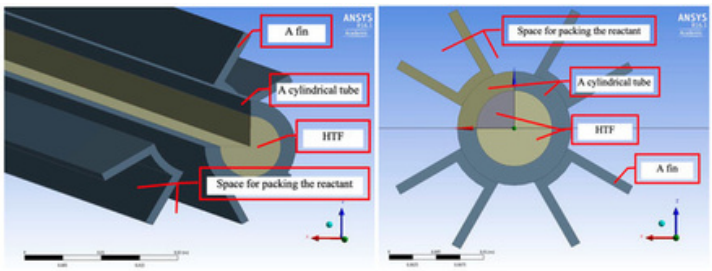
Engagement is central to the implementation of these initiatives. The university works with local start-ups and community groups to understand their existing activities, identify opportunities for improvement, and translate academic knowledge into practical solutions. This collaborative approach allows community stakeholders to participate in the development and application of low-carbon technologies and business opportunities rather than simply receiving information from the university.

The university also measures the outcomes and applicability of the assistance through tangible evidence of implementation. For the Nai Thung Local Fishing Association, evidence includes the application of solar energy for lighting on fishing boats. For the Ban Bang Talumpho Integrated Nipa Palm Ecosystem Learning Center, evidence includes the assessment of carbon sequestration value and the development of nipa palm-based products to support low-carbon and net-zero tourism. These outcomes demonstrate how university assistance can translate low-carbon concepts into practical technologies, products, and economic opportunities.

Through this systematic process, Walailak University demonstrates an established mechanism for assistance to low-carbon innovation and start-ups. The approach connects diagnosing community needs and opportunities, developing appropriate low-carbon solutions, engaging start-ups and local communities, and measuring practical implementation and outcomes. By supporting clean-energy applications in local fisheries and carbon-sequestration-based innovation in nipa palm ecosystems, the university contributes to the development of community enterprises and start-ups that foster a more sustainable low-carbon economy.

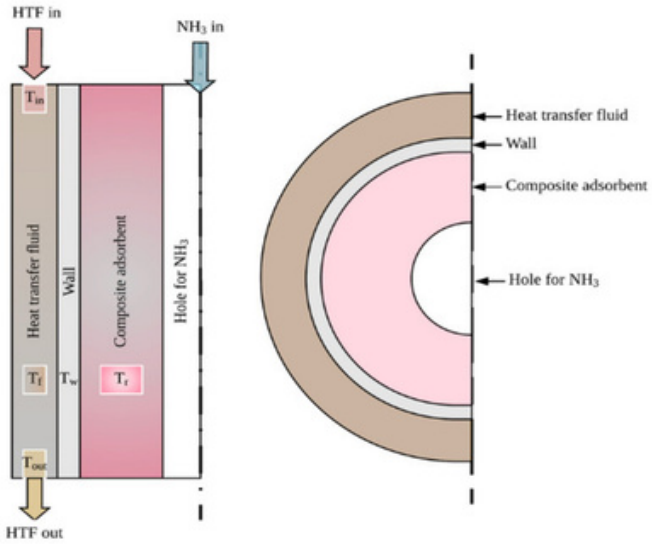
THERMOCHEMICAL ENERGY STORAGE INNOVATION FOR SOLAR ENERGY EFFICIENCY

Solar energy is a promising clean energy source, but its intermittent nature creates challenges for continuous energy use. This research therefore develops a Thermochemical Energy Storage (TCES) system using Strontium Chloride ($SrCl_2$), selected for its cost advantages and stability as a thermochemical storage material.



The research diagnoses the limitations of solar energy storage and develops two heat exchanger configurations: Water Jacket (Simple Reactor Layers) and Fin-tube, with the latter designed to increase heat-transfer surface area. ANSYS Fluent is used to simulate fluid flow and heat transfer, supporting the optimization of the system design and operating conditions.

The results demonstrate that the Compression Ratio (CR) significantly affects the desorption rate and Heat Transfer Fluid (HTF) requirements. Increasing CR from 1 to 4 reduces the HTF flow rate by almost 10 times, while the system achieves an energy storage efficiency of up to 94% at CR = 16. These quantitative results provide evidence for optimizing system performance and reducing energy requirements.



The water jacket heat exchanger of the thermochemical energy storage.

The innovation also has potential for engagement and integration with Photovoltaic-Thermal (PVT) systems, allowing solar thermal energy to be stored and subsequently used for cooling in a dual-use application. This approach is particularly relevant to Southeast Asia, where solar energy potential is high and cooling demand is significant.

The research measures performance through simulation and quantitative evaluation of desorption rate, HTF flow rate, and energy storage efficiency. Future development will focus on optimizing HTF flow control, investigating alternative storage materials, and testing TCES-PVT integration under real operating conditions.

Overall, the research demonstrates a systematic process that connects diagnosing the challenges of solar energy storage, developing an optimized TCES system, engaging with potential clean-energy applications, and measuring performance through quantitative evidence. The results highlight the potential of $SrCl_2$-based TCES to improve the efficiency, stability, and practical utilization of solar energy as part of the transition toward a cleaner energy system.