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[SDGs 17] Partnership for the Goals 全球夥伴

[17.3.7] Please indicate if your university publishes progress against SDG 7?

Projects of Increase of Renewable Energy Sources at NCUT

A. Solar Energy

The collaboration between NCUT and the government's public roof leasing operation has led to the establishment of a 433kWp solar power generation system on the top floors of the Machine Tool Building and Chin-Yi Dormitory. This initiative aims to contribute to energy conservation and carbon reduction. The anticipated annual electricity savings are detailed in the following Table. Furthermore, plans are underway to implement solar power generation systems with a capacity of 1150kWp in the school's Yanghao Dormitory, Luming Terrace, and Motorcycle Parking Lot (3), with construction expected to be completed in mid-2024. This expansion seeks to further enhance the benefits of sustainable energy practices. See the below Figure for details.



The solar power generation system on the top floors of the Chin-Yi Dormitory



The solar power generation system on the top floors of the Machine Tool Building



The solar power generation system on the top floors of the Yanghao Dormitory



The solar power generation system on the Motorcycle Parking Lot (3)

Figure The solar power generation system of NCUT

Table Solar power generation and energy saving statistics

Year	2021	2022	Jan.-Jun, 2023
Power generation (kWh)	562,419	548,655	278,133
Electric charge saved (NT\$)	NT\$1,687,257	NT\$1,465,965	NT\$834,399

B. Large Solar Photovoltaic Technology Communications

Acknowledging the growing significance of solar power generation as a mainstream emerging energy source, NCUT recognizes the potential impact on the power grid due to the intermittency and unpredictability of solar energy systems. Therefore, forecasting power generation is deemed crucial. Our institution has implemented a data collection system to gather relevant information and establish relationships between prediction methods and training data. Additionally, weather data is utilized to predict the heating efficiency of solar panels, and rainfall is factored in to predict the cleaning requirements. The process is depicted in the following Figure.



Figure Large Solar Photovoltaic Technology Communications

C. Energy inventory:

Our institution has actively engaged in the "Academic Assistance Industrial Park Project Counseling Program" initiated by the Industrial Park Bureau of the Ministry of Economic Affairs, specifically offering guidance for Chuansing Industrial Park in 2022. Furthermore, NCUT has introduced a training course on greenhouse gas emission inventory, aiming to cultivate talents in the field of climate change. As part of the annual independent inventory process, adjustments or plans for energy-saving and carbon reduction are made. In 2023, our institution is involved in the "Industrial Park Cross-regional Low-Carbon Transformation Integration Promotion Plan,"

focusing on key industries, particularly metal and machinery equipment manufacturing. This initiative anticipates the participation of 12 manufacturers, jointly advancing low-carbon manufacturing processes and the application of green technologies, as illustrated in the below Figure.



Teachers of NCUT and companies discuss energy inventory

D. Energy and Environmental Technology Center:

NCUT has established an Energy and Environmental Technology Center with the ultimate goal of achieving sustainable development and equality for future generations. The center prioritizes environmental protection, social equity, and economic development while implementing a local energy balance. Its services encompass:

Water Resources Research Services:

- Water quality testing
- Formulation of water quality standards and specifications

Energy Management Research Services:

- Heat measurement
- Energy measurement
- Heat exchanger energy testing and certification

Sustainable Environmental and Ecological Research Services:

- Air quality measurement
- Indoor air quality standards and specifications

Water Resources and Energy Integrated Application Research Services:

- Energy and environment Internet construction and management

Refer to the below Table for a detailed breakdown.

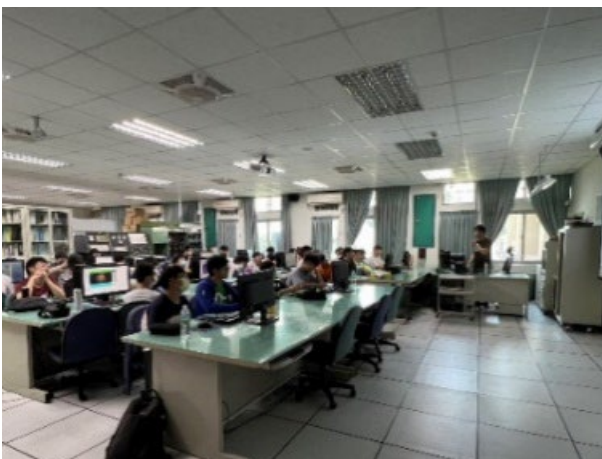
Table Energy and Environmental Technology Center case performance

Year	Project	Amount NT\$
2021	Market verification project plan of Kongpin Cloud Butler innovative service plan	220,000
2022	Research plan on energy independent management planning and talent training for precision machinery plants	300,000
2023	Development and research plans related to methods and systems for smart fluid power biological internal circulation promotion	300,000
	Jasmine tea production process optimization data collection research project	100,000

Diverse green energy technologies and courses at NCUT

A. Green power integration

Each year, NCUT offers energy-focused courses and themed practices covering topics such as generation and substation engineering, battery management systems, industrial distribution design, and monitor system design. These activities, including internships and special projects, aim to enhance students' understanding of battery management system functions, circuit design for management systems, and the characteristics of industrial distributor systems. Students apply their knowledge to create energy-efficient instruments, such as designs for solar power monitors and predictions for solar and wind power, contributing to our efforts in energy efficiency and carbon reduction. See the below Figure for details.



Monitoring system design and internship course



Themed practices

Figure Diverse green energy technologies and courses

B. Energy and Refrigeration and Air Conditioning Academic and Technical Seminar

The Energy and Refrigeration and Air Conditioning Academic and Technical Seminar aligns with the government's energy-saving policies, focusing on the development of refrigeration and air-conditioning technology for zero-energy buildings. The seminar introduces artificial intelligence to broaden technological advancements. Scholars and experts from various fields, including refrigeration and air conditioning, building energy conservation, industrial clean room technology, and related energy technologies, are invited to publish meticulous research results and engage in discussions to exchange research experiences. See the following figure for details.



Seminar and competition



Photos of Seminar and competition

The Energy and Refrigeration and Air Conditioning Academic and Technical Seminar

C. Conference on Green Technology Engineering and Application (GTEA)

The GTEA (Conference on Green Technology Engineering and Application), organized by NCUT, spans various subject areas, including Smart Organization and Organizational Design (SMD), Smart Manufacturing (MA), Green Manufacturing and Carbon Cycle Technology (GMCRT), Green Materials (GM), Refrigeration and Air Conditioning Technology (RAC), Green Energy and Energy Saving (GEES), Mechanical and Electrical Automation (MA), and other engineering-related fields (OTH). This interdisciplinary approach aims to provide solutions for economic and environmental sustainability. Over the years 2021 to 2023, a total of 246 papers were submitted.

In the 2023 seminar, notable speakers, Xiao Shusan, Chair Professor and Dean of the School of



Engineering, Department of Mechanical Engineering, National Central University, and Chen Weixin, Distinguished Professor, Department of Aerospace Engineering, National Cheng Kung University, were invited to discuss the latest trends in achieving net-zero carbon emissions and converting waste heat into green electricity. The lecture topics, "Challenges and Opportunities of Taiwan's Net-Zero Carbon Emissions in 2050" and "Technological Development of Converting Waste Heat into Green Electricity," aim to contribute to the advancement of green technology and the creation of a sustainable environment.

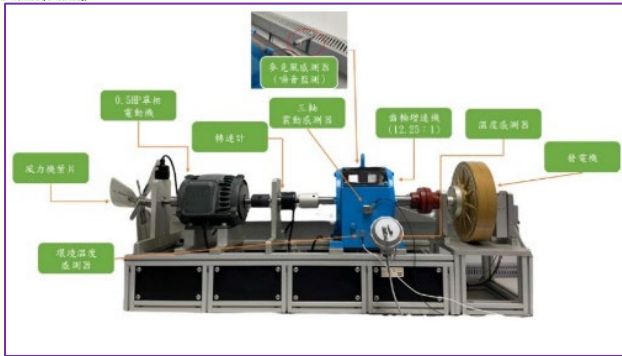
D. Intelligent Living Technology Conference

The "Smart Life Technology Seminar" hosted by NCUT serves as a platform for integrating smart life technology, aiming to enhance the quality of life and promote high-quality e-life services and sustainable development. Launched in 2006, it has reached its 17th session and has evolved into a communication platform for research and development in the field of smart life technology. The seminar fosters collaboration among various academic teams, facilitates the publication of research achievements, and promotes inter-school cooperation.

The focus of the seminar revolves around addressing future home environment challenges, home care, safety monitoring, building energy self-sufficiency, and energy conservation. By introducing industrial technologies related to motors, electronics, information, communications, and automation, the seminar aims to contribute to the creation of a safe, healthy, convenient, and comfortable living environment.

E. Offshore wind power project

The development of smart IoT portable wind turbine diagnosis equipment by NCUT aligns with the government's initiatives in the green energy technology industry and renewable energy. This innovative equipment enables remote operators and maintenance staff to engage in real-time monitoring of wind turbines, addressing issues and malfunctions promptly. The incorporation of auto-diagnosis enhances the reliability of the wind power supply system, leading to reduced repair and operation costs. This initiative contributes to the advancement of sustainable and efficient wind energy technologies. See the below Figure for details.



Physical simulation platform of wind power generation system with smart networking function



Wind power monitoring system

Offshore wind power project

Green Buildings: Enhancing Sustainability on Campus

Our campus, though modestly developed, boasts an impressive natural environment, featuring close to a thousand trees, including over 600 camphor trees. In our commitment to sustainability, we have undertaken initiatives to ensure that our campus infrastructure aligns with environmentally responsible practices. Several key buildings on our campus have been recognized as qualified green buildings, contributing to our commitment to a greener future. Notably, the Machine Tool Building, Library and Information Center, the front gate area, the new parking lot, and the Chin-Yi student dormitories have all achieved green building certification.

Furthermore, we are proud to share that NCUT has earned a noteworthy ranking of 68th in the UI GreenMetric World University 2022 ranking. This recognition underscores our dedication to sustainability and eco-conscious practices.

To provide further clarity, the following buildings, as shown in the accompanying figure, have received prestigious green building labels, signifying their compliance with stringent environmental standards:

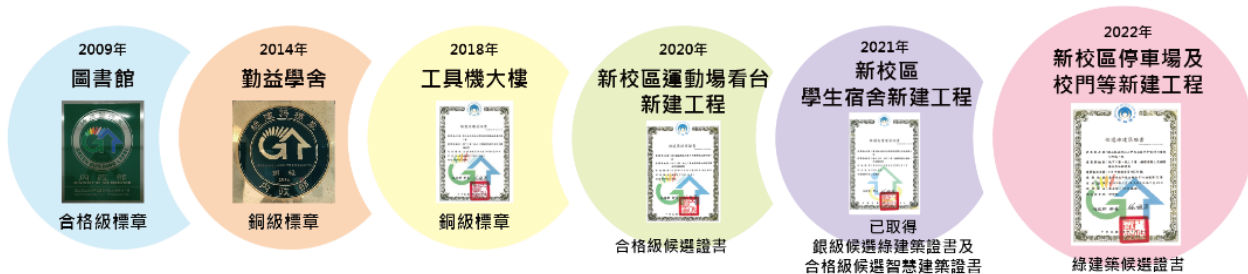


Figure. Certified green buildings of the campus

中文	英文
2009 年圖書館合格級標章	2009 Library: Certified Green Building Label
2014 年勤益學舍 銅級標章	2014 Chin-Yi Student Dorms: Bronze Green Building Label
2018 年工具機大樓	2018 Machine Tool Building
2020 年新校區運動場看台新建工程 合格級候選證書	2020 construction work of the auditorium of the stadium of the new campus: Certified Green Building Candidate Certificate
2021 年新校區學生宿舍新建工程 銀級候選綠建築證書合格級候選智慧建築證書	2021 new student dorm of the new campus: EWH Silver Green Building Candidate Label and Smart Building Candidate Certificate
2022 年 新校區停車場及校門等新建工程 綠建築候選證書	2022 construction work of the parking space, gate and others of new campus: Green Building Candidate Certificate

These certifications not only affirm our commitment to eco-friendliness but also serve as a testament to our ongoing efforts to create a campus that is both environmentally sustainable and conducive to the well-being of our university community.