

13 CLIMATE ACTION



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GOVERNANCE AND OPERATIONS

UCSI University demonstrates its commitment to Sustainable Development Goal 13 (Climate Action) through institutional climate governance and operational strategies aligned with the Net Zero Blueprint 2030 and the Greenhouse Gas Protocol, with a target to achieve carbon neutrality by 2050. The university conducts carbon accounting and reporting covering Scope 1, Scope 2 and Scope 3 emissions, enabling systematic monitoring of greenhouse gas emissions and informing strategies for emission reduction and climate risk management across campus operations.

Energy consumption is regularly monitored, including the use of low-carbon and energy-efficient technologies, as part of the University's carbon management framework. Operational initiatives such as digitalisation and ticketless systems to reduce paper consumption, energy efficiency improvements and campus tree-planting programmes contribute to lowering emissions and enhancing carbon sequestration.

Beyond campus operations, UCSI University actively supports climate awareness and community engagement through public seminars, sustainability campaigns and outreach programmes that address climate risks, mitigation, adaptation and disaster preparedness. The University also collaborates with government agencies, community groups and non-governmental organisations to advance climate resilience initiatives and promote sustainable practices at the local and regional level.

TEACHING AND LEARNING (CLIMATE LITERACY)

1. WORKSHOP ON CARBON MARKET

The Carbon Market Forum: Malaysia's Path Towards Climate Action was organised in collaboration with Malaysian Industry Group High Technology to address challenges and opportunities in Malaysia's carbon market, emphasising its role in reducing greenhouse gas emissions and supporting climate mitigation, in line with SDG 13.

Participants gained insights into compliance and voluntary carbon markets, carbon credit benefits and regulatory improvements needed for transparency and effectiveness. Immediate outcomes included enhanced understanding of carbon market dynamics and policy frameworks, empowering stakeholders to engage in national climate action. At a broader level, the forum also supports SDG 9 by fostering innovation in climate solutions, market mechanisms and technology-driven approaches for a greener economy, SDG 12 through low-carbon practices and sustainable investments and SDG 17 through the university's partnership with the government agency for a common interest and purpose.



2. CARBON CAPTURE, UTILISATION AND STORAGE: A GATEWAY TO SUSTAINABLE ENERGY

On 21 February 2025, The Carbon Capture, Utilisation and Storage (CCUS) Talk was organised by UCSI University as an online event to address greenhouse gas emissions and promote climate mitigation, supporting SDG 13. Petronas Carigali senior reservoir engineer Azlan Mustafa, shared insights on CCUS technologies, applications and their potential to reduce emissions from industrial and power sectors, enhancing participants' understanding of technical, environmental and policy considerations.

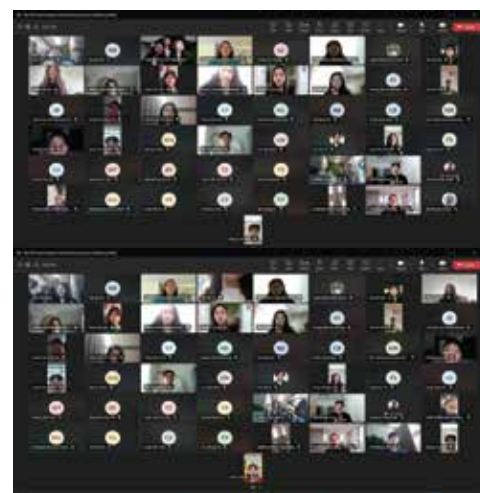
Immediate outcomes included increased awareness and motivation to adopt and advocate for carbon management solutions. At a broader level, the talk also contributes to SDG 7 by highlighting cleaner energy transitions, SDG 9 by promoting innovation in industrial decarbonisation and sustainable carbon management and SDG 17 through the university's partnership with the government-linked company Petronas for a common purpose.



3. ESR DAY FORUM 2025

The Environment and Social Responsibility (ESR) team hosted the Food Rescue and Waste Reduction for Climate Action session to address food waste and its contribution to greenhouse gas emissions, aligning with SDG 13. The session featured Sarah Grasset from The Lost Food Project (TLFP), who shared TLFP's success in rescuing over 8 million kilograms of food since 2016 and highlighted practical strategies for reducing food waste and carbon footprints.

Immediate outcomes included increased participant awareness of the environmental and social impacts of food waste and motivation to adopt sustainable consumption practices. At a broader level, the programme also contributes to SDG 2, SDG 12 and SDG 17 by promoting responsible food management, mitigating emissions, supporting food redistribution and fostering cross-sector collaboration for sustainable solutions.



RESEARCH AND DISCOVERY

1. MODIFICATION OF ACTIVATED CARBON WITH NITROGEN-BASED DEEP EUTECTIC SOLVENTS FOR ENHANCED CO₂ ADSORPTION

(Biomass Conversion and Biorefinery, (2025). Assoc Prof Ir Dr Lee Kiat Moon)

In the past few decades, carbon dioxide (CO₂) concentration in the atmosphere has become a major concern. This research study focused on CO₂ adsorption using coconut shells' activated carbon (AC), modified with deep eutectic solvents (DESs) to improve AC's adsorption efficiency. Nitrogen-based DESs: choline chloride (ChCl):urea (ACDES1), ChCl:polyethylenimines (PEI) (ACDES2) and ChCl:urea:PEI (ACDES3) with different impregnation ratios were investigated. The CO₂ adsorption test was performed in a packed-bed adsorption column at constant temperature (30°C) with initial CO₂ concentration and flow rate of 15% and 200 mL/min respectively. Among the adsorbents investigated, ACDES1 of impregnation ratio 1:2 exhibited the highest adsorption capacity (21.41 mg/g) and the longest breakthrough (18.1 min) and saturation times (23.7 min). Despite the reduction in the specific surface area and pore volume during impregnation, determined through Brunauer–Emmett–Teller (BET) analysis, DES functionalisation introduced active sites that promoted chemisorption and enhanced CO₂ adsorption. Additionally, ACDES1 showed good recyclability with less than 5% reduction in CO₂ adsorption capacity over five cycles. Besides, ACDES1 also showed high thermal stability, collectively suggesting the potential of the ChCl-urea-impregnated AC for CO₂ capture in the industries.

2. PERFORMANCE AND MECHANISM INVESTIGATION OF CO₂ CAPTURE BY NOVEL TERNARY MEA/TERTIARY AMINE/SULFOLANE BIPHASIC SOLVENTS

(International Journal of Greenhouse Gas Control, Volume 146, (2025). Asst Prof Dr Lai Li Sze)

Chemical-physical biphasic absorbents significantly reduce CO₂ capture energy consumption. In this study, four tertiary amines were combined with monoethanolamine (MEA) and sulfolane to form ternary MEA/co-absorbent/sulfolane biphasic solutions for CO₂ capture. The co-absorbents used were N-methyldiethanolamine (MDEA), 1-Dimethylamino-2-propanol (DMIPA), 3-(Dimethylamino)-1,2-propanediol (DMPA), and 3-Diethylamino-1,2-propanediol (DEAP). The dynamic phase separation behavior and properties were examined, the absorption/desorption characteristics were analysed and the phase separation absorption mechanism was explored through ¹³C Nuclear Magnetic Resonance (NMR) Spectroscopy.

Results showed that all four ternary solvents performed excellently, achieving high CO₂ loadings in the upper phases (3.09–3.41 mol/L), strong absorption and desorption efficiencies (over 92.5 % and 85 %, respectively), large cyclic loadings (above 2.67 mol/L) and reduced energy consumption (>45.81 % lower compared to 5 M MEA solution). The addition of tertiary amines improved the absorption performance of MEA/sulfolane solutions. Phase separation was influenced by amine solvent alkalinity and hydrophilicity, leading to the presence of sulfolane in both liquid phases and the selective distribution of MEA and tertiary amines. This research offers promising alternatives for efficient CO₂ capture and provides theoretical guidance on liquid-liquid phase separation absorption mechanisms.

COMMUNITY AND PARTNERSHIP

1. AIRBUS INDUSTRY OUTREACH: ADVANCING SUSTAINABLE AVIATION FUEL (SAF) IN MALAYSIA

UCSI University, in collaboration with Airbus and the Aerospace Malaysia Innovation Centre, organised an outreach to address high carbon emissions in aviation by promoting Sustainable Aviation Fuel (SAF) as a climate action strategy. The initiative aimed to explore SAF feasibility, supply chain optimisation and sustainable aviation pathways while strengthening collaboration between industry, academia and government. Key participants included Distinguished Prof Dr Phang Siew Moi, UCSI Group Sustainability Office vice president Leong Sat Sing and Prof Emeritus Tan Sri Dr Zakri Abdul Hamid.



The event enhanced understanding of SAF potential, decarbonisation strategies and cross-sector innovation. Immediate outcomes included actionable insights for sustainable aviation and technology transfer. At a wider level, the programme also contributes to SDG 7, SDG 9 and SDG 17 by supporting climate mitigation, advancing cleaner energy, fostering industrial innovation and promoting strategic partnerships for sustainable aerospace solutions.

2. GIYSCC LAUNCH, IN SITU LAUNCHING AT UCSI-IISDS

The International Institute of Science Diplomacy and Sustainability (IISDS) hosted the in situ launch of the Global Indigenous Youth Summit on Climate Change 2025 to address climate change and the underrepresentation of indigenous youth in sustainability discourse, aligning with SDG 13. The initiative aimed to foster youth leadership, integrate indigenous knowledge and strengthen climate diplomacy within Malaysia and the Asean region. Key participants included Distinguished Prof Tan Sri Dr Zakri Abdul Hamid, Prof Ts Dr Tan Wee Hoe, Prof D. Mohamad Osman and Prof Paul Arthur Berkman.



3. DISTINGUISHED LECTURE HIGHLIGHTS ROLE OF SCIENCE DIPLOMACY IN PROTECTING SARAWAK'S RAINFORESTS

UCSI University Kuching Campus, in collaboration with IISDS, Ingsa Asia and RCE Kuching, hosted a distinguished lecture by Distinguished Visiting Prof Dr Paul Arthur Berkman, with participation from Prof Ts Dr Tan Wee Hoe and Aishwuriya K Kunashankar. The lecture addressed climate change and rainforest sustainability in Sarawak, emphasising the integration of natural sciences, social sciences and Indigenous knowledge for informed, climate-resilient decision-making, advancing SDG 13.

