07

AFFORDABLE AND CLEAN ENERGY

2019-2023 Publications	1,032
2019-2023 Percentage of all Taiwan Publications	8.7%
Course Units	143
Student Engagements with Units on SDG 7	2,263

Research

Green Roof Demonstration Project

As global warming and the urban heat island effect intensify, our university's Professor Jehng-Jung Kao from the Graduate Institute of Environmental Engineering and Professor Hsin-Fei Meng from the Institute of Physics have collaborated on a "Green Roof Demonstration" project. This project involves the installation of over 20 transparent solar panels on the roof of the Environmental Engineering Building, along with the construction of a "DIYGreen Zero-Waste Circular Rooftop Garden" developed by Professor Kao's research team. The garden offers benefits such as insulation, carbon reduction, increased green coverage, and reduced stormwater runoff. It uses recycled bottles as the base and uses vermiculture to compost kitchen waste, generating organic fertilizer to promote plant growth. This system addresses the competition for sunlight between silicon solar panels and plants, achieving dual benefits of power generation and agriculture with the aim of harmonious coexistence with nature.

Enhancing Solar Panel Efficiency and Lifespan

Professor Hsin-Fei Meng from our university's Institute of Physics is actively engaged in research on organic photovoltaic devices, modules, and manufacturing processes to increase the efficiency and lifespan of large-area organic solar modules. Professor Meng and his research team have innovatively developed a blade coating process and module design that improve the crystallization of organic materials through material combination and design. This advancement significantly enhances the stability of organic photovoltaic modules in outdoor operation, boosting their power generation efficiency from 5% to 11% and extending their outdoor lifespan to 3-4 years, surpassing the current international literature.

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Social Impact

"Taiwan House" Wins Japan's Good Design Award and Golden Pin Design Award

The Transdisciplinary Design Innovation Shop (TDIS) team from our university has won the Japan "Good Design Award" with their project "1 House for All Taiwan House." The project aims to establish a sustainable urban renewal mechanism and utilize highly efficient renewable energy for building and operating houses, showcasing innovative architectural concepts. "Taiwan House" uses domestically produced engineered wood as the structural material to address social housing needs during urban renewal. It proposes an integrated solution that includes "sustainable construction industry upgrading," "urban renewal strategies," and "practicing housing justice." This project has received high praise from international judges, highlighting the urgency of advancing sustainable transformation in Taiwan.

Energy Education Center Opens for Public Tours

Our university's "TSMC-NCTU Energy Education Center," which opened in 2017, is now available for public tours by appointment. The center also serves as a research and experimentation space for related departments within the university, promoting concepts of sustainable energy, smart living, social engineering, and building technology. The Energy Education Center is designed with reinforced structures, upgraded eco-friendly materials, and integrated smart environmental control systems, featuring a central computer system that effectively maintains an optimal low-energy and comfortable living environment. Through water resource recycling and solar power-generating glass, the center is self-sufficient and contributes excess electricity to the nearby science park. In addition to being a green energy laboratory and a green technology experience site, the center embodies environmental protection principles, enhancing public imagination of sustainable green energy and smart living through interactive participation.

Education & Cultivation

Focusing on Semiconductors, Smart Vehicles, and Green Energy

Our university is focusing on three major areas: semiconductors, smart vehicles, and green energy. We have reached a consensus with the Industrial Technology Research Institute (ITRI) and Kyushu University in Japan, leading to the official signing of a memorandum of cooperation. This partnership will facilitate more opportunities for collaboration between Taiwan and Japan in developing advanced technologies and talent exchange. Yang Ming Chiao Tung University and Kyushu University possess strong academic research capabilities and forward-looking technological expertise, while ITRI has strengths in applied technology development and commercialization. Together, the three parties are committed to pioneering research and talent cultivation in semiconductors, smart vehicles, and green energy. Our university has long been a key driver of the semiconductor industry in Taiwan and hopes that through increased international cooperation, we can attract more international students and apply research results to the industry, injecting innovative technological energy into the sector.

Cultivating Green Energy Professionals

Our university's College of Artificial Intelligence is the first AI-focused college in Taiwan, aiming to become a leading international center for artificial intelligence research and education. Based on teaching and research trends, the College of Artificial Intelligence consists of three academic and research units: the Institute of Computational Intelligence, the Institute of Intelligent Systems, and the Institute of Smart Industry and Green Energy. The Institute of Smart Industry and Green Energy is dedicated to addressing the future demand for AI and green energy professionals in Taiwan. It plans related green energy and research directions and is committed to cultivating professionals in AI and green energy to meet the substantial talent needs of Taiwan's future innovative green energy industry.

Stewardship

Intelligent Green Energy Industry-Academia Co-Creation Mechanism

Our university has partnered with Wistron Corporation to establish the "Joint Industrial Innovation Center for AI and Green Energy" at the Tainan Campus. In the first semester of the 113th academic year, we will launch the "Master's Program in Intelligent IoT Industry" to promote cross-disciplinary research in smart manufacturing and green energy electronics through innovative smart services, smart technology, and intelligent industrial IoT. This initiative seeks to foster industry-academia co-creation collaborations between our university and the local industry in Tainan. The establishment of the R&D center will realize the mechanism for co-creation in research and talent cultivation in intelligent manufacturing and smart green energy, introduce a unique co-creation model for advanced production lines, and promote cross-disciplinary research collaboration. It will also set a new trend in product and production line development and cross-department talent cultivation collaboration. The center will operate with an open mechanism, inviting scholars and experts in related fields to collaborate, making it the first world-class industry-academia co-creation R&D center and talent cultivation base in intelligent manufacturing and smart green energy in the nation.

International Collaboration Promoting Energy Technology Development

On October 30, 2023, Professor Yi Chang, Dean of the International Semiconductor Industry Academy at our university, led a delegation to visit the Indian Institute of Technology, Delhi (IIT Delhi), and signed a renewal of the cooperation memorandum with the institute's president, Prof. Rangan Banerjee. Since 2016, the two institutions have collaborated closely in multiple fields, achieving significant results. They discussed expanding the existing cooperation to include biomedical, energy, and humanities fields, with plans to send at least 50 PhD students to Taiwan each year. The collaboration will focus on practical research exchanges and cooperation in application areas such as drones, smart manufacturing, electric vehicles and autonomous vehicles, carbon capture and utilization, renewable energy, and hydrogen energy, further strengthening and deepening the partnership between the two institutions.