

SDG.7.2.3

1. In accordance with the Executive Yuan's Energy-Saving Action Plan for Government Agencies and Schools, the University reduces its annual electricity consumption by at least 1%. At the beginning of each year, the University regularly submits data to the Non-Production Industry Energy Audit Online Reporting System, and uses this platform to analyze and understand the University's main sources of carbon emissions (SDG-7.2.3-01).
2. National University of Kaohsiung plans to announce its Sustainability Declaration at the opening of the 2025 Sustainability Week by the end of 2024, and will begin implementing ISO 50001 as well as declare its energy policy at the kick-off meeting. In 2022, the University joined in responding to the "2050 Net Zero Emissions" initiative during Sustainability Week.
3. In accordance with ISO 14064 procedures, the University establishes a "Greenhouse Gas Inventory Task Force" each year to conduct greenhouse gas inventories and complete third-party verification. Scope 1 and Scope 2 emissions decreased from 6,034 metric tons in 2022 to 5,926 metric tons in 2023. Third-party verification for 2024 is in progress, with emissions continuing to decline.
4. The University implements phased completion of its Sustainability Report, carbon inventory, and energy management, while establishing a campus EMS, rooftop solar power generation and cooling systems, SDG-integrated curriculum, shared campus transportation, and bus services. Compared with the 2015 baseline year, the EUI indicator decreased from 58.8 to 31.4 in 2024.
5. Relevant management procedures and outcomes are disclosed in Chapter 5 and the Appendix of the 2024 Sustainability Report. NUK's carbon emissions decrease yearly. Its carbon emissions are published in the annual sustainability report and on the webpage (<https://ces.nuk.edu.tw/p/412-1011-5978.php?Lang=en>) for public viewing. The summary is as attached.

Attachment 1

CH.0 About the report
CH.1 Vision and Strategy of Sustainable University
CH.2 School Affairs Governance & Operations
CH.3 Human Resource and Financial Planning and Business Performance
CH.4 Sustainable Education Achievements
CH.5 Sustainability Environmental Performance
CH.6 Social Inclusion and Regional Revitalization
CH.7 Appendix

5.1 Smart, Green, and Sustainable Campus
5.2 Energy and Climate Action
5.3 Sustainable Supply Chain
5.4 Civic Engagement on Sustainable Environmental Education



▲ Smart Cloud Management System Webpage



▲ Classroom Air Conditioning System Website

5.2.2 Green Energy

- 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.
- 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

- 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:
 - Replacement of power-saving air-conditioning \$2,289: 10 buildings have completed more than 9 air-conditioning using inverter-type installations (10/13=77%).
 - 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.
 - 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:

Energy-saving control and management	Action plan	Description
	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

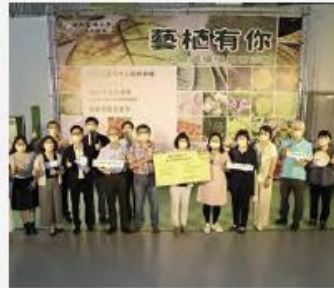
Two measures are taken to save fuel: a. Regular maintenance and inspection of the school's official vehicles are carried out to maintain efficiency and to save fuels; b. When replacing aged official vehicles, the purchase priority is given to the ones with high efficiency and low fuel consumption. The 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%

5.2.6 Carbon Neutral Commitments and Emission Reduction Programs

"As a citizen of the world, everyone has the responsibility to slow down the pace of global climate change and avoid damaging the natural environment." At the opening ceremony of the 2022 Sustainability Week, the President of the University signed "Net Zero 2050". NUK follows the national policy of actively linking industries and society, cooperates with the government to promote energy transformation, and simultaneously takes stock of the six major directions of "Green University", "Campus Carbon Neutrality", "Low-Carbon Transportation", "Green Building", "Zero Waste and Low-Carbon Diet", and "Citizen Participation".



▲ Signing Net Zero 2050

In response to global climate action, the Taiwan 2050 Net Zero Carbon Emission Pathway Plan, and the cultivation of globally sustainable human resources, NUK has been promoting campus climate action since 2022 from the perspectives of campus environmental organization and regulations, environmental management, energy-saving strategies, and environmental education.

The University has integrated UN Sustainable Development Goals into the organization and operation of the University, and has formulated a carbon neutral plan, which aims to utilize the University's professional knowledge and scientific research capabilities to actively reduce the environmental carbon footprint of the campus, and to gradually achieve carbon neutrality of the campus. Specific practices are described below:

Action Plan 1: Campus Carbon Inventory

1. Description of Current Status: At the opening ceremony of the Sustainable Development Week on May 23, 2022, the President of the University announced and signed "2050 Net Zero Carbon Emissions" declaration, which aims to achieve carbon neutrality and move towards the goal of net zero emissions by 2050 gradually.

2. Implementation Strategies and Practices: In order to understand the carbon emissions of the school, a carbon inventory is expected to be conducted from 2023 to 2026 to calculate the greenhouse gases emitted directly or indirectly by the school in all aspects of administration, teaching, research, and student learning, so as to further develop appropriate measures to reduce the emissions of the school.

- A. Carbon inventory will be conducted annually and the results of the inventory will be made public.
 - a. Annual carbon inventory conducted by a professional consultant.
 - b. Carbon check certified by a third-party impartial organization
- B. Setting up emission reduction measures based on the results of inventory and verification to gradually move towards carbon neutrality (SDG 7, SDG 13)
 - a. Develop and review a campus-wide reduction plan based on the results of the current year's inventory.

3. Implementation results in 2024: The school conducted the first 2022 GHG inventory in 2023 and therefore set 2022 as the base year for the inventory. In 2024, the school continued to conduct the 2023 GHG inventory.

- A. Organization of the inventory : The University has 13 administrative units; academic units include the Colleges of Humanities and Social Sciences, Law, Management, Science, and Engineering, and the Center for General Education, as well as 21 university departments and 2 independent research institutes. The program emphasizes cross-disciplinary integration and the cultivation of talents to meet the needs of industry and academia in Southern Taiwan. This inventory is organized according to ISO 14064-1, the greenhouse gas inventory team of the University. The composition of the team and their responsibilities are as follows.
- B. Boundary of the report : In accordance with the ISO 14064-1 standard, the University defines the organizational boundaries of our inventory as follows in accordance with the Law of Control Rights:

d. Our greenhouse gas emissions are as follows.

GHG Inventory Category	GHG Emission Source	MTCO2e/Yr
Category 1, Direct GHG Emissions and Removals	Total	149.7564
1.1 Stationary Combustion	Emergency generator (diesel)	9.6745
1.2 Mobile Combustion	Public Transportation Vehicle (Gasoline & Diesel)	12.1790
1.3 Industrial process emissions (direct process emissions from school operations)	Lab alcohol for Combustion (Methanol, Ethanol, Others), Lab Specific Gas Cylinders (CO2, N2O, Gas, Acetylene), Lawnmowers (Diesel)	2.4904
1.4 Fugitive emissions	Refrigerant (air conditioning, refrigeration & freezer equipment, bus air conditioning), septic tanks, fire extinguishers (dry powder, CO2, foam extinguishers)	125.4125
1.5 Land Use, Land Use Change and Forestry Emissions	NI	0
Category 2 Input energy indirect GHGe	Total	5,776.3739
2.1 Indirect emissions from imported electricity, including GHGe from the production and consumption of imported electricity by the related organization.	School Electricity - Purchased Electricity	5,776.3739
2.2 Indirect emissions from energy inputs, incl. GHGe from energy consumption (steam, heat, cooling and compressed air) of the organization's production through the physical network, except for emissions from electricity.	NI	0.0000
Category 3 Indirect GHGe from transportation	Total	562.2858
3.3 Emissions from employee commuting	Employee commuting	249.4679
3.5 Emissions from business or employee travel and transportation	Faculty/staff/student travel (by high-speed rail, Taiwan Railway, air, and MRT only)	312.8179
Category 4. GHGe between products used by the organization	Total	1,291.3295
4.1 The organization purchases GHGe from raw material extraction, manufacturing and processing.	Procurement of electricity, water, gasoline and diesel for school	1,176.4162
4.3 Disposal of emissions from solid and liquid wastes depend on the characteristics of the waste and its treatment. Typical treatment types are landfill, incineration, biological treatment or recycling processes.	Waste incineration, waste removal and transportation	114.9133
Category 5. Indirect GHGe derived from products of user organization	Total	362.9148
5.2 Emissions from downstream leased assets	Outsourced manufacturers lease electricity, tap water, and natural gas	362.9148
Total		8,142.660

* The latest version of the announced GWP value is the IPCC 6th Assessment Report (2021), so the IPCC 6th Assessment Report (2021) is used.

▲ NUK Inventory of GHG Emissions, 2023 (Base Year)

Action Plan 2: Campus Climate Action

1. Description of Current Status:

A. Global climate change is a critical issue for mankind, and we are a member of the Green University and one of the participants in global environmental protection. In 2019-2020, the University received funding from the Architectural 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 are installed in each building on campus to collect data on electricity usage in each building, and a "Power-BI" webpage has been built to provide students and faculty with information on electricity usage and remind them to conserve energy in order to fulfill their responsibilities as citizens of the earth.

B. In addition to the improvement of hardware and equipment, the environmental regulations and management of the University should also be included in climate issues. In response to the SDGs: 6, 13, 15 and UI Green Metric World University Rankings, the University intends to take stock of the current status of environmental and climate-related issues and regulations during 2023-2026, and to examine the potential risks in management in order to take measures to effectively reduce and eliminate them.

2. Implementation Strategies and Practices

A. The University's Sustainable Climate Change Program, which participates annually in UI Green Metric World University Rankings - Energy Climate Change, Education and Research (SDG 13).

a. Revise the Chinese and English sustainability reports annually and participate in the evaluation.

b. Participate in UI Green Metric World University Rankings annually to review annual implementation.

c. Inventory campus carbon emissions and develop medium- and long-term options for reducing emissions.



◆ Global Reporting Initiative Sustainability Reporting Standards

Based on the results of the review, it is confirmed that the general disclosures, specific topic disclosures, and material topics management disclosures in the Report have complied with the requirements of the GRI Standards, specifically demonstrating the school's impact and contribution to sustainable issues. In the future, the organization can continue to introduce and combine other international disclosure requirements to demonstrate the school's active response and disclosure on sustainable issues.

ASSURANCE OPINION

AFNOR ASIA has developed a complete sustainability reporting assurance standard based on the verification guidelines of the AA1000 Assurance Standard (v3) and the GRI Standards. Based on the sufficient evidence provided by NUK and the facts seen during on-site verification, we adhere to the principle of fairness and issue a statement on the global sustainability reporting standards followed by the organization. In our opinion, the information and data presented in the Report by NUK provides a fair and balanced representation. We believe the focuses on economic, social, and environmental matters in NUK in 2024 are well represented.

ASSURANCE LEVEL

In accordance with the AA1000 Assurance Standard (v3), we verified this assurance statement corresponding to a moderate level. The scope and methods are as described in this statement.

For and on behalf of AFNOR :

Steven Huang
The Director for Certification and Assessment
Jun.12.2025

Verification team: Wen Yi Yen (Lead Verifier).

AFNOR Asia Ltd.—209, No. 110, Chung Ping Rd., Taoyuan, Taiwan
Tel : +886 3 2208080, Fax : +886 3 2204866, <http://www.asia.afnor.org>



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GROUPE

Greenhouse Gas Verification Opinion



台灣中油股份有限公司
CPC Corporation, Taiwan

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Greenhouse Gas Verification Opinion

The inventory of Greenhouse Gas emissions in year 2023 of

National University of Kaohsiung

No. 700, Gaoxiongda Xue Rd., Nanzi Dist., Kaohsiung City, Taiwan

has been verified in accordance with ISO 14064-3: 2019 as meeting the requirements of

ISO 14064-1: 2018

Direct emissions

149,7564 tonnes of CO₂e

Indirect emissions

7,992.9040 tonnes of CO₂e

Direct emissions and indirect emissions

8,142.660 tonnes of CO₂e

Authorized by

GOU-HSU LU

Gou-Hsu Lu

Authorized Agent of CPC Corporation, Taiwan

Date: 2024/12/19

Version: 1.1



Green Technology Research Institute, CPC Corporation, Taiwan

No.2 Zuonan Rd., Nanzi-Tzu District, Kaohsiung City

Tel: 886-7-5824141 Fax: 886-7-5887324

This Opinion must contain the complete verification scope, objectives, criteria and findings to be valid.

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