Phranakhon Si Ayutthaya Rajabhat University (ARU)

sustainability report 2024

Phranakhon Si Ayutthaya Rajabhat University (ARU) is situated at the heart of the Ayutthaya UNESCO World Heritage Site. The university's architectural style reflects the historic Ayutthaya designs found in the surrounding ruins. Due to its location within the World Heritage Site, university buildings are subject to height restrictions in compliance with preservation regulations. Despite these limitations, the campus maximizes the use of available land while preserving existing trees, which provide shade and a pleasant environment for faculty and students. ARU is located in Phranakhon Si Ayutthaya District, the city center of Phranakhon Si Ayutthaya Province. The district covers an area of 130.60 km^2 and has a total population of 136,467, resulting in a median population density of approximately 1,053 inhabitants per km^2.

1. Infrastructure, Setting, and Safety

Phranakhon Si Ayutthaya Rajabhat University (ARU) is located in the Ayutthaya UNESCO World Heritage Site, where building designs follow height restrictions and reflect historic Ayutthaya architecture. The campus emphasizes sustainability with shaded areas, conservation plantings, and 40,000 m^2 of water absorption zones that support biodiversity, stormwater management, and natural cooling.

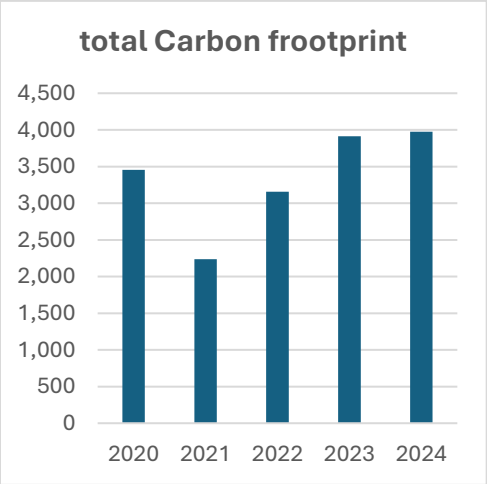
All buildings provide accessibility for people with disabilities and special needs, as well as worship and maternity care rooms. Safety is ensured through CCTV monitoring, fire extinguishers in all buildings, fire hydrants in newer buildings, and automatic barrier gates to control campus access.

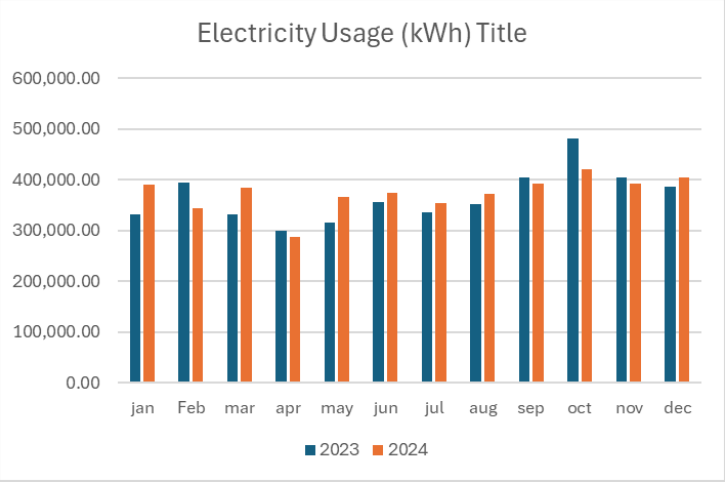
ARU demonstrates a strong commitment to sustainable, safe, and inclusive infrastructure that integrates heritage preservation, green spaces, and security for the university community.

2. Energy and climate change

Phranakhon Si Ayutthaya Rajabhat University (ARU) promotes energy efficiency and renewable energy through high-efficiency appliances, LED lighting, inverter cooling systems, and smart building technologies covering 13.8% of campus. A real-time energy monitoring system helps optimize electricity use across buildings. The campus has two solar PV modules generating 6,773 kWh/year, wind power producing 800 kWh/year, and selected electronic devices powered by individual solar units. These renewable systems reduce electricity purchased from the grid and provide learning opportunities for students.

In 2024, total electricity consumption was 4,463,669 kWh, mainly for lighting, cooling, and laboratories. Energy-saving initiatives include the “ARU Workout” app promoting walking and cycling, the “ARU Waste Exchange” 3Rs program, and power management systems to optimize usage. Renewable energy is applied to practical projects such as solar-powered water filtration, automated trash collection, automated doors to reduce AC loss, solar-panel tracking systems, and floating solar platforms for wastewater treatment. Student projects further demonstrate clean energy applications. ARU’s 2024 carbon footprint was 3,976 tCO_2 (0.60 tCO_2/person), showing the combined impact of energy efficiency measures, renewable energy use, and sustainable campus practices.





3. Waste

ARU promotes waste reduction and recycling through its “ARU Waste Exchange” program. Introduced in 2020, the program encourages students, faculty, and staff to separate waste—including plastic, paper, metal, and glass—before disposal. Participants can deposit waste at designated stations and earn rewards, with an automated system implemented in 2021 to increase collection efficiency.

In 2024, Green cones and garden towers were installed in front of faculty buildings and along main streets to compost food scraps, which are digested by earthworms to produce fertilizer. Some food waste is directly used for animals, while the remainder is used to raise Black Soldier Fly larvae, later processed as sustainable animal feed. A food waste digestion machine also converts leftovers into soil fertilizer, supporting circular resource use. Inorganic waste treatment reached 100%, with 5.6 tons recycled in 2024, representing over 75% of total waste treated. The university aims to achieve 80% recycling by 2025. Combined with educational workshops, competitions, and 3Rs activities, ARU effectively minimizes landfill waste, transforms waste into valuable resources, and fosters a culture of sustainability among the campus community.

4. Water

Phranakhon Si Ayutthaya Rajabhat University (ARU) implements comprehensive water management and conservation strategies across campus. Rainwater is collected from building roofs, parking areas, and other surfaces and discharged into campus ponds and canals. Certain buildings also store rainwater for indoor plant irrigation, ensuring efficient use of natural resources.

The university promotes water-efficient appliances to reduce consumption. Out of 1,033 water fixtures on campus, 185 are water-efficient, including 70 basins (5.25%), 100 urinals (23.22%), and 15 sensor-assisted fixtures (100%). These installations help optimize water use in classrooms, laboratories, and public areas.


Wastewater management at ARU includes treatment of hazardous or highly toxic chemicals by outsourced companies, with notifications to relevant users regarding collection schedules. Non-hazardous wastewater, containing fertilizers, soap, and organic compounds, is filtered using biomedia and released into lagoons for further treatment through plant-based filtration systems.

ARU maintains strict water quality standards and guidelines for discharges, shared across faculties to ensure compliance. Monitoring and evaluation are conducted through an IoT system in the main lagoon, providing daily water state reports, which are validated by students in water condition courses. Comprehensive monitoring reports are produced every six months, ensuring sustainable water management practices are upheld campus-wide.

5. Transportation


ARU promotes environmentally-friendly transportation through free zero-emission vehicle (ZEV) shuttle buses, rent-free bicycles, and pedestrian-friendly pathways. The two ZEV shuttle buses run 30–50 trips daily, transporting 200–300 passengers, with plans to expand the fleet and operating times. Bicycle use has increased with dedicated lanes and convenient parking, while sidewalks include disabled-friendly features and LED lighting for safety.

Parking is limited to 350 car and motorcycle spaces (5,104 m^2, 2.56% of campus area), with some areas converted into bicycle lanes, green spaces, and handicapped parking. Four programs—shuttle services, bicycles, bicycle lanes, and green-area conversions—have been implemented since 2021 to reduce private vehicle reliance, achieving a slight reduction in parking demand while supporting sustainable campus mobility.

Future plans include additional EV infrastructure, linking external parking with shuttle service, and converting other internal vehicles to ZEVs. Covered pedestrian paths may also be upgraded with solar rooftops to generate electricity. Together, these initiatives reduce carbon emissions, encourage active mobility, and enhance accessibility, demonstrating ARU's commitment to sustainable transportation.

6. Education and research

In 2024, Phranakhon Si Ayutthaya Rajabhat University (ARU) conducted 69 sustainability-related events, including 15 green projects, 6 student social engineering initiatives, >30 faculty and institute sustainability projects, and >20 community income improvement activities. These programs promote environmental awareness, sustainable practices, and community engagement among students and staff.

ARU also enhances teaching and learning quality by providing students with life and career counseling, extra-curricular activities, English language development, and digital competency training. Staff are supported with research management systems, facilities, and research funding. Together, these initiatives integrate sustainability into education and research, equipping the university community with skills and knowledge to contribute to a sustainable future.

Summary

Phranakhon Si Ayutthaya Rajabhat University (ARU), located in the Ayutthaya UNESCO World Heritage Site, integrates historic architecture with sustainability. The campus preserves trees and green spaces, includes 40,000 m^2 of water absorption areas, and provides accessible, safe buildings with CCTV, fire safety, and inclusive facilities. Energy efficiency is promoted via LED lighting, inverter cooling, high-efficiency appliances, and smart building technologies (13.8% coverage), supported by solar PV, wind power, and student clean energy projects. Total electricity use in 2024 was 4,463,669 kWh, with a carbon footprint of 3,976 tCO_2. Waste management

emphasizes reduction, separation, and recycling through the “ARU Waste Exchange,” composting, Black Soldier Fly larvae production, and food waste digestion, achieving over 75% recycling. Rainwater is harvested, used efficiently, and treated through biomedia and plant-based lagoons, monitored via IoT systems. Sustainable transportation includes ZEV shuttle buses, bicycles, and pedestrian pathways, with limited parking converted into green spaces. ARU hosted 69 sustainability events in 2024 and promotes education and research integrating environmental awareness, digital skills, and community engagement across campus.