

03 Sustainable environment



Major subjects of this chapter

GRI 302-1 302-4: Energy
GRI 303-2: Water and effluent
GRI 304-4: Biodiversity
GRI 306-2: Waste



Priority readers

- ☐ Entrepreneurs
- ☒ Faculty, staff, and students
- ☐ Parents
- ☒ Government agencies
- ☐ Alumni
- ☒ Community people/NGO
- ☐ Suppliers

3.1 Energy resource management

3.2 Pollution prevention and control

3.3 Biodiversity

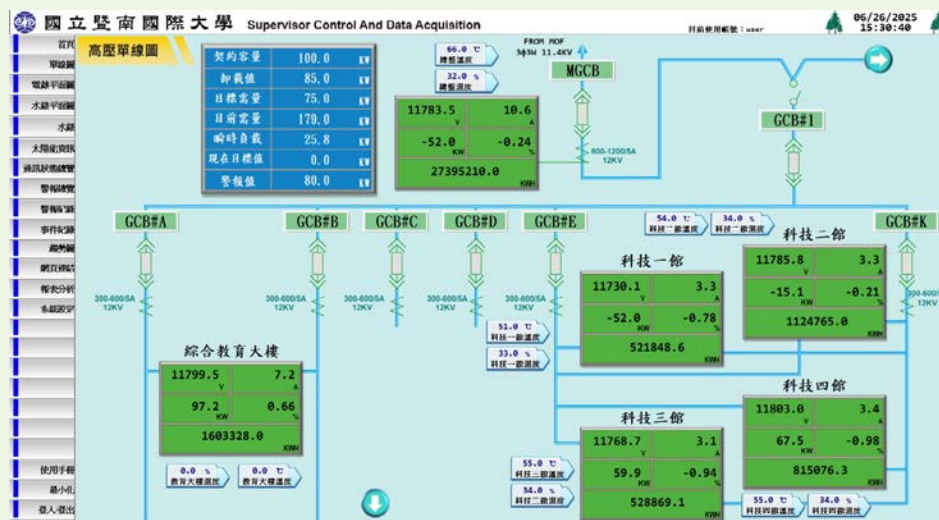
3.4 Green purchase and supply chain management

3.1 Energy resource management - Smart Monitoring System

GRI 302-1、302-4

1. Smart electricity meters

- Applied for Ministry of Education subsidy project to install smart electricity meters since 2022.
- Completed smart electricity meters of main power panels at eight buildings in 2022.
- Goal: Established precise power management to achieve energy conservation goal.



A total of 1,311 outdated lighting fixtures were replaced with LED panel lights, which spent NT\$1,300,000 in 2024. :

- The replacement benefits were of before: $1,785 \text{ units} \times 20 \text{ watts} \times 4 \text{ tubes} \times 8 \text{ hours/day} \times 365 \text{ days/year} \times 50\% \text{ utilization rate} = 750.5568 \text{ GJ}$
- The replacement benefits were of after: $1,785 \text{ units} \times 25 \text{ watts} \times 1 \text{ tube} \times 8 \text{ hours/day} \times 365 \text{ days/year} \times 50\% \text{ utilization rate} = 234.5472 \text{ GJ}$

Before subtracted after, the annual energy conservation efficiency was 516.0096GJ, totaled NT\$435,738.

2. Smart water meters

- Installed smart water meters at three main reservoir on campus in 2022.
- Completed installation of smart water meters at 23 buildings in 2024.
- Benefits: Monitored water consumption efficiency, early leak detection, and water conservation.

3. Solar power installations

- A total of 4.129 MWp of roof type solar power installed.
- Newly completed “administrative building and SHEC” roof type solar power installations in 2024.
- Phase I (1,539 kWp), phase II (1,727 kWp), and phase III (5,173 kWp)
- Goal: Full NCNU’s ownership of solar power installations by 2043 to achieve RE100



4. Power management performance

- EUI baseline value: 56 (kWh/m² · year)
- EUI baseline value from 2020 to 2023: 54, 51, 54, and 55.2

- Met Executive Yuan's "Electricity Efficiency Management Program for Government Agencies and Schools" demand.

Phase I

- ◆ Installed capacity : 1,539 kWp
- ◆ Location : College of Management and
- ◆ College of Science and Technology
- ◆ Est. power generation (year): **6,875 GJ**



Phase II

- ◆ Installed capacity : 1,727 kWp
- ◆ Location : Student dormitory, student restaurant, and faculty dormitory
- ◆ Est. power generation (year): **6,228 GJ**



Phase III

- ◆ Installed capacity : 5,173 kWp(capacity planning)
- ◆ Location : Ground type: outdoor court and parking lot Roof type: administrative building and SHEC
- ◆ Est. power generation (year): **27,594 GJ**



Green transportation policy

1. Campus bus service

The campus bus began available on Feb. 1, 2019 to solve transportation insufficiency problem.

Key measures:

- Every 10-20 minutes per bus during semester
- Free rides on campus
- 40% fare discount for faculty, staff, and students
- Available real-time bus tracking via cell phone app



▶ The campus bus

2. High-speed rail shuttle reservation service

- Collaborated with Nantou Bus to provide shuttle services for students to go home in 2019.
- Schedule: 12:20, 15:20, and 17:30
- Free rides for students with valid student ID
- Required a minimum of 25 people for the service to operate.

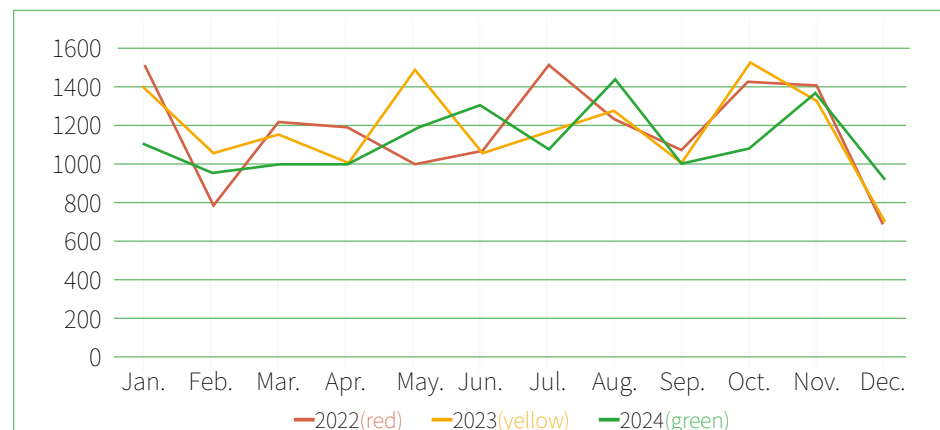


▶ Free rides for students with valid student ID

3. Fuel consumption of official vehicles

Reduction of fuel consumption in recent three years:

- 14,049.31 liters (458.80 GJ) in 2022
- 14,127.34 liters (461.35 GJ) in 2023
- 13,352.86 (436.06 GJ) in 2024
- **Comparison with 2022**



Month/year	2022	2023	2024
Jan.	1,509.78	1,392.98	1,107.23
Feb.	781.34	1,048.65	953.31
Mar.	1,207.71	1,145.77	990.02
Apr.	1,181.99	1,003.12	991.62
May.	987.88	1,486.23	1,175.16
Jun.	1,063.01	1,050.01	1,300.56
Jul.	1,515.39	1,165.97	1,066.14
Aug.	1,231.61	1,273.42	1,427.95
Sep.	1,060.53	1,017.84	998.33
Oct.	1,422.47	1,522.29	1,073.71
Nov.	1,403.96	1,332.62	1,358.95
Dec.	683.64	688.44	909.88
Total (liters)	14,049.31	14,127.34	13,352.86

Management of greenhouse gas emissions and reduction strategy

1. Current situation of greenhouse gas emissions

Actively promoted greenhouse gas reduction, which amounted to 5,547 MtCO₂e CO₂e in 2021. This reduced approximately 25% in 2011 (base year). Carbon dioxide (CO₂) contributed to the major one of total emissions, followed by methane (CH₄), and nitrous oxide (N₂O).

2. Comprehensive carbon reduction strategy

Adopted internationally recognized carbon footprint classification standards to plan an integrated carbon reduction strategy based on scopes. Promoted the efficiency of overall energy use to move toward the goal of net zero emissions.



Scope I: Direct emissions source management

Carbon reduction strategy	Effectiveness-implementation
Installed heat pump systems	<ol style="list-style-type: none"> 1. Reduced the usage of natural gas by installing heat pump system in student dormitories. 2. Installed heat pump systems in Sports and Health Education Center (SHEC) to reduce direct energy consumption.
Implementation of low carbon transportation	<ol style="list-style-type: none"> 1. Gradually replaced official vehicles on campus with Electric Vehicles (EV).

Scope II : Energy indirect emissions management

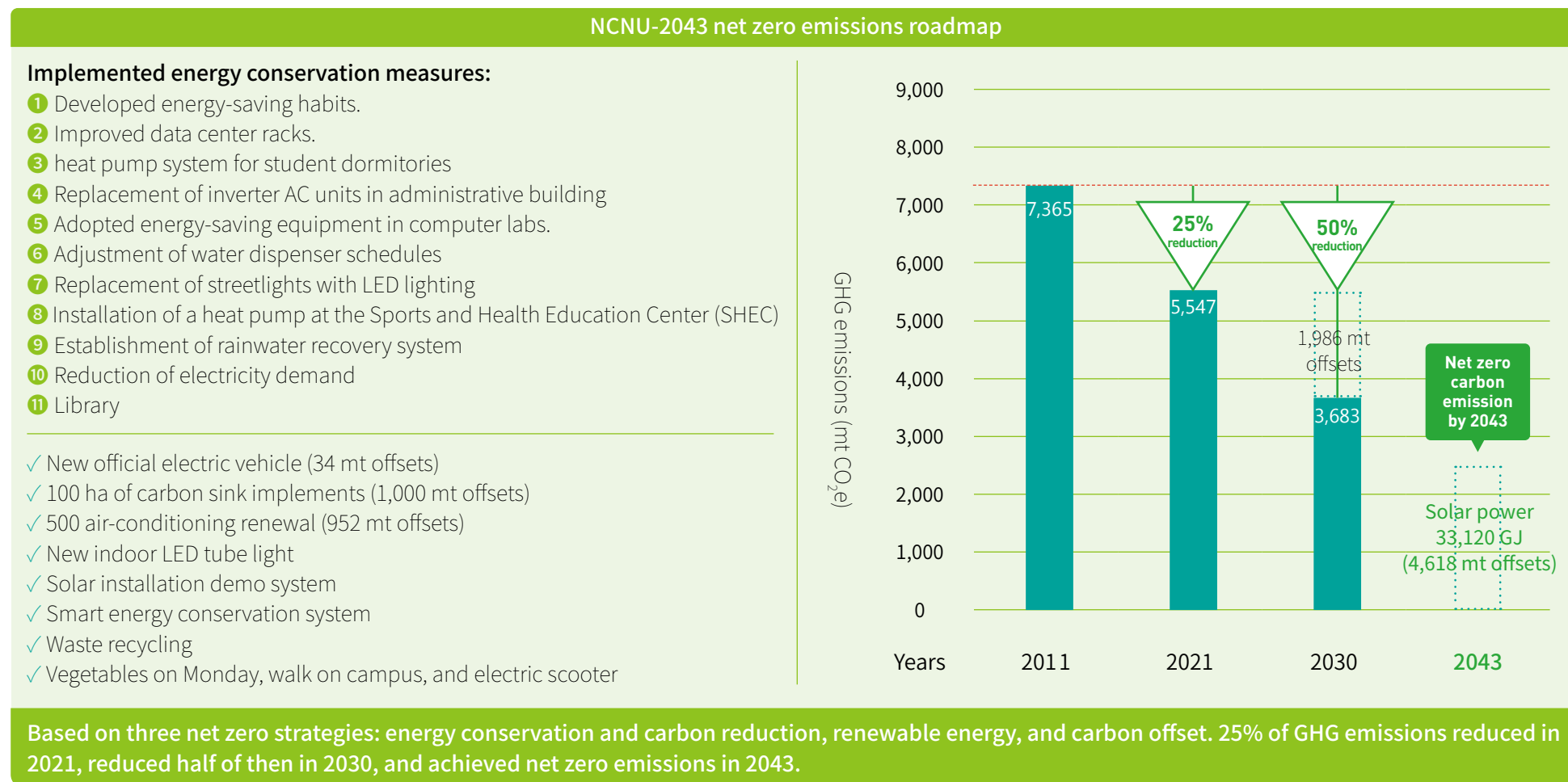
Carbon reduction strategy	Effectiveness-implementation
Lighting system optimization	<ol style="list-style-type: none"> 1. Phased out streetlights and classroom lighting with LED fixtures. 2. Adopted smart lighting control in public areas.
Air Conditioning (AC) upgrade	<ol style="list-style-type: none"> 1. Renewed central AC units for inverter AC units (administrative building and Library). 2. Installed high efficiency AC units in computer classrooms.
Power management optimization	<ol style="list-style-type: none"> 1. Adjusted power saving schedule to hibernate mode for water dispensers. 2. Reduced power demand and Energy Use Intensity (EUI) annually. 3. Continued to improve data center racks to promote Power Usage Effectiveness (PUE). 4. Phased out outdated transformers to promote safety and reduce no-load losses.

Scope III : Other indirect emissions management

Carbon reduction strategy	Effectiveness-implementation
Sustainable water resource utilization	<ol style="list-style-type: none"> 1. Each building built rainwater recovery system 2. Campus sewage treatment facilities reached 80% of recycled water conversion rate.
Promotion of low carbon transportation	<ol style="list-style-type: none"> 1. Implemented vehicle identification system to charge parking fee to promote carpooling rate among faculty, staff, and students. 2. Implemented bus incentive discount, free rides at stops on campus, whereas 50% discount off campus. 3. Shared electric scooters for rent, provided 100 of them for commuting between PuLi Township and campus.
Promotion of low carbon lifestyles	<ol style="list-style-type: none"> 1. Promoted campus meatless on Friday to reduce dietary carbon footprints. 2. Formed a habit of energy conservation 3. Formulated a reasonable AC usage management policy.
Increasing carbon sink	<ol style="list-style-type: none"> 1. Collaborated a tree planning program with enterprises to increase carbon sink on campus.

3. Carbon reduction pathway in future

NCNU formulates a clear roadmap for greenhouse gas reduction (GHR) and targets net-zero emissions by 2043 (base year 2011; – 50% by 2030, – 100% by 2043)."



To achieve the goal of net zero emissions, continued to promote as follows:

- ① Renewable energy development: expanded solar power installations on campus to increase the proportion of green power.
- ② Implemented smart energy management for precise monitoring and control to promote overall energy efficiency.
- ③ Continued to phase out high energy consuming equipment to promote energy efficiency.
- ④ Expanded tree planning on campus to increase carbon sink.
- ⑤ Strengthened the cultivation of sustainability awareness among faculty and students to encourage the practice of low carbon lifestyles.

3.2 Pollution prevention and control GRI 302-2

Water resource management and sewage treatment

- Built complete sewage treatment facilities since founded in 1995
- Separate collection system of rainwater and sewage
- Sewage treatment plant capacity: 1,200 CMD (cubic meter per day, m³/day) design, presently treating approximately 600 CMD
- Process flow: process treatment → secondary treatment → tertiary treatment → disinfection → recycled water
- Water recovery rate maintained 74%-81% from 2022 to 2024.
- Effluent quality tests on a regular basis in line with standards

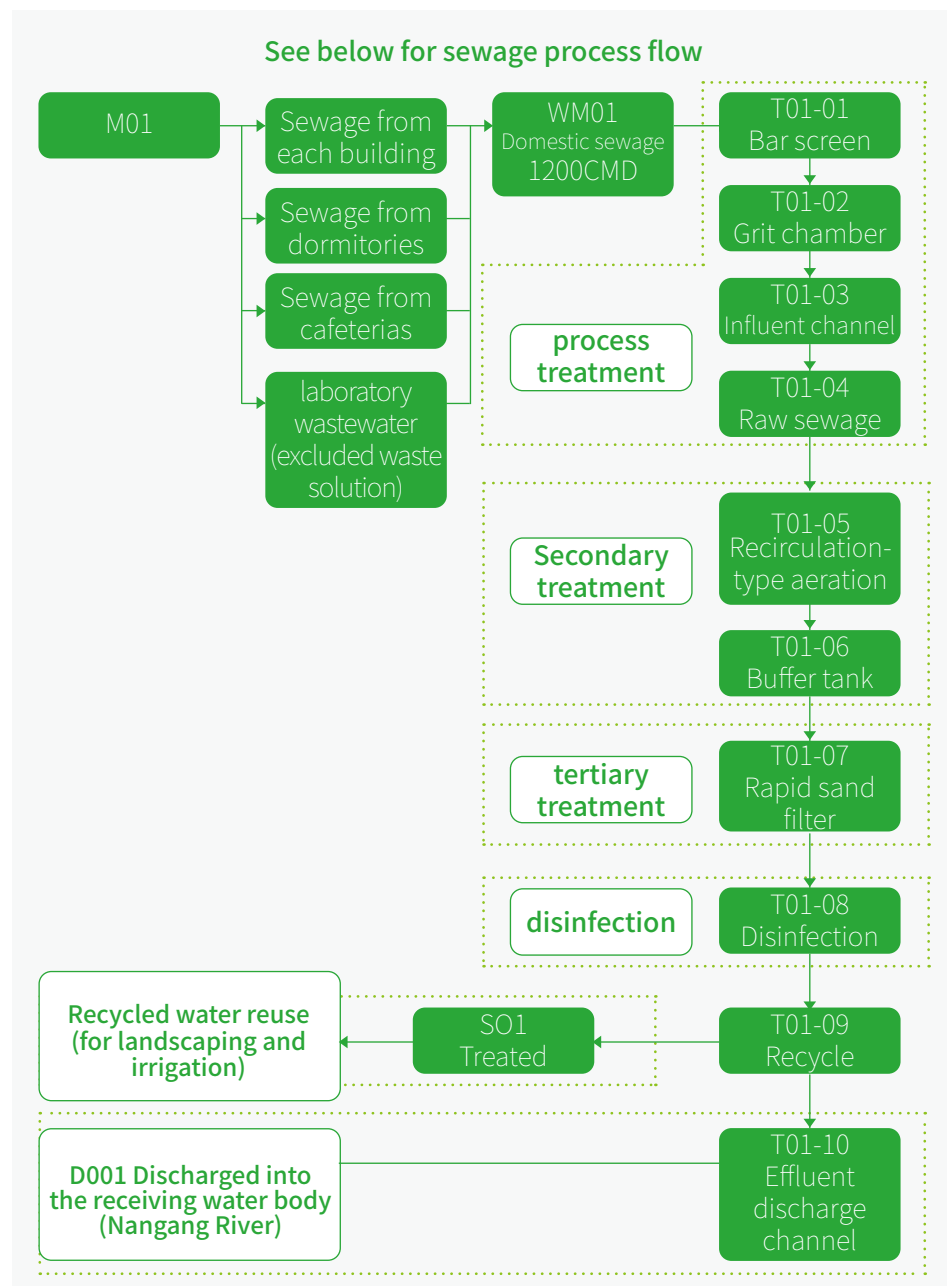
	2022	2023	2024
Tap water volume (Liter)	212,763	204,828	238,201
Total wastewater volume (Liter)	148,630	128,859	157,798
Reclaimed water volume (Liter)	110,670	102,801	127,259
Total water consumption (Liter)	64,133	26,335	80,403
Recovery rate	74.46%	79.77%	80.6%
Water consumption per capita (liter/day)	92	85	98

※Tap water volume data came from water bill statistically.

※Calculation of total water consumption volume: total sewage subtracted recycled water volume.

※Water recycle rate calculation: recycled water volume divided by total sewage volume.

	2022/6/14	2022/11/10	2023/5/16	2023/11/16	2024/5/2	2024/12/2
COD(mg/L)	8.9	25.1	10.5	10	16.7	12.3
BOD(mg/L)	2	9.6	3.9	3.3	5.5	4.6
SS(mg/L)	2.5	2	1.5	1.9	6.2	2.2
Results	Passed	Passed	Passed	Passed	Passed	Passed



GRI 306-2

Waste and air quality management

1. Waste disposal policy

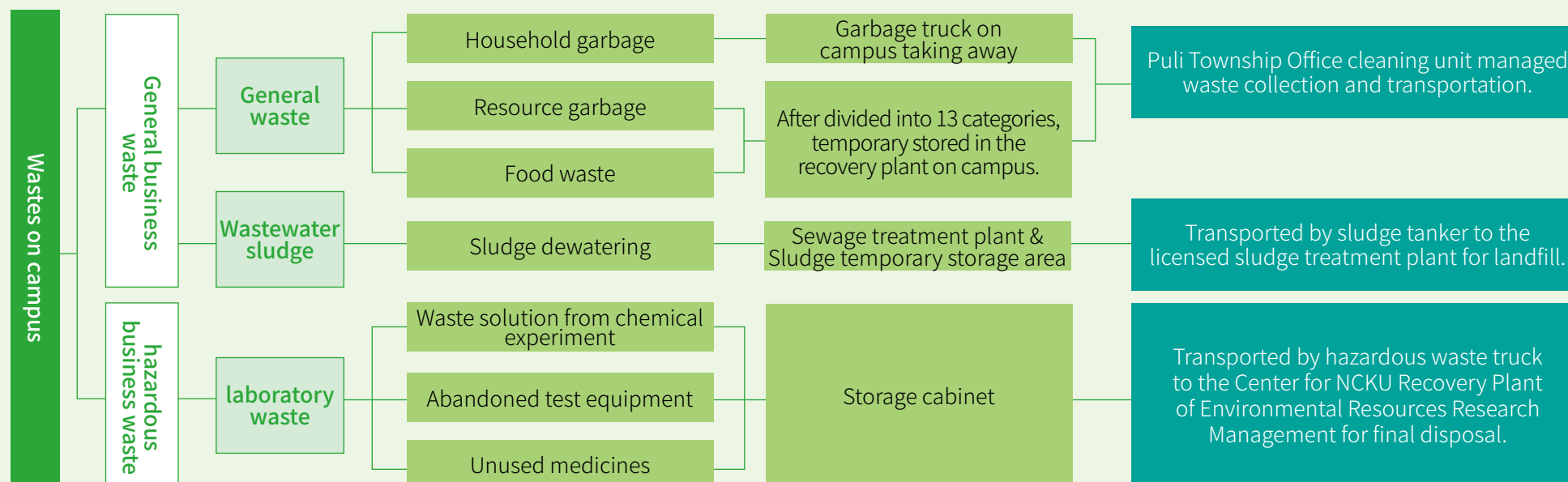
- Implemented “keep trash off the ground ” policy since July, 2002.
- Wastes categorization on campus :
General business waste: household garbage, resource garbage, food waste, wastewater sludge, waste solution from chemical experiment, abandoned test equipment, and unused medicines
- Resource recovery :
recovery rate were 41% (2022), 43.7% (2023), and 43.8% (2024) respectively.
- Hazardous business waste :
transported regularly by licensed hazardous waste truck.

General business waste in recent three years

	2022	2023	2024
Incineration (kg)	121,570	104,750	118,370
Recovery (kg)	84,605	81,397	92,360
Food waste (kg)	20,005	15,610	19,620
Waste generation (kg)	206,175	186,147	210,730
Recovery rate	41%	43.7%	43.8%

Hazardous business waste disposal status in 2024

Category	Treatment facility address	Treatment method	Weight (MtCO ₂ e)
C-0119/heavy metal waste solution	Off-site	chemical treatment	0.425
C-0299/medicines		chemical treatment	0.43
C-0399/medicines		Incineration	0.01
C-0399/glass		Incineration	0.71
D-1502/Alkaline waste solution		chemical treatment	0.25
D-1503/Acidic waste solution		chemical treatment	0.23
D-1799/waste oil		Incineration	0.25
D-2301/Halogenated waste solution		Incineration	2.45
D-2302/Non-halogenated waste solution		Incineration	0.4



2. Indoor air quality management

Unless required by competent authority, public places were subject to test the concentration of indoor air pollutants at least once in every two year routinely.

Recent tests were conducted on March, 2023. The results met relevant provisions.

	Test values	Test methods	Standard values
Carbon dioxide (CO ₂)	435	NIEA A448.11C	1000
Formaldehyde (CH ₂ O)	<0.02	NIEA A705.12C	0.08
Bacteria	90	NIEA E301.15C	1500
PM ₁₀ (μg/m ³)	19	NIEA A206.11C	75



3.3 Task Force on Climate-Related Financial Disclosures (TCFD)- governance

Status and commitment for climate change

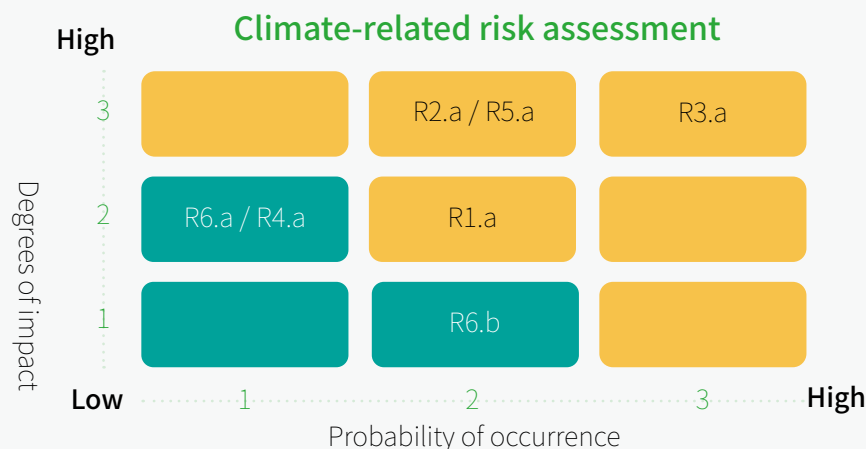
- Climate change came increasingly severe, not only caused significant impact on human life but also brought unprecedented threats against global ecosystem.
- The carbon reduction strategy was formulated based on the results of Greenhouse Gas Inventory. The goal was to achieve net zero emissions in 2043.
- We expected to pioneer the way of environmental protection and education as a result of contributing the future of the earth.

Climate change governance and management framework	
Institutional affairs meeting	the highest decision-making unit, having a meeting at least once/ semester to review key concerns, such as institutional research development plan and budget.
Committee for Institutional Research Development Planning	discussed institutional affairs, and other major related affairs assigned by the President. (de previous edition)
Sustainable Development Committee	responsible for discussing topics, such as CSR, SDGs, and ESG, integrated and implemented sustainable development.
Environmental Protection and Occupational Safety and Health Center	Responsible for power and water management, waste, resource recovery, and occupational safety topics on campus

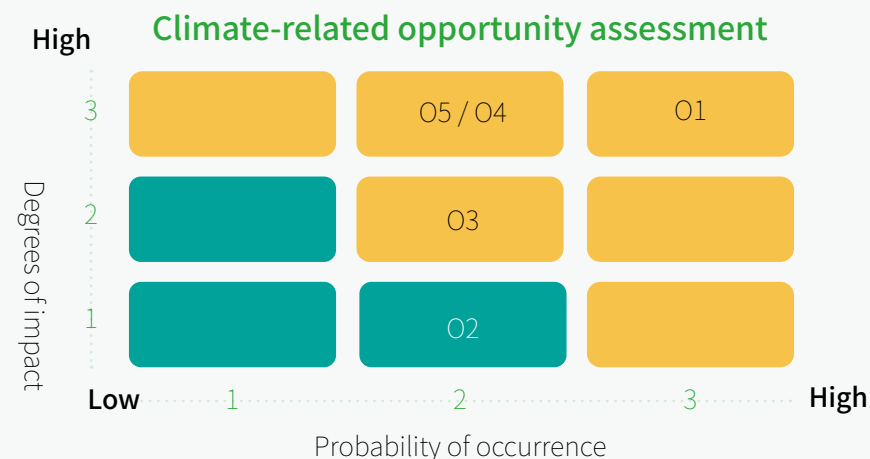
Key climate resolutions of Sustainable Development Committee	
TCFD disclosures	NCNU not only responded actively to the risks and opportunities by climate change but also disclosed TCFD in 2023.
Addressing strategies of climate-related topics	Sustainable Development Committee Addressing short, med., and long terms strategies and action plan of climate-related topics
Committed to net zero emissions in 2043	Expected to achieve net zero emissions in 2043 based on three net zero strategies: energy conservation and carbon reduction, renewable energy, and carbon offset.
Developed renewable energy	Installed solar power installations on own roofs at own expenses in line with government green energy policies, in order to reduce pollution and carbon emission.

Strategies (I) Climate risk and opportunity management timetable

	Short term (1~3 yr.)	Med-term (3~10 yrs.)	Long term (over 10 yrs.)
Transition risks	<ul style="list-style-type: none"> ✓ Costs of energy resources increased (R3.a market) ✓ Strengthened the obligations of emissions reporting (R1.a policies and regulations). 	<ul style="list-style-type: none"> ✓ Stakeholders concerned and negative feedback increased (reputation R4.a) ✓ Costs of transition for low carbon campus (R2.a technology) 	
Physical risks	<ul style="list-style-type: none"> ✓ Frequency of extreme climate events and severity increased (R5.a extreme climate incidents- immediacy). 		<ul style="list-style-type: none"> ✓ Ave. temperature rising (R6.a extreme climate incidents- long term) ✓ Changing in rainfall pattern (R6.b. extreme climate incidents- long term)
Opportunities		<ul style="list-style-type: none"> ✓ Reduction of water consumption and usage (O1 resource efficiency) ✓ Participation in renewable energy project then use of energy conservation measures (O5 resilience) ✓ Making use of public sector incentive measures (O4 market) 	<ul style="list-style-type: none"> ✓ Use of low carbon energy resources (O2 energy source) ✓ Low carbon campus services promotion (O3 products and services)



Climate-related risk in major sequence: costs of energy resources increased (R3.a market), costs of transition for low carbon campus (R2.a technology), frequency of extreme climate events and severity increased (R5.a extreme climate events- immediacy), and strengthened the obligations of emissions reporting (R1.a Policies and Regulations), were of high climate risks.



Climate-related opportunity in major sequence: reduction of water consumption and usage (O1 resource efficiency), low carbon campus services promotion (O3 products and services), making use of public sector incentive measures (O4 market), and participation in renewable energy project then use of energy conservation measures (O5 resilience), were of high climate-related opportunity.

Strategies (II) Impact assessment of climate-related risk

Types	Climate-related risk		Explanatory risk	Potential influence	Responsive strategy
Transition risk	Market	Costs of energy resources increased.	<ul style="list-style-type: none"> ✓ Cost of energy increased due to rising electricity prices. ✓ The cost of green energy was higher than others. 	<ul style="list-style-type: none"> ✓ Financial cost increased. 	<ul style="list-style-type: none"> ✓ Green energy development
	Policies and regulations	Strengthened the obligations of emissions reporting.	<ul style="list-style-type: none"> ✓ The net zero emissions must be achieved in 2050 in response to Climate Change Response Act. 	<ul style="list-style-type: none"> ✓ Financial cost increased. ✓ Penalties for legal violations 	<ul style="list-style-type: none"> ✓ Committed to reach the goal of net zero emissions in 2043
	Reputation	Stakeholders concerned and negative feedback increased	<ul style="list-style-type: none"> ✓ Student willingness to enroll decreased due to lack of implementation of green campus or other negative feedback. 	<ul style="list-style-type: none"> ✓ Student numbers decreased. 	<ul style="list-style-type: none"> ✓ Committed to the transition for low carbon campus ✓ Green energy development
	Technology	Costs of transition for low carbon campus	<ul style="list-style-type: none"> ✓ Unable to achieve the transition for low carbon campus 	<ul style="list-style-type: none"> ✓ The cost of the transition for low carbon campus increased 	<ul style="list-style-type: none"> ✓ Smart energy conservation system ✓ Electric vehicle ✓ Renewed energy efficiency equipment
Physical risks	Extreme climate incidents	Frequency of extreme climate events and severity increased.	<ul style="list-style-type: none"> ✓ Heavy rainfall endangered campus environment which might cause financial losses. ✓ Work (traffic) safety of faculty and students were influenced by traffic disruption or downpour. ✓ Drought caused water shortage. 	<ul style="list-style-type: none"> ✓ Work (traffic) safety of faculty and students ✓ Financial cost increased. 	<ul style="list-style-type: none"> ✓ Implemented early warning on campus and emergency response mechanism. ✓ Concerned changes in water information at any time.
Types	Climate-related opportunity		Explanatory opportunity	Potential influence	Responsive strategy
opportunity	Resource efficiency	Reduction of water consumption and usage	<ul style="list-style-type: none"> ✓ Continued to reduce water consumption 	<ul style="list-style-type: none"> ✓ Financial cost decreased. 	<ul style="list-style-type: none"> ✓ Implementation of water conservation measures ✓ Water pipeline leak detection ✓ Constructed retarding basin.
	Energy source	Use of low carbon energy resources	<ul style="list-style-type: none"> ✓ Reduced greenhouse gas emissions on campus. ✓ Promoted the efficiency of energy use. 	<ul style="list-style-type: none"> ✓ Promoted NCNU image. ✓ Financial cost decreased. 	<ul style="list-style-type: none"> ✓ Fully utilized energy-saving and environmentally friendly labeled products.
	Products and services	Low carbon campus services promotion	<ul style="list-style-type: none"> ✓ Formed green campus. 	<ul style="list-style-type: none"> ✓ Promoted NCNU image. 	<ul style="list-style-type: none"> ✓ Implemented green campus measures
	Market	Making use of public sector incentive measures	<ul style="list-style-type: none"> ✓ Participation in government energy conservation and carbon reduction project ✓ Strove for government agencies' energy conservation and carbon reduction subsidy projects. 	<ul style="list-style-type: none"> ✓ Received subsidies from government agencies. 	<ul style="list-style-type: none"> ✓ Fully utilized energy-saving and environmentally friendly labeled products. ✓ Applied energy conservation and carbon reduction subsidies from government agencies.
	Resilience	Participation in renewable energy project then use of energy conservation measures	<ul style="list-style-type: none"> ✓ Development of renewable energy ✓ Actively promoted energy conservation and carbon reduction scheme as well as the efficiency of energy use. 	<ul style="list-style-type: none"> ✓ Promoted NCNU image. ✓ Financial cost decreased. 	<ul style="list-style-type: none"> ✓ Installed solar power installations. ✓ Planned net zero emissions in 2043.

Market and costs of energy resources Context analysis

Case I.

based on the context of International Energy Agency, IEA-net zero emissions in 2050 and Climate Change Response Act, Ministry of Environment, the time assumed from 2020 to 2050. Controlled the temperature rise at 1.5° C by the end of the century. Carbon emission of current policy controlled about 1.8 ° C. The carbon reduction pathway and pricing trend could result 2.7 ° C temperature rise. The annual expenditure would increase to NT\$2,500,000 when NCNU purchased carbon credit for carbon offset (NT\$500 per ton of CO₂e). This estimated greenhouse gas emission at stabilizing 5,000 metric tons of CO₂e and achieving net zero emissions in 2043.

Preparation for the responses to the results of context analysis

- 1 Implemented ISO 14064-1 and PAS 2060 verification to improve reliability.
- 2 Reduced greenhouse gas emissions. Promoted the efficiency of energy use.
- 3 The goal of net zero emissions in 2043

Case II.

“RCP2.6” the time assumed from 2021 to 2040. Nantou would confront 1.7° C mean annual temperature and 29.5% rainfall variability. Therefore, that estimated power consumption at stabilizing 10,000,000 kWh in 2030. Total electricity bill would increase NT\$21,000,000, estimated NT\$2.1 per kWh, annually when NCNU purchased renewable energy.

Preparation for the responses to the results of context analysis

- 1 To reduce power consumption, in order to promote the efficiency of energy use
- 2 Implemented green campus measures (comprehensively utilized energy-saving and environmentally friendly products and applied energy conservation and carbon reduction subsidies from government agencies).

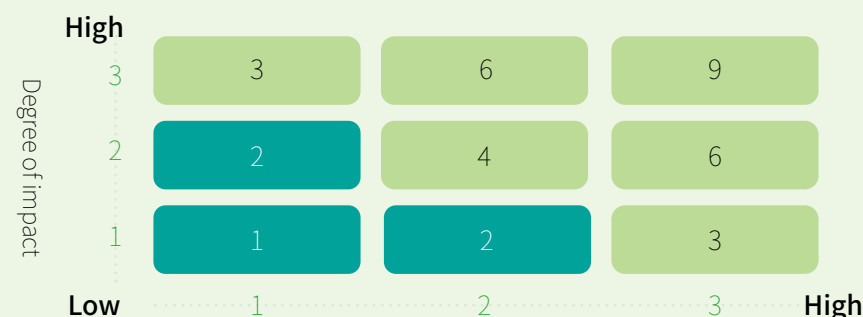
Risk management and Key Performance Indicators (KPI)

Risk management process

- 1 **Established risks and opportunities management** : Assessed external risks and opportunities (social development trends, natural disaster events, and education industry) internal risks and opportunities.
- 2 **Risk and opportunity identification** : identified the influence against sustainable development and the risk of goal of business performance achievement.
- 3 **Risk and opportunity assessment** : assessed degree of impact of risk/opportunity occurrence and probability of occurrence
- 4 **Treatment of risk and opportunity response** : assessed selectable treatment strategy, formulated and executed risk treatment action
- 5 **Continued to monitor** : Internal Control Project Team reviewed risk management report and audit report during institutional affairs meeting.
- 6 **Communicated and discussed terms** : conducted annual disclosure reports, such as NCNU sustainable campus report and corporate social responsibility website.

Risk assessment matrix

- **Probability of occurrence**: 3 (highly likely), 2 (likely), and 1 (unlikely)
- **Degree of impact severity**: 3 (very severe), 2 (severe), and 1 (moderate)
- **Risk level (probability of occurrence x degree of influence)**:
 - ⊙ High (6~9 points): required immediate action (substantive influence).
 - ⊙ Medium (3~4 points): formulated correspond plan then resources input (substantive influence).
 - ⊙ Low (1~2 points): processed internally.



Goals and measures of major risks and opportunities management

Major risks and opportunities	Indicators	Goals of 2024	Goals of 2030	Goals of 2040	Management measures
Strengthened the obligations of emissions reporting (R1.a Policies and Regulations).	Greenhouse gas emissions (base yr. in 2011)	Goal of 30% reduction achievement	Goal of reducing half of them	Net zero emissions achievement	Conducted inventory, in terms of ISO 14064-1 Greenhouse Gases-Part 1 annually.
Costs of transition for low carbon campus (R2.a technology)	Implementation of UI GreenMetric University measures	Implementation of UI GreenMetric University measures annually by 10 cases	Implementation of UI GreenMetric University measures annually by 10 cases	Implementation of UI GreenMetric University measures annually by 10 cases	Conducted related measures of energy conservation, water saving, reduction of waste, and sewage promotions annually.
Costs of energy resources increased (R3.a market)	Installed capacity of renewable energy	3,266KW	8,640KW	8,640KW	Installed solar power installations
Frequency of extreme climate events and severity increased. (R5.a extreme climate incidents-immediacy)	Implemented early warning on campus and emergency response mechanism.	Implemented early warming on campus and emergency response drill annually.	Implemented early warming on campus and emergency response drill annually.	Implemented early warming on campus and emergency response drill annually.	Implemented early warming on campus and emergency response drill annually.
Reduction of water consumption and usage (O1 resource efficiency)	Reduction of water consumption	Water consumption per capita 0.1 MtCO ₂ e/person/day	Water consumption per capita 0.08 MtCO ₂ e/person/day	Water consumption per capita 0.05 MtCO ₂ e/person/day	Continued to construct water recycling system, installed water saving devices comprehensively, and implemented water pipeline leak detection on campus.
Low carbon campus services promotion (O3 products and services)	Implementation of UI GreenMetric University measures	Implementation of UI GreenMetric University measures annually by 10 cases	Implementation of UI GreenMetric University measures annually by 10 cases	Implementation of UI GreenMetric University measures annually by 10 cases	Conducted related measures of energy conservation, water saving, reduction of waste, and sewage promotions annually.
Making use of public sector incentive measures (O4 market)	Applied energy conservation and carbon reduction subsidies from government agencies.	Applied one case of subsidy annually	Applied one case of subsidy annually	Applied one case of subsidy annually	Continued to apply energy conservation and carbon reduction subsidies from government agencies.
Participation in renewable energy project then use of energy conservation measures (O5 resilience)	Greenhouse gas emissions (base yr. in 2011)	Goal of 30% reduction achievement	Goal of reducing half of them	Net zero emissions achievement in 2043	Conducted inventory, in terms of ISO 14064-1 Greenhouse Gases-Part 1 annually. Promoted the efficiency of energy use.

3.4 Biodiversity

GRI304-4

The area of NCNU was approximately 1.49 square kilometers and located in areas of high elevation alongside Taomi Village and Nancun Village, where approximately a 0.5 square kilometers slope land was a habitat for numerous wild animals to live and grow, including protected species, such as pangolin, yellow-margined box turtle, maroon oriole, Taiwan blue magpie...etc.

The schedule of protected species on campus by NCNU

CASE 1 : Endangered species 【Land area】 Yellow-margined box turtle

CASE 2 : Rare species 【Land area】 Pangolin, besra, serpent eagle, barred owlet, collared scops owl, mountain scops owl, maroon oriole, Taiwan hwamei, and jumbo dragonfly

CASE 3 : Other species 【Land area】 Crab-eating mongoose, Taiwan partridge, Taiwan blue magpie, brown shrike, steere's liocichla, white-eared sibia, chestnut munia, striped-tailed rat snake, greenpond frog, and golden birdwing



Photo credit: Liu Minghao

Restoration of rare golden birdwing

The habitat was developed successfully with host and nectar plants for butterflies, zollinger dutchmanspipe, and chman's pipe around Sun Pond for golden birdwing.

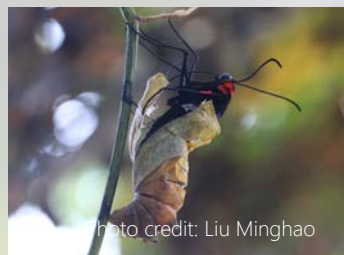


Photo credit: Liu Minghao

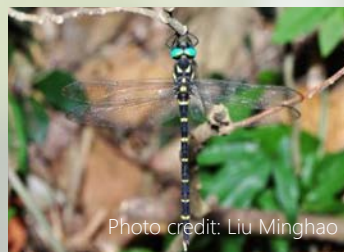


Photo credit: Liu Minghao

Conservation of rare jumbo dragonfly

Fine treated water was provided by NCNU sewage treatment plant for the habitat of rare jumbo dragonfly to reproduce. This implemented environmental education and species conservation. Kept updating and maintaining sewage treatment facilities to ensure water quality.

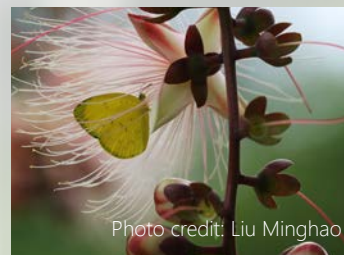


Photo credit: Liu Minghao



Biodiversity-environmental education park

Eco-environment overview

NCNU was located in Taomi Community, Puli Township. A diverse terrain and an altitude ranging from 400~800 meters developed natural environment with biodiversity. Faculty and students frequently observed and participated in eco-environment activities, including pangolin, formosan reeve's muntjac, yellow-margined box turtle, Taiwan blue magpie. Campus was characterized by ecological richness, including 23 species of frogs, eight species of fireflies, 161 species of butterflies, 67 species of dragonflies, and other endemic plants.

Achievements of eco-conservation on campus

The goal of campus landscape aimed to construct a diverse ecological park environment. The vision of restored native wildlife habitats was spearheaded by Prof. Guo-Dong, Peng, host and nectar plants for butterflies such as Kusukusu Eupatorium, Ixora chinensis, Double flower, and Taiwan Lemon Depressed Orange Ponkan were extensively planted in the secondary waterway ecological landscape project. This successful creation of butterfly habitats had attracted the *Athyma jina sauteri* to reside. The further long term plan was to restore Taiwan Native Aquatic Animals and Plants Garden for fireflies and others. The *Da-Ann Hygrophila* was currently restored successfully.



Center for Habitat
Management



Environmental education promotion activities

Warning signs had been placed for roads within the home range of endangered species. The temporary shelter unit-NCNU Sustainable Lifestyle Lab, was in charge of rescuing and monitoring of endangered species. In addition, five workshops of eco-conservation promotion were held for faculty and students, off campus visitor, and community people, about 300 participants in 2024. Additionally, through a co-production with a television station, launched the program My Animal Classmate – Pangolin to publicize pangolin conservation.



▶ Pangolin rewilding and monitoring



▶ A stairway for pangolin



▶ Installation of “Beware of Pangolins” sign

Awards

NCNU participated in the “National Environmental Education Facility Short Video Competition” hosted by National Environmental Research Academy in 2024. Dept. of Electrical Engineering, student Yen-Lin, Chiu received the Golden Award (NT\$30,000 bonus) for The Pangolin Guardian. Not only brought unique pangolin’s eco-environment on campus but also conveyed a compelling message on environmental protection.

Continued to support and actively promote environmental education on/off campus, mobilizing the community to joint efforts for sustainable environment.



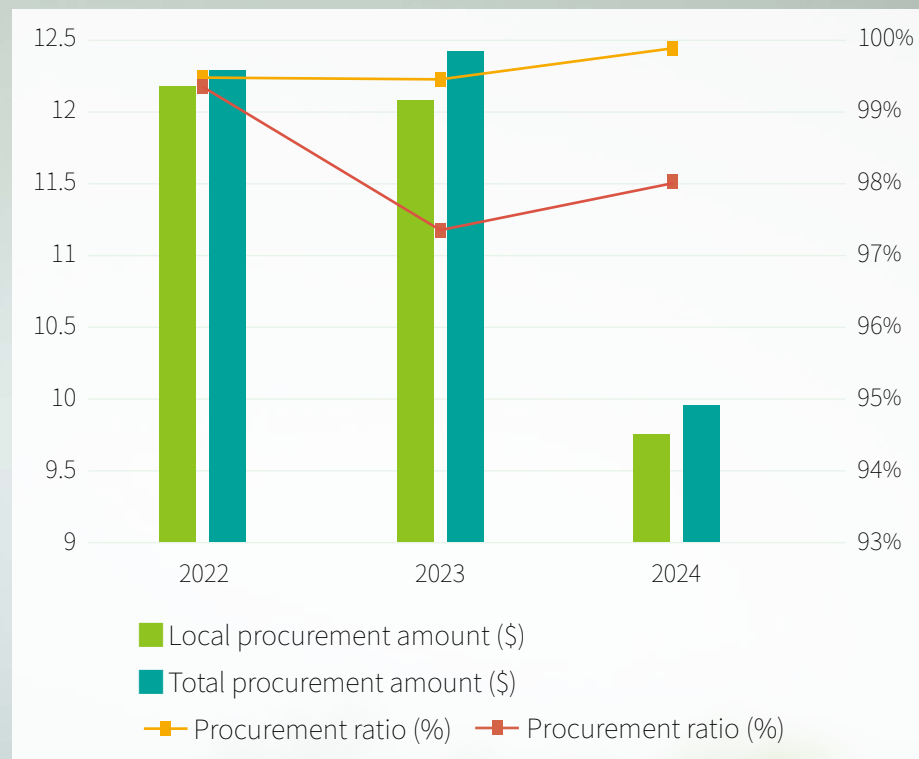
3.5 Green purchase and supply chain management

Green purchase

NCNU actively promoted the concept of environmental protection. Faculty members and students are encouraged to cultivate environmental literacy on campus. Any purchases must consider below certifications, such as “energy-saving label”, “environmentally friendly label”, “water saving marks”, “energy star”, or “energy efficiency class 1 and class 2 marks”. Prioritized the selection of certified products with environmentally friendly label. Encouraged the use of recyclable, low pollution, resource saving green products. This fostered a green consumption trend. The green purchase achieved 99.47%, 99.42% and 99.92% from 2022 to 2024, which exceeded the goal of 95% required by Ministry of Environment (former Environmental Protection Administration). This demonstrated the commitment to environmental protection and education.

Supply chain management

As a government agency, NCNU strictly complied with the “Government Procurement Act” process to ensure quality and guide each unit in engineering, finance, and service procurement. Formulated qualifications of tenderers based on characteristics and needs of procurement in terms of laws and regulations to ensure their undertaken abilities. 75 tender cases, 72 suppliers, and particularly local suppliers accounted for as high as 96%, the procurement expenditure was about NT\$97,630,000, which accounted for 98.1% from total expenditure in 2024. This demonstrated NCNU local economic support, which did conform to the principles of economic efficiency and social responsibility.



	2022	2023	2024
Green purchase			
Procurement ratio (%)	99.47	99.42	99.92
Supply chain management			
Local procurement amount (\$)	122,545,070	121,057,146	97,631,331
Total procurement amount (\$)	123,499,962	124,296,079	99,526,681
Procurement ratio (%)	99.23%	97.39%	98.1%