

SDG.17.3.7

NUK's efforts in SDG7 are as follows:

1. Course Offerings: (2024 Sustainability Report p.62)

NUK offers various courses related to renewable energy and assists the industry in understanding clean energy.

- (1) A total of 264 courses will be offered in 2023-2024 on the topics of natural ecology, human-environment relationship and sustainable development.
 - (2) In 2022, the "Introduction to the Calculation and Application of Carbon Storage" course was offered for the first time. This is the first step in nurturing students to become seed professionals in carbon inventory.
2. Establish the "Research Center for New Energy and Electricity Development" and the "Disaster Prevention and Rescue Science and Technology Research Center" to provide the public, enterprises, academia, and the government with consultation and policy recommendations.
3. Campus implementation of various smart energy saving measures (2024 Sustainability Report p78; pp.87-90)
- (1) Installation of an intelligent energy management system and the effectiveness of energy conservation measures.
 - (2) Buildings are constructed with green buildings, and 2,142.92kWp of solar panels have been installed on the roofs, and the number is increasing.
 - (3) We have applied for green energy certificates to promote the use of green energy and have spared no effort in the promotion and practice of clean energy.
 - (4) From 2019 onwards, the Sustainability Report will be published regularly on the website in August each year to illustrate the content of Goal 7: Ensure that all people have access to affordable, reliable, sustainable and modern energy.
4. Since 2019, a sustainability report has been issued every year to illustrate the results of SDG7 planning and implementation. See the website .(<https://ces.nuk.edu.tw/p/412-1011-5978.php?Lang=zh-tw>)
5. **The attachment** is the summary of SDG7 in 2024.

5.1 Green, Smart and Sustainable Campus

In response to the United Nations' goal of sustainable development, integrate sustainable development affairs and resources across administrative and academic units, and implement the spirit of SDGs, ESG, and CSR in all aspects of the University, the 193rd NUK University Council approved the establishment of the National University of Kaohsiung Sustainable Development Promotion Committee on March 10, 2023, with the president as the convener and the vice presidents as the vice conveners. Under the committee, there are four sections: "University Governance Section", "Curriculum, Teaching, and Social Responsibility Section", "Campus Environment Section", and "Research, Industry, and Academic Resources Section" to integrate resources, regularly supervise the achievements of cross-unit work teams, and review the implementation of annual plans.

5.1.1 Sustainable Campus Environment Management

Organizations Related to Campus Environment

1. The Campus Environmental Safety and Health Section: Its duties include safety and health, environmental protection and campus planning.
2. 9 Committees
 - A. Campus Sustainable Development Promotion Committee: The committee was established to respond to the United Nations' goal of sustainable development and to integrate sustainable development issues and resources across administrative and academic units.
 - B. The Campus Sustainable Development and Planning Committee: to review and implement the ideals of environmental development and establish a mechanism for sustainable development of the campus.
 - C. The Environmental Protection, Safety and Health Committee: to maintain the quality of the campus environment and ensure the safety of the laboratory operations of faculty-staff and students in accordance with relevant laws and regulations such as environmental protection and labor safety and health.
 - D. The Energy Conservation Committee: to strengthen the management

of energy and promote the rational and effective use of energy in accordance with the provisions of Article 6 Paragraph 1 of the Enforcement Rules of Energy Administration Act.

- E. The Biological Experiment Safety Committee: to ensure the experimental safety of faculty and researchers engaged in genetic recombination-related research in accordance with "Genetic Recombination Experimental Code" of MST.
- F. The Laboratory Animal Care and Use Committee: to supervise the management and use of laboratory animals in accordance with Article 16 Paragraph 1 of Animal Protection Act, with English title "Nation University of Kaohsiung Animal Care and Use Committee".
- G. The Public Art Executive Panel: to budget public art funds and implement public art projects in accordance with "Regulations Governing the Installation of Public Artwork".
- H. The Public Art Selection Panel: to handle the selection and installation site of public art projects.
- I. The Public Art Appraisal Panel: to conduct appraisal after public art is installed.

University Self-defined Regulations

NUK currently has six regulations on campus environmental safety and health.

1. NUK Environmental Safety and Health Policy
2. NUK Safety and Health Management Regulations
3. NUK Code of Practice for Laboratory Safety and Hygiene
4. NUK Waste Disposal Act
5. NUK Measures for the Establishment of the Environmental Protection, Occupational Safety and Health Committee
6. NUK Measures for Establishment of the Environmental Safety and Health Center



5.2 Energy and Climate Action

5.2.1 Climate Change Response Strategies

In response to global climate change and in line with the direction of the national energy and emissions reduction policy, NUK signed "2050 Net Zero Emissions" declaration and goal in 2022 Sustainability Week. In addition to strengthening the concept of a sustainable university and the mutual support of curriculum, teaching, and administrative systems to implement campus climate action, specific details are being implemented in the 2023-2026 mid-term plan. Therefore, in 2024, the response strategy was to review the current status of the sustainable campus through a detailed inventory, which are divided into two major parts, namely the campus environment and the SDGs related courses.

Construct Sustainable Campus Environment

The University is committed to practicing the SDGs spirit and a green university with friendly campus. Therefore, the current environmental inventory of the campus can be divided into external feedback, energy equipment, smart monitoring system, and water-saving facilities. The description is as follows.

1. External feedback: After many years of effort, the school has been recognized with the Green Building Label, the Local National Important Wetlands, and awards for quality of construction in the areas of buildings, health, and animal and plant habitats. We have also participated in national and international competitions to learn what we can do to strengthen and learn from other schools' efforts on sustainability issues. The following is a description of the school.

A. Participate in the Sustainability Report and participate in judging: Starting from 2019, we have published a sustainability report for the previous year's sustainability environment, and so far, we have received 3 gold and 1 silver medals in the Corporate Sustainability Reporting category of the TCSA Taiwan Corporate Sustainability Award, and the sustainability report to be published in 2024 is posted on the university's website (<https://ces.nuk.edu.tw/>) and has been recognized by TCSA Taiwan Corporate Sustainability Award in the category of Sustainability Reporting with Bronze Medal.

B. Participation in UI Green Metric World University Rankings: The results

of the 2024 UI Green Metric World University Ranking were announced on December 18, 2024. 1,477 institutions from 95 countries participated in the competition, and we were ranked 278th, which is in the top 18% of the world's universities. Compared to 2023, when 1,183 institutions participated in the competition and the University was ranked 285 out of 24% of the world's universities, this is a significant improvement. It also proves that our efforts and direction in promoting green and sustainable campuses have been recognized. Among them, our infrastructure and transportation projects are the best. The following is a description.

a. Ranked 8th among the participating universities in Taiwan in "Infrastructure" category. The reason for this recognition includes the signing of the Talloires Declaration on June 5, 2004 at the beginning of the school's founding, making it the first green university in Taiwan. The 82.5 hectares of campus land, former farmland and fish farms, was acquired by the Kaohsiung City Government, and after a series of environmental restoration, the forest and vegetation area of the campus has reached 51.64%.

b. In addition, the campus has created an ecological pond, East Lake, ecological watercourse, and water-friendly spaces, plus 10 public art displays such as "Happy Together" located in various locations. It is combined with more than 300 hectares of off-campus periphery into a university community to carry out environmental education and management based on the concept of "lungs of the community", and to attract the public to recreation, and furthermore the school holds outdoor teaching at the National Taiwan Education end to realize the spirit of commonwealth.

c. "Transportation" program: In the top 88.89% of global rankings, the program was recognized for controlling the entry of motorcycles into the campus, so that except for delivery and official vehicles, all motorcycles belonging to faculty, staff and students must be parked in designated parking areas. In cooperation with the Kaohsiung City Government and YouBike, the University has set up 10 parking stations on campus to facilitate the movement of faculty, staff, students, and the general public. In addition, the University controls



the number of vehicles entering the campus through a fare collection mechanism, and plans for five locations for sharing taxi rides in student dormitories and other places, and then transfers them to public transportation to reduce the use of private transportation.

- d. "Water Resource Management" project: ranked in the top 95% in the world because the University's wastewater is collected through the pipeline and treated at the wastewater treatment plant, and mainly discharged to the campus water system for lawn sprinkler irrigation and eco-waterway supplemental water, and then discharged to the first major drainage ditch at the north side of the bridge of the University, and then finally into Dien Bao Creek. In addition to the traditional secondary biological treatment, the wastewater treatment plant also provides tertiary treatment with screening and ozone sterilization, and the quality of the discharged water meets the April 29, 2019 revised discharge standards.

2. Energy Equipment: In line with the school's policy of creating green energy, the school has inventoried the available roofs of the school to install solar photovoltaic panels, each with 2,142.920kWp, including bartering and applying for green energy certificates.



► Solar Panels

3. Build a Smart Power Monitoring System: EMS Central Power Management System

- A. Smart Power Consumption Framework: All 12 buildings in the university are equipped with smart digital meters to monitor the total power consumption, air-conditioning power consumption, and power consumption in some areas of the



▲ 1st Student Dorm & General Dorm installed with 266 digital meters

buildings. The EMS central power management system collects, records, calculates, and analyzes data from digital meters across the campus, and further manages the loading and unloading of central air conditioners and stand-alone air conditioners in each building.

- B. Smart Electricity Management and Tariff Billing System: Used in the management of electricity consumption in student accommodation, the system can provide users with a systematic history of electricity consumption, alert notifications, achieve the goal of energy-saving smart living, and implement user billing. Optimize the electricity billing process to enhance the convenience of life.



- Electricity consumption in dormitories
- Calculation of Electricity Charges for Residential Students
- Tariff Maintenance
- Check-out Billing
- End-of-period billing
- Electricity Saving Notice Maintenance
- Payment Status Inquiry



▲ Smart Electricity Management and Tariff Billing System

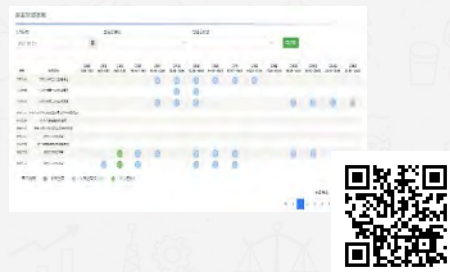
- C. Multi-payment system: Combine the digital student ID card with the multi-payment system to notify students of the amount of electricity bills due and information on electricity consumption, saving labor management and billing costs.



- D. Smart Cloud Management System: Use meter data to analyze the electricity consumption of dormitories and draw visualized charts. The administrator can send out real-time power consumption alerts in accordance with the energy-saving policy to urge students to adjust their power consumption.
- E. Classroom Air Conditioning Control System: In accordance with class schedule of each semester, the air conditioning system delivers and cuts off power according to whether the classroom is in session or not, so as to avoid wasting power when the air conditioning is on but the class is not in session.



▲ Smart Cloud Management System Webpage



▲ Classroom Air Conditioning System Website

5.2.2 Green Energy

1. The Administration Building and the Law College set up their own solar panels to generate electricity with a total capacity of 36.4kwp and applied for 15 renewable energy certificates.
2. In conjunction with the Million Rooftop PUs Project, the entire school building rooftops are equipped with solar power generation system bid lease, with a total of 2,142.960kwp and generated about 2.74 million kWh in 2024

1. Replacement and installation of energy efficient equipment: The University has been budgeting for the replacement of traditional appliances with energy efficient equipment since 2018. Compared to the base period in 2015, the average energy-saving appliances have been improved by over 81%, over 75%: and the electricity bill has been saved by over \$2.55 million per year. In 2024, depending on the annual funding budget, the following are completed:

- A. Replacement of power-saving air-conditioning \$2,289: 10 buildings have completed more than 9 air-conditioning using inverter-type installations (10/13=77%).
- B. Replacement of LED lighting fixtures \$184,000: over 85% of the lighting fixtures in the school buildings and roads around the school have been replaced with energy-saving LED lighting fixtures.
- C. The improvement of the average energy-saving electrical appliances has exceeded $(85+77)/2=81\%$, which is more than 75%

▼ List of solar power generation equipment

Site	Yr/Mon Installed	KWp	Mode of operation	MW 2023	MW 2024
College of Law	2004/12	26.400	REC	8,185	7,968.6
Admin. BL	2013/08	10.000	REC	2,917	2,367.8
College of Engineering	2019/12	209.450	FIT	282,144	279,352
Library & Info BL	2019/12	348.395	FIT	482,184	472,284
College of Management	2019/12	93.810	FIT	120,116	116,876
1st General BL	2019/12	154.875	FIT	209,696	206,344
Admin. BL	2019/12	57.525	FIT	78,716	78,292
Student Dorm	2020/01	56.640	FIT		
Duty Accommodation	2020/01	50.445	FIT	467,532	461,088
Motor-and-Bicycle Parking Lot	2020/01	246.620	FIT		
Sport & Leisure BL	2022/06	581.060	FIT	797,650	784,050
Student Activity Center	2022/10	307.700	FIT	401,460	332,454
Total		2,142.920		2,850,599	2,740,806

FIT : Feed-in Tariff REC : Renewable Energy Certificate



◀ Solar Panels



5.2.3 Effectiveness of Energy Saving Measures

In order to implement campus energy management and energy saving measures, energy saving strategies such as energy saving control management, retirement and replacement of power-consuming equipment, and utilization of renewable energy, as well as various action plans such as centralized power monitoring system, retirement and replacement of old air-conditioning system, and solar power system, have been formulated. From 2015 to 2024, the electricity saving rate reached 11.84%, and the EUI indicator will be reduced from 58.8 to 31.4.

Construct Sustainable Campus Environment

The major strategies and actions of electricity conservation measures are listed in the table below:

	Action plan	Description
Energy-saving control and management	Central electricity monitoring system	Network function of digital electricity gauge was used to conduct on-line monitoring and controls on the electricity usage of each buildings.
	Implement self-management on spaces	Self-management system on electricity bills will be implemented for each buildings in order to conduct "users pay" policies and save energy.
	Installation of electricity gauge in independent units and outdoor court	Independent electricity gauge will be set up to monitor the electricity usage of independent units and outdoor courts for the affiliated units to conduct electricity calculations and controls.
	Adjustment on the starting and stopping time of air conditioning	Implement the rules that air conditioning will not be supplied for administration building and general classroom during winter season (from December to March next year).
	Adjustment on opening hours of the library and information center	Different opening hours will be established for each space regarding its function and usage frequency. Those spaces will not be opened during Weekends of Winter and Summer Vacations.
	Participate in the demand-based price competition measures of taiwan power company	Participate in the demand-based price competition measures of Taiwan Power Company to save energy and electricity bills
Replace old electricity consumption equipment with new ones	Implementation of intelligent classroom step-by-step	For the project, we applied network cloud technology and used low carbon and energy-saving as our focus to implement intelligent air conditioning schedule management in teaching spaces such as general classrooms and seminar rooms at the 6 teaching buildings of the school. Users may send in real time through course arrangement system and space borrowing system, organize air condition monitoring and database management and implement comprehensive fully automatic air conditioning schedule control, temperature monitoring and the on off procedure control to enhance the correctness and liability in the management of air conditioning for classrooms, reaching the objectives of facilitating sustainable development of environment and enhancing the quality of learning environment.
	Replacing old Air conditioning system with new ones	Budgets were prepared to replace the old air conditioning system with frequency-conversion air conditioner system. Replacements have been completed in College of Science and College of Engineering.
	Replacing lightings with LEDs	Budgets were prepared to replace old light bulbs with LEDs. Replacements have been completed in campus circulating roads, streetlights at the parking lots and the classrooms of each buildings and seminar rooms.
Utilization of renewable energy	Replacing old air conditioning system with new ones	Student dorms adopts solar power hot water system 100% to provide hot water.
	Replacing lightings with LEDs	1. Administration building and College of Law installed solar power panels for electricity generation themselves. The total electricity generated was 36.4 kwp. In addition, they have applied for 15 renewable energy certificates. 2. To cooperate with the "million sun road" plan, we have installed standard solar power generator system on the roof of all the school buildings. In total, 2217.02 kwp was installed.

Electricity Consumption Statistics

Year	Total/kw	Total/GJ	Year over 2015	TOE	EUI
2015	14,201,510	51,084.57	-	1221.9	58.8
2016	14,528,086	52,259.30	-2.27%	1250	37.1
2017	14,090,386	50,684.84	0.81%	1212.3	36
2018	12,884,463	46,346.99	9.27%	1108.6	33
2019	12,970,796	46,694.89	8.67%	1116	33.2
2020	12,733,420	45,840.31	10.28%	1095.6	32.6
2021	11,292,628	40,620.97	20.43%	971.6	28.9
2022	11,959,686	43,020.46	15.79%	1029	30.6
2023	12,274,980	44,154.76	13.57%	1056.1	30.9
2024	12,520,011	45,036.17	11.84%	1077.2	31.4

EUI = Total electricity used (kWh)/NUK Total floor area
2015 was selected as the base year for the implementation of the Central Four-Saving plan.

Fuel Saving Measures

Two measures are taken to save fuel: a. Regular maintenance and inspection of the school's official vehicles are carried out to maintain efficiency and to save fuels; b. When replacing aged official vehicles, the purchase priority is given to the ones with high efficiency and low fuel consumption. The total fuel consumption in 2024 is 5102.56 liters, which represents a fuel saving of 17.69% compared to the base year 2019. However, if compared with 2023, an increase of 2.59% occurred due to the use of diesel fuel on campus for tree pruning equipment and vehicles in result of more natural disasters. In 2024, however, there were more natural climate disasters, resulting in an increase in usage.

Statistics on Fuel Consumption

Year	Gasoline/L	Diesel/L	Ttl Fuel Consumption/L	TOE	Fuel saving (%)
2019	5,227.26	880.41	6,107.67	4.8	-
2020	4,774.51	1,424.93	6,199.44	4.9	-1.50%
2021	5,690.06	847.16	6,537.22	5.2	-5.45%
2022	4,492.70	432.82	4,925.52	3.9	24.65%
2023	4,418.62	554.88	4,973.50	3.9	18.57%
2024	4,524.55	578.01	5,102.56	4.0	17.69%