

# **Climate Action Outcomes and Policy Planning**

## **National University of Kaohsiung**

### **2020-2026**

#### **Source:**

- 1. The Sustainability Report 2020-2022**
- 2. The School Evaluation Report 2023**
- 3. University Affairs Mid-term Plan 2023-2026**

After becoming the first green university in Taiwan by signing the Talloires Declaration on Green Universities in 2004, the National University of Kaohsiung (hereafter NUK) has in recent years, in response to global climate action, Taiwan's Pathway to Net-Zero Emissions in 2050, and the cultivation of globally sustainable human resources, has introduced the spirit of sustainable development of the SDGs into the university's development planning, and implemented campus climate action in all aspects of sustainable campus facilities and environment. The results from 2020 to 2023 and the policy implementation plan from 2023 to 2026 are as follows.

## **I. Campus Climate Action Outcomes 2020-2023**

From 2020 to 2023, the University demonstrates its efforts in climate action through the three main areas of Smart Green Campus, Smart Management, and Sustainability Partnerships in accordance with the strategic goals of the university development. The results are summarized as follows.

### **1. Smart Green Campus**

- (1) Green Building and Smart Building: All new school buildings constructed since 2012 have been awarded the Green Building Label. The Student Activity Center, which was completed and opened in 2022, was not only awarded the Golden Award for Urban Engineering Quality<sup>1</sup>, but was also awarded the Green Building Label and Smart Building Label at the same time (Table 1).

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<sup>1</sup> Multi-functional Student Activity Center won the "Golden Award for Urban Engineering Quality": <https://www.nuk.edu.tw/p/404-1000-51779.php?Lang=zh-tw>

**Table 1 List of Green and Smart Buildings on Campus**

Building	Time	Award
Humanities & Social Science Building	Oct. 2012	9 Indicators Gold Level Green Building Label
	2013	Participated in Kaohsiung City Kaohsiung Housing Green Building Contest, & won the Public Building Award and the Rainwater Storage and Reuse Award.
Administrative Building	Sept. 2014	9 Indicators Bronze Level Green Building Label
Second Student Dormitory	April 2016	Qualified Green Building Label for Accommodation
Student Activity Center	July 2022	Qualified Green Building Label for Basic Type
	Dec. 2022	Smart Building Label

(2) Improve sports venues on campus: In order to host the National University and College Athletic Games 2020, the University renovated the 400-meter standard track and field, tennis courts, and roads around the campus on schedule and in good quality to provide athletes with a safe and comfortable venue for competition.

(3) Green Energy Installation: In coordination with Million Rooftop PUs, the University has inventoried the available rooftops for the installation of solar photovoltaic panels, with a total of 2,217.055kWp installed on 12 buildings, including bartering and applying for green energy certificates (Table 2).

**Table 2 Statistics on NUK Alternative Energy (Solar Photovoltaic) Power Generation Equipment**

Item	Building	Year	Total installed capacity (kWp)	Operation mode	2019 power generation (kWp)	2020 power generation (kWp)	2021 power generation (kWp)	2022 power generation (kWp)
1	Law College	12/2004	26.40	REC	No data	No data	11,966	14,733
2	Administrative Building	08/2013	10.00	REC	No data	No data	2,875	2,998
3	Engineering College	12/2019	209.45	FIT	282,472	276,216	286,136	289,616
4	Motorcycle Parking Lot	12/2019	348.40	FIT	513,636	496,008	492,192	493,836
5	The Library	12/2019	93.81	FIT	136,104	124,192	123,640	123,492
6	Management College	12/2019	154.88	FIT	202,176	193,440	211,760	213,728
7	First General Building	12/2019	57.53	FIT	83,592	84,972	80,804	81,356
8	Administrative Building	01/2020	56.64	FIT	440,592	469,752	476,436	480,324
9	Student Dormitories	01/2020	50.45	FIT				
10	Staff Housing	01/2020	246.62	FIT				
11	Sports & Leisure Building	06/2022	637.53	FIT	Not installed	Not installed	Not installed	491,600
12	Activity Center	10/2022	325.34	FIT	Not installed	Not installed	Not installed	Estimated settlement by end July

Item	Building	Year	Total installed capacity (kWp)	Operation mode	2019 power generation (kWp)	2020 power generation (kWp)	2021 power generation (kWp)	2022 power generation (kWp)
								2023
Total	2,217,02							

Description:

1. FIT: Feed-in Tariff, REC: Renewable Energy Certificate
2. Estimated annual electricity generation = installation capacity 1kw × 365 days × 24 hours × average annual capacity factor; the average annual capacity factor for photovoltaic power in Kaohsiung City is taken as 13.56%.
3. Before 2020, the power generation of the College of Law and the Administration Building (REC) was read from the smart meter network by the Certification Center, and the University has no relevant records. However, after 2021, because the Center did not support the online reading system, the University switched to using photographic reading to send back the electricity. In addition, the solar panels of the College of Law are relatively old, and some of them are damaged, so the electricity generation is not as good as it should be.

## 2. Smart Management

(1) Power Management System: EMS Central Power Management System.

- A. Smart electricity consumption structure: In recent years, the old air conditioners have been actively replaced, and smart digital electricity meters have been installed in 12 buildings to monitor the total electricity consumption of the building, the electricity consumption of air conditioners, and the electricity consumption of some districts.
- B. Smart electricity consumption management and electricity pricing system: Used to manage student dormitory electricity consumption, which can provide users with a systematized electricity consumption history, warning notifications, achieve the goal of energy-saving, and implement user fees. It also optimizes the operation process of electricity bill pricing and improves the convenience of life.
- C. Multi-payment system: Combining the digital student ID card with the multi-payment system, students will be notified of the electricity bill and consumption information for payment, saving manual management and charging costs.
- D. Smart cloud management system<sup>2</sup>: Use the electricity meter data to analyze the electricity consumption in the dormitory and draw visual charts. Administrators can cooperate with energy-saving policies, send electricity warnings in real time, and urge students to adjust their consumptions.

<sup>2</sup> Smart cloud management system: <https://reurl.cc/7k0Ox1>

E. Classroom air-conditioning control system<sup>3</sup>: In accordance with the scheduled timetable of each semester, the air-conditioning system is powered on and off according to the usage of the classroom, so as to avoid the waste of electricity when no class is in session.

(2) Smart monitoring system: In order to strengthen the campus security, in recent years, 11 audio-visual emergency systems have been installed through the injection of relevant project funds, and the use of integrated monitoring and control devices, multiple license plate recognition systems, top floor security control and improvement of campus lighting. It is to build a campus security network that meets the needs of the school and reinforces the security network.

(3) Electronic document system: In response to information security risks such as the diversification of web browsers and the suspension of IE and related components, the second-generation electronic document system was introduced in November 2021. So far, the online approval rate is about 93.53%.

### **3. Sustainability Partners**

(1) Ecological diversity: 51.6% of the campus area is landscaped, with a green coverage rate of 86.22%, 142 species of trees, three wetlands, a 300-meter butterfly eco-trail, and 68 species of 36 families of birds, with a census of yellow orioles to be conducted from 2021 onward (Att. 1-18). Since 2019, the stray dogs on campus have received care. Heartworm medication, ligatures, vaccinations, advocacy and foster care meetings have been deployed to realize the Respect Life and friendly campus.

(2) Zero Emission Mobility Vehicle (ZEV) Policy: The University prohibits the entry of non-approved vehicles, and from 2020 onwards, the University and the City Government have planned to install U-BIKE rental stations on campus, and by 2022, 10 stations have been set up, with more than 200 U-BIKES available for use, which will actually realize the benefit of reducing carbon emissions. Distribution of stations on campus: <https://ga.nuk.edu.tw/p/405-1010-46824,c4397.php?Lang=en>

(3) Implement socially responsible procurement policies: Achievement rate of green

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<sup>3</sup> Classroom air-conditioning control system: <http://dets.nuk.edu.tw/DETS/>

procurement is 99% or more (Table 3). 5.31% achievement rate of preferred procurement in 2021, superior to the 5% stipulated in the previous regulation.

**Table 3 NUK Achievement rate of green procurement**

Year	2019	2020	2021	2022
Achievement rate	99.7%	99.7%	99.37%	99.44%

(4) Publication of Sustainability Report: Starting from 2019, NUK has published a sustainability report every year focusing on the previous year's sustainability results, and has made improvements through PDCA reviews by participating in domestic and international competitions. To date, NUK has received three gold and one silver sustainability report awards and has been recognized as a finalist for the National Sustainability Award.

In summary, the specific achievements in recent years include active electricity saving, optimizing the use of solar energy, implementing relevant electricity saving strategies (Table 4), maintaining high efficiency and low fuel consumption of public vehicles (Table 5), and zero-carbon emission mobility. At the same time, the estimation of GHG emissions shows that the per capita carbon emissions have been decreasing yearly and reached 0.89 metric tons by 2022 (Table 6). In addition, compared with the base year of 2015, the electricity saving rate in 2022 reached 15.79%, with an annual saving of more than 2.6 million RMB, but the opening of the Student Activity Center in 2022 onward will lead to an increase in electricity consumption.

**Table 4 List of Power Conservation Strategies and Action Plans**

Strategy	Action plan	Description
Energy-saving control management	Centralized power monitoring system	Use the network connection function of the digital ammeter to monitor and control the electricity consumption of each building online.
	Implement space self-management	Each building implements a self-management system for electricity charges, and implements user fees to save energy.
	Electric meter installation for independent units and outdoor courts	Separate meters are set up for the electricity used in the units and outdoor courts for the purpose of calculating and controlling the electricity consumption of the respective units.
	Air conditioner start and stop time adjustment	To stop air-conditioning in administrative buildings and classrooms during the winter (December - March).
	Adjustment of Library opening hours	Each space has different opening hours according to its function and frequency of use, and is closed on Saturdays and Sundays during the summer and winter vacations.
	Participation in	Participate in Taiwan Power's demand tariff to save energy

Strategy	Action plan	Description
	demand side bidding of Taiwan Power Co.	and electricity.
Replacement of power-consuming equipment	Progressively building smart classrooms	This project utilizes network cloud technology and takes low-carbon and energy-saving as the main axis to build smart air-conditioning scheduling for general classrooms, lecture halls, and other teaching spaces in the six teaching buildings of the university. Users use the classroom scheduling system, the real-time transmission of space borrowing system, the integration of air-conditioning monitoring, database management, the establishment of a comprehensive fully automatic air-conditioning scheduling control, temperature monitoring, open and close program control, in order to enhance the accuracy and reliability of the classroom air-conditioning management, to promote the sustainable development of the environment and enhance the quality of the learning environment goals.
	Air Conditioning System Replacement	Yearly replacement with inverter air-conditioning system which has been completed in Science and Engineering Colleges.
	Lighting replacement with LED lights	Yearly replacements with LED lights. Ring road, parking lot, classrooms and lecture halls were completed.
Renewable energy	Solar Water Heating System	100% of the student dormitories use solar water heating systems to provide hot water.
	Photovoltaic system	The Administration Building and Law College installed solar panels with a total generating capacity of 36.4kWp and won 15 renewable energy certificates. In line with the "Million Rooftop PUs" program, the entire campus roof is equipped with a solar power generation system with a total of 2,217.02kWp.

**Table 5 Statistics on Fuel Consumption of School Vehicles**

Year	Gasoline (liters)	Diesel (liters)	Total Fuel Consumption (Liters)	Fuel saving (%)
2019	5,227.26	880.41	6,107.67	-66.33%
2020	4,774.51	1,424.93	6,199.44	-68.83%
2021	5,690.06	847.16	6537.22	-78.03%
2022	3,566.14	432.82	4,925.52	-34.14%

**Table 6 NUK Carbon Emission Statistics by Year**

Year	Carbon Emissions (MT CO <sub>2</sub> e)	Savings over 2015 (%)	Carbon emissions per capita (MT CO <sub>2</sub> e/capita)
2015	7,400.630	-	1.41
2016	7,617.742	-2.93%	1.23
2017	7,438.977	-0.52%	1.17
2018	6,754.273	8.73%	1.06
2019	7,090.454	4.19%	1.10
2020	6,786.914	8.29%	1.07
2021	5,732.896	22.54%	0.85
2022	6,041.622	22.49%	0.89

※Carbon emissions are quoted from electricity bills; per capita carbon emissions are self-estimated.

## II. Our Climate Action Policies and Targets for 2023 to 2026

In response to global climate action, Taiwan's Pathway to Net-Zero Emissions in 2050, and the cultivation of globally sustainable human resources, the University will use the results from 2020 to 2023 as the basis for comprehensively strengthening and implementing campus climate action in the areas of campus environmental organization and regulations, environmental management, energy conservation strategies, and environmental education, and will include them in the action plan in the 2023-2026 Mid-term University Development Plan 3. The University will continue to implement this action plan on a regular basis and evaluate its progress. In addition, it will regularly evaluate the progress of implementation. The implementation projects can be divided into three major areas, namely "Campus Carbon Neutrality", "Smart Campus", and "Internalization of Sustainability", and the specific action plans (as shown below) are as follows.

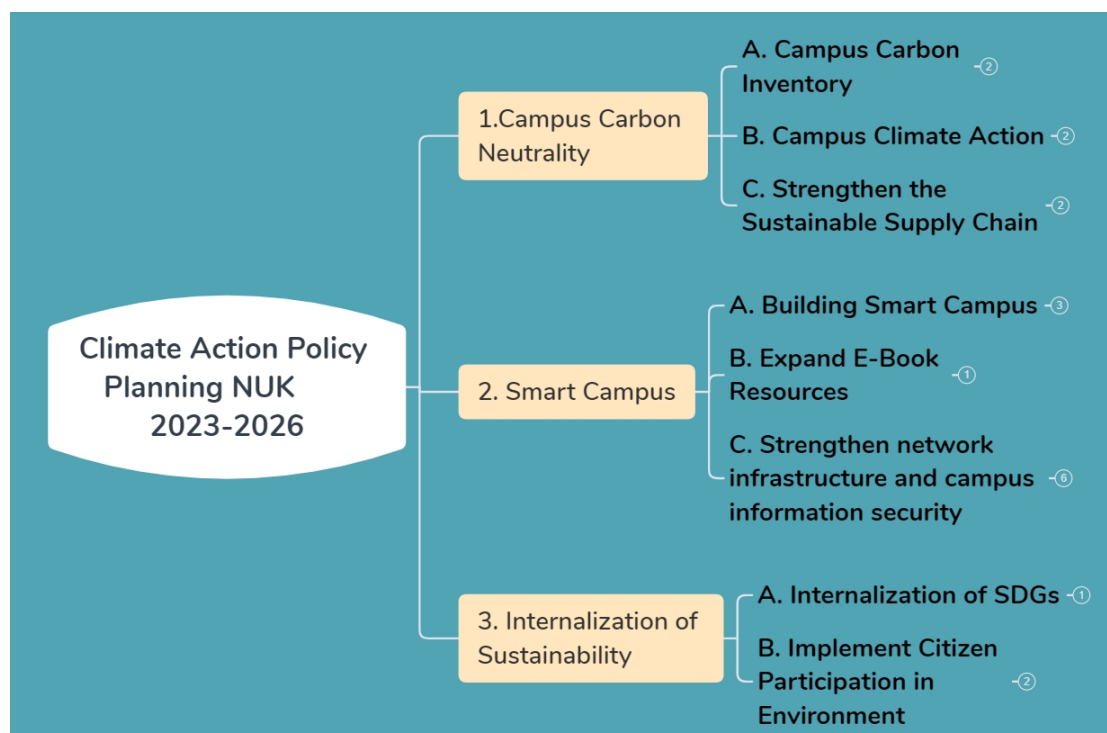


Fig. Climate Action Policies for 2023-2026

## **1. Campus Carbon Neutrality**

The University integrates the goal of sustainable development of the United Nations into the organization and operation of the school, and utilizes its professional knowledge and scientific research capabilities to actively reduce the environmental carbon footprint of the campus, and to gradually achieve campus carbon neutrality in the following ways:

### **A. Action Plan 1: Campus Carbon Inventory**

**a. Description of Status:** Description of Status: At the opening of the Sustainability Week on May 23, 2022, the President of the University announced and signed the "2050 Net Zero Emissions" declaration, which will progressively achieve carbon neutrality and move towards the goal of 2050 net zero emissions.

**b. Implementation Strategies and Practices:** Implementation Strategies and Practices: In order to understand NUK's carbon emissions, a carbon inventory is expected to be conducted from 2023 to 2026 to calculate the greenhouse gasses (GHG) emitted directly or indirectly by the school in all aspects of administration, teaching, research, and student learning, so to further formulate appropriate measures to reduce the school's emissions.

1) Carbon inventory will be conducted annually and the results of the inventory will be made public

- Annual carbon inventory (including the carbon footprint of the school trees) conducted by professional consultants.
- Carbon verification by a third party.

2) Setting up emission reduction measures based on the results of inventory and verification to gradually move towards carbon neutrality (SDG 7, SDG 13).

- Develop and review a campus-wide reduction plan based on the



results of the annual inventory.

2) Expected results: Understand the carbon emissions of the whole university and reduce carbon emissions yearly in order to move towards carbon neutrality as a mid-term goal, and then achieve the goal of "2050 Net Zero Emissions".

3) Performance Indicator

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A Carbon Inventory & Publication of Results	a.No.carbon inventory results published	Quantification	No.	1	1	1	1
	b.Publication of 3 <sup>rd</sup> Party Carbon Checks	Quantification	No.	1	1	1	1
B Carbon Inventory-based Emission Reduction Measures	Reduction in carbon emissions per year	Quantification	%	--	2	3	3

## B. Action Plan 2: Campus Climate Action

### a. Description of Status:

1) Global climate change is an important issue for humanity, and NUK is a member of the Green University and a participant in global environmental protection. In 2019-2020, it received funding from the Architectural and Building Research Institute of the Ministry of the Interior and the Kaohsiung City Government to renovate the student dormitories into smart-energy residences, and to install a smart-energy management system and a centralized power monitoring system. For electricity usage, digital meters have been installed in each building on campus to collect data on electricity usage in each building, and a "Power-BI" website has been built to provide teachers and students with

information on electricity usage and remind them to conserve energy and fulfill their responsibilities as global citizens.

- 2) In addition to the improvement of hardware and equipment, the University should also incorporate climate issues into its environmental regulations and management. In response to SDGs: 6, 13, and 15 and the UI GreenMetric World University Rankings, the University intends to take stock of the current status of environmental and climate-related issues and regulations from 2023 to 2026, and to examine the potential risks in management in order to take measures to effectively reduce and eliminate them.

#### **b. Implementation Strategies and Practices**

- 1) The University's Sustainable Climate Change Program, which participates annually in the UI GreenMetric World University Rankings - Energy Climate Change, Education and Research (SDG 13).
  - Revise the Chinese and English sustainability reports annually and participate in the judging process.
  - Participate annually in the UI GreenMetric World University Rankings to review annual performance.
  - Inventorying campus carbon emissions and developing medium- and long-term plans to reduce them.
  - Review annually the suitability of the school's administrative rules and regulations.
- 2) Enhance smart power and introduce a water management system to participate in the UI GreenMetric World University Rankings - Water Resources (SDG 6, SDG 15).
  - Use smart power system to monitor to reduce power wastage annually
  - Water saving devices and water management
  - Wastewater recycling

- c. **Expected results:** The University will review its internal regulations, strengthen its smart power management and integrate it into its water management system, and propose a specific climate change response plan to meet the university social responsibility requirements.

**d. Performance Indicator**

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A University Climate Change Sustainability Plan	Annual Sustainability Report Project Ranking	Qualification	Rank	Gold	Platinum	Platinum	Platinum
	Reduction in fossil fuel use (annual/previous year's oil use)	quantization	%	5	5	6	6
B Enhancement of smart power and integration into water management systems	Electricity Savings Data and Ratio (Annual/Previous Year's Electricity Consumption)	quantization	%	1.5	1.5	2	2
	Water Conservation Data and Ratio (Annual/Previous Year's Water Consumption)	quantization	%	5	5	5	5
	Wastewater recycling (annual recycled water/contemporary annual water use)	quantization	%	85	85	90	90

**C. Action Plan 3: Strengthen the Sustainable Supply Chain**

**a. Description of Status:**

Responsible producers and consumers will help to reduce the economic, environmental and social costs and enhance the protection of the environment in line with the "Responsible Consumption and Production" program required by SDG 12. In recent years, the University has followed the Executive Yuan's procurement policy to make ethical purchases and has installed a smart resource recycling system in the student dormitory area. The following is a description:

- 1) Responsible producers and consumers will help to reduce the economic, environmental and social costs and enhance the protection of the environment in

line with the "Responsible Consumption and Production" program required by SDG 12. In recent years, the University has followed the Executive Yuan's procurement policy to make ethical purchases and has installed a smart resource recycling system in the student dormitory area. The following is a description:

- 2) Priority procurement policy: In accordance with Article 69 of the "Law for the Protection of the Rights and Interests of Persons with Mental and Physical Disabilities" and the "Measures for Priority Procurement of Goods and Services Produced by Organizations of Welfare Institutions for Persons with Mental and Physical Disabilities or Sheltered Workshops," the University has implemented a priority procurement policy. This meets the 5% requirement of Article 3 of the Regulations on the Priority Purchase of Goods and Services for Organizations or Sheltered Workshops for the Physically and Mentally Disabled.
- 3) Smart resource recycling system in the student dormitories: In order to improve odors and dirty dark corners in the dormitory garbage areas, as well as to enhance environmental protection in reusing resources, and to reduce the garbage produced, a new-type smart garbage recycling management and recycling stations were built in the student dormitories in 2019, which utilize Internet of Things (IoT) technology to establish a smart input guidance mechanism, full detection devices, and digital records of the recycling process, and use statistical results to analyze user habits to further improve garbage removal and resource utilization.

#### **b. Implementation Strategies and Practices**

- 1) Increase rate of ethical procurement (SDG 2, SDG 12)
  - Enhance Green Purchasing Execution Rate
    - Strengthen the proportion of priority purchases
  - Promote and reduce the amount of plastic waste and participate in the UI GreenMetric World University Rankings - Waste (SDG 12).
  - Annual promotion of plastic and disposable item minimization and waste

disposal policies for outsourcers.

- Measure annual campus-wide waste and recycling volumes and increase the percentage recycled each year.

**c. Expected results:** With reference to the indicators of SDG 12, the University continues to implement relevant procurement policies to enhance ethical green purchasing and prioritization, and to measure and reduce the use of single-use plastics to minimize the environmental impact.

**d. Performance Indicator**

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A Increase the rate of ethical purchases	1) Increase green procurement ratio	quantization	%	95	95	95	95
	2) Enhance the preferred purchasing ratio	quantization	%	5	5	5	5
B Promote and reduce plastic waste (Environment)	1) Frequency per year per year that the policy on minimizing the disposal of waste and plastics is promoted (incl. outsourced contractors)	quantization	Frequency	4	4	4	4
	2) Waste to recycling quantities and ratios (resource recovery/total annual waste)	quantization	%	10	13	16	19

**2. Smart Campus**

The University promotes the campus digitization and digital governance through information engineering to enhance the overall efficiency of school operations, with a view to reducing the administrative burden of staff and improving the campus experience. Specific practices of the Smart Campus are summarized as follows:

**A. Action Plan 1: Building Smart Campus**

**a. Description of Status**

- 1) In terms of campus environment, the University has participated in the University Impact Ranking every year starting since 2019 to review and

adjust the appropriateness and effectiveness of the SDGs sustainable campus planning and policy directions.

2) In recent years, the University has made efforts to improve the energy efficiency of existing buildings in response to SDG 7, SDG 11, and the UI GreenMetric World University Rankings:

- Installation of solar photovoltaic panels for power generation: the first phase of the solar photovoltaic panels installed on the rooftop of the school building was tendered in 2017, with a capacity of 1,217kWp, meter-mounted cogeneration in 2019, and was awarded the Ministry of Education's award for the installation of solar photovoltaic power generating equipment in the "Total Design Capacity Category" in 2020. The second phase of the tender was tendered in 2021, and the capacity of the panels will be reached to 2,217.02kWp by the end of 2022. By the end of 2022, the capacity will reach 2,217.02kWp.
- In response to the diversification of web browsers and the discontinuation of IE maintenance and other information security risks, the University has newly introduced the "2nd Generation Electronic Documentation System", which has increased the percentage of online approvals by more than 90%.
- Collaborated with the Kaohsiung City Government's Transportation Bureau to set up 10 U-BIKE stations on campus to enhance the usage of zero-emission vehicles.

#### **b. Implementation Strategies and Practices**

1) Enhance energy-saving equipment and introduce green energy, and participate in the UI GreenMetric World University Rankings - Environmental Infrastructure (SDG 7, SDG 11)

- Gradually replace energy-intensive electrical appliances with high-

efficiency green equipment, e.g., lighting and air-conditioning.

- Buildings to incorporate energy utilization systems for intensive energy savings, e.g., elevators.
- Upgrade green energy power, e.g., solar panels.

2) Build a smart green campus system and participate in the UI GreenMetric World University Rankings - Environmental Infrastructure (SDG 11)

- Reinforce the electronic document management and correspondence system, and increase the proportion of online signatures and electronic receipt of documents.
- Strengthen the centralized smart surveillance system, e.g., smart door control and video surveillance system, to enhance management efficiency and maintain campus safety. Raise energy-saving awareness and encourage actions by installing smart air-conditioning scheduling systems and power monitoring systems.

3) Develop a sustainable low-carbon transportation strategy and participate in the UI GreenMetric World University Rankings - Transportation (SDG 11)

4) Increase the fee for driving to campus, establish different parking permit fees for electric vehicles, hybrid vehicles, and gasoline vehicles based on carbon emissions, and encourage the use of shared transportation on campus.

- Purchase only zero-emission vehicles (ZEVs) for public vehicles to reduce environmental pollution.
- Allocate funding for incremental improvements to the traffic space to maintain pedestrian and vehicular safety.
- Build a smart lane control system and provide recommendations for the shortest possible routes to reduce the carbon footprint of vehicles on campus.

### **c. Expected results**

1) Continue to move towards a carbon-neutral smart campus and gradually transform existing buildings into smart green buildings.

2) To build a smart green campus system, to increase the number of zero-emission vehicles, and to gradually improve the traffic space.

#### d. Performance Indicator

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A. Reinforce energy-saving equipment and introduce green energy.	1) Replace and Install energy-saving equipment (e.g. lighting, air-conditioning) (Maintenance)	quantization	\$'000	3000	2000	2000	2000
	2) Introduce energy utilization systems (e.g. elevators) (Maintenance)	quantization	No.	2	2	2	2
	3) Enhance solar panel power generation (based on 2022) (Environment)	quantization	%	3	3	3	3
B Build a smart and green campus system	Online signatures ratio (Documents & Files)	quantization	%	91	92	93	94
	2) Electronic receipt of documents ratio (Documents & Files)	quantization	%	91	92	93	94
	3) Strengthen the centralized smart surveillance system (General)	quantization	\$'000	1100	1200	1300	1400
C Develop a sustainable and low-carbon transportation strategy	Increase parking fees for gasoline vehicles (General)	quantization	\$	1000	1000	1000	1200
	Replace with zero-emission vehicles (General)	quantization	No.	0	1	0	1
	Improve traffic space (General) (Maintenance)	quantization	\$'000	300	4000	300	300
	Build smart lane control system (General)	quantization	\$'000	300	400	400	500

### B. Action Plan 2: Expand E-book Resources

#### a. Description of Status

1) Due to technological advancement, more and more library materials have become electronic, and the Library now prioritizes electronic resources in the procurement of library materials.



2) The Library participates in e-book consortia such as the Taiwan Academic e-Books and Databases Consortium (TAEBDC) and shares Chinese and Western e-books with the libraries of universities and colleges in Taiwan, in order to meet the professional needs of e-publishing in terms of copyright acquisition, access to network technology, and the service and maintenance of the product by the vendors.

**b. Implementation Strategies and Practices:** Join Taiwan Academic E-Book and Database Consortium (TAEBDC) and participate in its related procurement (Collections, P&C, and PDA) to increase the collections of Chinese and Western professional e-books every year (SDG 4)

**c. Expected results**

1) The number of professional e-books (including e-resources) grows to more than 10,000 volumes each year, providing a rich and diversified high-quality collection with no time difference and no restriction on the use of space for all teachers and students of the University.

2) Promote the use of e-books through alliances or e-book vendors on campus, increase the usage of library collection, and enhance students' capability of utilizing resources.

**d. Performance Indicator**

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A Increase the Chinese and Western language e-book collections (Library)	Increase the collections of e-books per year by the Taiwan Academic E-Books & Databases Consortium (TAEBDC)	quantization	Volume	10,000	10,000	10,000	10,000

### **C. Action Plan 3: Strengthen network infrastructure and campus information security**

#### **a. Description of Status**

- 1) Currently, there are 10 academic, research, and administrative buildings on campus, and the number of network-related devices is increasing every year. Therefore, it is necessary to continuously monitor the operation of all equipment to confirm the robust status of the equipment and the proper rate to ensure the normal operation of the network service.
- 2) In order to strengthen the risk management of information security, it is necessary to replace the outdated equipment in a timely manner, and to introduce new technologies and acquire new systems to enhance the system security.
- 3) In recent years, a high percentage of major security incidents have been carried out through email and social engineering attacks, by using emails with malicious programs or links to URLs, supplementing attractive subject lines and content to lure unsuspecting users to open them and cause further damage. Therefore, the Ministry of Education has planned a yearly exercise program to prevent malicious email and social engineering attacks, and the target audience for the exercise has been expanded to include teachers and programmers in the schools, in addition to school administrators in 2022.
- 4) In response to the frequent activities of hostile forces outside the country in recent years and the frequent tampering of the websites of educational and administrative units, the contingency measures for the websites of various units have been included in the major concerns of the Executive Yuan and the Ministry of Education.

#### **b. Implementation Strategies and Practices**

- 1) In order to strengthen the quality of the university's network, a budget has been allocated for the replacement of the network facilities in teaching, research and administrative buildings annually to ensure that the quality and quantity of the

information network facilities can meet the needs of users (SDG 9).

- 2) The school administration system uses virtualization technology and a virtualized cloud platform built with disk array storage devices, which can strengthen the backup mechanism of server hosts and improve data access performance, so that related system services can be uninterrupted and service performance can be improved, ensuring the confidentiality, integrity and availability of administrative information, and constructing a safe campus information communication environment (SDG 9)
- 3) Promote the University's information security maintenance program and combine it with information security data tracking and feedback to form a positive cycle of developing an information security-enabled campus.
- 4) Increase the information security awareness of personnel, and implement internal information security checks so to review the annual information security incidents in the school, track and provide feedback on the promotion of corresponding information security measures and rolling adjustments to the information security strategy.
- 5) Organize education and training and increase publicity of information security to strengthen the awareness of faculty and staff annually. Evaluate the effectiveness of the reduction in the opening rate of the Ministry of Education's email social engineering test letter.
- (6) Establish a "Maintenance Bulletin Page" and switch mechanism for each unit. Review the effectiveness and timeliness of the contingency procedures by conducting Business Continuity Plan (BCP) exercises annually.

### **c. Expected results**

- 1) Regularly replace network facilities, improve transmission speeds, increase performance, and provide an additional layer of protection for information security with advanced network technologies and protocols.
- 2) Ensure that the normal service of the key business system reaches more than

95.4% of the annual working hours. Due to information security incidents, abnormal incidents, and other security incidents that cause system and host abnormalities to interrupt the operation and service, it should not exceed 3 times per quarter, and each time should not exceed 8 working hours.

- 3) Enact the implementation and analysis of information security plans and information security data, and strengthen the information security protection capabilities of the information and communication system. It cannot only meet the specifications of the information and communication security management law, but also achieves the goal of overall campus information security resilience.
- 4) The strength of information security is more than the security protection and repair of the information system. The key lies in whether the organization's personnel know how to reinforce and update information security timely. Through information security education and training and e-mail social engineering drills, the idea of implementation of the information security of all personnel in the organization is equally important.

#### d. Performance Indicator

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A Replace & update network device	Teaching & Admin. Buildings	quantization	Building	1	1	1	1
B Service availability of business-critical systems	Normal service hours for business-critical information systems	quantization	%	95.4	95.4	95.4	95.4
C Information system security testing	Annual inspection of schoolwide information system	quantization	Frequency	1	1	1	1
D Occurrence of Security Breach	No. of security breaches per year in schoolwide ICT System	quantization	No.	<30	<25	<20	<15
E Email Social Engineering	MOE email social engineering drill open rate	quantization	%	<12	<11	<10	<9
F Business Continuity Exercise	No. annual drills for continuous operation of schoolwide business when the web pages of administrative units and departments are tampered with	quantization	次	1	1	1	1

### **3. Internalization of Sustainability**

The University has incorporated the learning objectives of SDGs into its curriculums, encouraging students to enhance their sustainable literacy through the college's required and the liberal arts courses, as well as combining faculty, staff, student organizations, and community residents to participate in relevant sustainable activities, strengthening the concept of a sustainable environment and the degree of participation. Specific practices are described below:

#### **A. Action Plan 1 : Internalization of SDGs**

##### **a. Description of Status**

- 1) The SDGs-Inside has been promoted since 2018 to encourage teachers to integrate the UN's Sustainable Development Goals (SDGs) into their curricula, and to cultivate students' macro-literacy in addition to their professional competencies. A series of SDGs-Inside courses have been organized with the support of the University's Teaching and Learning Innovation Fund. At this stage, the courses are offered by the colleges.
- 2) In order to integrate SDGs-Inside into the students' daily life, student clubs are encouraged to organize relevant activities according to their own characteristics and in conjunction with the SDGs. At present, there are six student societies whose development concepts are integrated with the SDGs, and they are listed below:

The Student Associations (SDG 16), Science Communication Club (SDG 4), Seeds of Hope Club (SDG 4), Spring Sun Club (SDG 3), Little Otter Repair Station (SDG 12), Indigenous Student Society (SDG 10, SDG 11). More student societies will be encouraged to become part of the SDGs-Inside community in the future.

##### **b. Implementation Strategies and Practices : Inventory the SDGs courses that**

have been offered by each department at this stage, and select the more engaging ones to be required in the college, or invite instructors to offer liberal arts courses to encourage target students to take the courses (SDG 17).

**c. Expected results:** The SDGs literacy will be integrated into the curriculum design by means of required or liberal arts courses, so as to increase the breadth of the target students, and to enable every student to graduate with more than 2-3 directions of sustainability awareness.

**d. Performance Indicator**

Indicator item	Indicator Measurement	Evaluation Approach	unit	Expected target/ Attainment			
				112	113	114	115
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A Provide cross-disciplinary lectures or related teaching activities on carbon reduction issues.	No. courses (credit/micro-credit) / No. lectures/No. of activities (2 courses rel. to carbon reduction in the past 3 years) (New Indicator)	quantization	No. courses / sessions	Course : 3 Lecture : 3 Teaching ACT. : 1	Course : 3 Lecture : 3 Teaching ACT. : 1	Course : 4 Lecture : 3 Teaching ACT. : 1	Course : 4 Lecture : 3 Teaching ACT. : 1

**B. Action Plan 2 : Implement Citizen Participation in Environmental Sustainability**

**a. Description of Status:** At the beginning of NUK's construction, the idea of building a sustainable and ecological green campus was an essential founding principle. Therefore, the campus is divided into different levels of maintenance and management zones according to different ecological diversity. An ecological pond not only serves as the final body of water but also has the At the same time, exotic species are growing, affecting the survival of the native species.

**b. Implementation Strategies and Practices**

1) Strengthen the ecosystem support strategy and participate in the UI GreenMetric World University Rankings - Environmental Infrastructures (SDG 13, SDG 15)

- Regular removal of exotic species to minimize ecological hazards.

- Create plant and animal friendly habitats and maintain biodiversity.
    - 1) Work with local communities to maintain ecosystems (SDG 15).
  - Annual campus ecosystem education program “Sustainability Week”.
  - Increase the number of eco-sustainable local community volunteers.
- c. Expected results: Minimize ecological hazards by removing exotic species appropriately annually. Strengthen the concept of sustainable environment and participation by combining local forces, recruiting environmental volunteers, and attracting faculty-staff and outsiders to participate in related sustainable activities, in order to actively implement the goals of SDG 13 and SDG 15.

**d. Performance Indicator**

Indicator item	Indicator Measurement	Evaluation Approach	Unit	Expected target/ Attainment			
				2023	2024	2025	2026
				Target	Target	Target	Target
				Attainment	Attainment	Attainment	Attainment
A Strengthen the ecosystem support strategy	1) Regular removal of exotic species	quantization	No.	3	3	3	3
	2) Increase the number of tree species	quantization	No.	142	145	145	146
B Work with local community to protect ecosystem	1) No. participants	quantization	No.	250	250	300	300
	2) Total service hours of volunteers	quantization	Hour	3000	3000	3300	3300

**III. Executive Effectiveness & Management Evaluation Mechanism**

The evaluation mechanism for the effectiveness of this project is based on a dual-track operation model through "Unit Performance Self-Management" and "University Meeting Review", and participation in domestic and international evaluations of sustainability issues and sustainability reports. The PDCA (Plan-Do-Check-Act) quality cycle model (figure below) is used to assess the results of the performance indicators of the action plans on a regular basis, and revise the key indicators on a rolling basis in order to implement university responsibility and to fulfill the objectives of the university affairs during this period of development.

At the internal performance management level, after the relevant units of the

university and the Vice President's Office announce the objectives, strategic blueprints, and key tasks for the current university development, the relevant promotional and implementation units will draw up specific action plans and corresponding qualitative and quantitative performance indicators under the strategies, which will be finalized and implemented after the approval of the University Council meeting. Secondly, the school regularly tracks the progress of each action plan and provides feedback on implementation difficulties and reviews through regular business meetings, such as the business meetings of each executive unit and reports from administrators.

At school-level review, the results of each performance indicator will be used as a reference for rolling revisions to the schoolwide KPIs, and adjustments will be made to the implementation of the items and schoolwide KPIs through school-level meetings such as the administrative meetings, the University Development Committee, and the Sustainable Campus Promotion Committee, as well as to enhance the effectiveness of the overall implementation of the plan through the annual release of the Sustainability Report, in order to continue the school's sustainable development.

**P (Plan )**

- Draw up current objectives, strategic blueprint, priorities and KPIs.
- Develop specific action plans and performance indicators.

**D(Do)** – Implement and track the progress of each action plan regularly.

**C(Check )**

- Report difficulties in implementing action plans and review.
- Trace performance indicator of the plan, examine the results & resolutions.

**A(Action)**

- Rolling revision of school-wide KPIs and delivery projects
- Social Responsibility, Internationalization & Local Connections
- Sustainable University & Internalizing Literacy
- Featured Research & Industry Links



- Learning to Use & Interdisciplinary Teaching
- review mechanism for effectiveness of the University's climate action plan implementation