



AFFORDABLE AND CLEAN ENERGY

GOVERNANCE AND OPERATIONS

UCSI University advances Sustainability Development Goal 7 (Affordable and Clean Energy) through institutional strategies that promote energy efficiency, carbon emission reduction and the gradual integration of renewable energy across campus operations. Energy efficiency considerations are incorporated into campus infrastructure management, ensuring that renovation works and facility upgrades prioritise efficient energy use through modern building technologies and optimised mechanical systems.

The University has implemented energy-saving measures across campus facilities, including full LED lighting, motion and occupancy sensors for lighting control, automated energy management systems and high-efficiency chiller systems to reduce electricity consumption while maintaining thermal comfort. Existing buildings are progressively upgraded through improvements to cooling systems, lighting controls and other energy-efficient equipment to enhance operational efficiency.

Operational teams regularly monitor and review campus energy consumption to identify areas of high energy use and reduce energy wastage, supporting the University's carbon management efforts and lowering CO₂ emissions.

To further strengthen its low-carbon transition, UCSI plans to install solar photovoltaic panels on selected campus buildings by 2027, complementing the current use of solar water heaters and increasing the share of renewable energy in campus operations.

These initiatives support SDG 7.2 and SDG 7.3 by improving energy efficiency and expanding renewable energy adoption.



Roof Solar Panel

TEACHING AND LEARNING

1. APEC SYMPOSIUM ON ENERGY TRANSITION: BATTERIES, FUEL CELLS AND ELECTRIC VEHICLES

Collaborating with APEC on Energy Transition: Batteries, Fuel Cells and Electric Vehicles, the Symposium was held at UCSI University, addressing carbon emissions in transportation and promoting clean energy solutions, supporting SDG 7. The symposium aimed to advance the adoption of Electric Vehicles (EVs) and Fuel Cell Vehicles, foster sustainable urban planning and provide actionable policy recommendations for a low-carbon transport future.

Participants included regional experts, policymakers and academics who engaged in knowledge exchange on EV infrastructure, national energy policies and clean energy integration. Immediate outcomes included enhanced capacity in policy development and sustainable transport planning. By promoting technological innovation, low-carbon mobility and regional collaboration, the initiative also contributes to SDG 9, SDG 13 and SDG 17 through strengthening multi-stakeholder partnerships.



2. SOLAR PV SYSTEMS AND MAXIMUM POWER EXTRACTION

Solar PV Systems and Maximum Power Extraction was an online technical talk organised by UCSI University to address the sustainability challenge of optimising renewable energy generation, supporting SDG 7. The session aimed to equip students and professionals with knowledge on solar PV technologies, system performance and maximum power point tracking (MPPT) techniques to enhance clean energy efficiency.

Delivered by Dr Thanikanti Sudhakar Babu, participants gained insights into PV optimisation, real-world applications and research opportunities. Immediate outcomes included improved technical competency and understanding of sustainable energy solutions among students. At a broader level, the programme contributes to SDG 7 by promoting low-carbon energy adoption and supports SDG 4 by providing inclusive, future-oriented learning opportunities in renewable energy technologies.



3. WORLD FISH'S DEEP DIVE SERIES

Deep Dive Videocast: Seaweed and Algae for Climate and Energy Solutions was organised by UCSI University in collaboration with WorldFish to explore marine biomass as a renewable energy source. The session addressed the need to reduce dependence on fossil fuels by highlighting sustainable aviation fuel and bioenergy derived from seaweed and algae, contributing to SDG 7.



The discussion was led by Distinguished Professor Dr Phang Siew Moi, who shared insights on carbon sequestration, renewable fuel production and the broader benefits of seaweed for ocean ecosystems and livelihoods. Immediate outcomes included increased awareness and understanding of algae-based energy innovation. At a broader level, the initiative also contributes to SDG 13, SDG 14 and SDG 17 as it strengthens cross-institution collaboration.



RESEARCH AND DISCOVERY

1. EV AND PV PENETRATION IMPACT ON GRID WITH CONSERVATIVE VOLTAGE REGULATION AND REACTIVE VOLTAGE COMPENSATION

(ISA Transactions, Volume 158, (2025) Asst Prof Ts Dr Navinesshani Permal)

As global interest grows in renewable energy sources, the impact of combined Electric Vehicle (EV) and PhotoVoltaic (PV) penetration on the power grid stability requires renewed attention to incorporate new technologies to maintain the power quality under operational constraints. Energy-saving techniques such as Conservation Voltage Reduction (CVR) allow the power utilities to transmit voltage at a lower operation limit, increasing the generation margin to absorb the peak load demands. Increased reverse PV penetration results in grid overvoltage while EV charging absorbs the reactive power causing grid instability. Both overvoltage and loss of reactive power in the grid can be reduced by using CVR and reactive power injection techniques. A power electronic secondary var controller (SVC) can dynamically inject reactive power into selected grid buses. This work compares the voltage stability of an IEEE 33 bus system operating with and without CVR. The simulation studies analysed the effects of EV penetration level and PV hosting capacity with SVC compensation paired with and without conservation voltage reduction technique. The analysis results demonstrate that tandem usage of CVR and SVC maintains the grid voltage under operational limits, meets load and EV demand, and increases power efficiency and PV penetration.

2. EFFECTS OF GREEN FAÇADE RETROFITTING ON THERMAL PERFORMANCE AND ENERGY EFFICIENCY OF EXISTING BUILDINGS IN NORTHERN CHINA: AN EXPERIMENTAL STUDY

(Energy and Buildings Volume 335, (2025) Prof Ts Dr Nangkula Utaberta)

In recent years, vertical greenery systems have gradually entered public attention, and more and more people are beginning to know it. This study aims to explore the impact of green façade retrofitting on building thermal performance and building energy consumption under hot summer conditions in northern China and to derive detailed data for future building energy efficiency retrofitting. This article used a comparative experiment to complete this research. Four laboratories of the same structure were constructed in Shandong Province, China. A movable metal frame was installed on the outside of the laboratory and the green façades could be adjusted to direct green façades or indirect green façades according to the need of the experiment. In addition, two different plants were studied. This study was carried out under two experimental conditions: cooling and no cooling. The experiment was carried out from July to August 2024. According to the data obtained from the experiment, the green façade well reduced the surface temperature of the walls around the experimental room and the average temperature level in the room. The most significant temperature drop of 23.1 °C was observed on the surface of the external walls of the room with the indirect green façade covered with Parthenocissus quinquefolia. The data show that the average temperature in several experimental rooms decreased by 1-5 °C. The indirect green façade improves the thermal insulation of the building envelope better than the direct green façade. In the cooling experiments, the room with indirect green façades covered with Parthenocissus quinquefolia has the highest energy-saving rate of 45.75 %. However, the room with direct green façades covered with Humulus scandens only has an energy saving rate of 6.43 %.

COMMUNITY AND PARTNERSHIP

1. FLES 2025 VIDEO COMPETITION

FLES 2025 Video Competition: Sustainable Campus Innovation Challenge was organised by the Future Leaders Empowerment Series (FLES) under UCSI's Youth Beyond Boundaries. The initiative engaged university students in identifying campus sustainability challenges related to energy consumption, carbon emissions and resource use, supporting SDG 7. The objective was to encourage students to propose practical, low-carbon solutions that promote energy efficiency and sustainable campus practices.

Participants produced short videos highlighting sustainability issues and proposing feasible strategies such as sustainable transportation, energy efficiency improvements and responsible resource use. Immediate outcomes included strengthened student awareness of clean energy concepts, systems thinking and sustainability leadership. At a broader level, the competition also contributes to SDG 12 and SDG 13 by promoting energy-efficient solutions, responsible consumption practices and climate action within the university community.



2. COASTAL FLOODING ADAPTATION AND RESILIENCE CHALLENGE 2025

Coastal Flooding Adaptation and Resilience Challenge 2025 was held from 4 to 6 November 2025 during the ICAEW ASEAN Sustainability Summit in Kuala Lumpur. The competition engaged 150 students from 24 universities, including UCSI University, to develop sustainable and financially viable solutions addressing coastal climate risks at Carey Island, supporting SDG 13. The objective was to integrate technical and financial perspectives in climate adaptation planning.

Six finalist teams presented solutions to a judging panel including the Securities Commission Malaysia, SD Guthrie Berhad, NAHRIM, Asian Capital Markets Forum and the World Bank. Immediate outcomes included innovative proposals and enhanced student capacity in sustainability and financial decision-making. This initiative also contributes to SDG 4, SDG 9, SDG 13 and SDG 17 by strengthening cross-sector collaboration.

