

# 2025 NTNU Sustainable Development Annual Report



## Table of contents

SDG 1	<i>No Poverty</i>	1
SDG 2	<i>Zero Hunger</i>	3
SDG 3	<i>Good Health and Well-Being</i>	6
SDG 4	<i>Quality Education</i>	8
SDG 5	<i>Gender Equality</i>	11
SDG 6	<i>Clean Water and Sanitation</i>	14
SDG 7	<i>Affordable and Clean Energy</i>	17
SDG 8	<i>Decent Work and Economic Growth</i>	19
SDG 9	<i>Industry, Innovation and Infrastructure</i>	21
SDG 10	<i>Reduced Inequalities</i>	23
SDG 11	<i>Sustainable Cities and Communities</i>	26
SDG 12	<i>Responsible Consumption and Production</i>	28
SDG 13	<i>Climate Action</i>	30
SDG 14	<i>Life Below Water</i>	33
SDG 15	<i>Life on Land</i>	37
SDG 16	<i>Peace, Justice and Strong Institutions</i>	40
SDG 17	<i>Partnerships for the Goals</i>	43



## SUSTAINABILITY — The Cornerstone of Inheritance and Innovation, the Practice of Social Responsibility

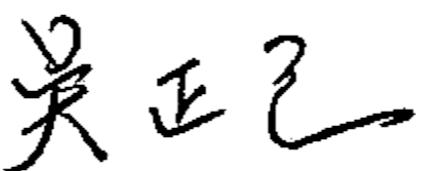
The vision for the development of National Taiwan Normal University (NTNU) is to continuously deepen the connection between academic achievements and sustainable development goals through three main axes: "Internationalization," "Social Impact," and "Inheritance and Innovation," with "Comprehensive Smart Innovation, Internationalization, Cross-Domain Integration, and Industry-Academia Collaboration" as its core. The university will actively fulfill its social responsibility by actively participating in social responsibility projects, guided by the spirit of the United Nations Sustainable Development Goals (SDGs), and connecting the needs of society and industry with the university's R&D capabilities through diverse industry-academia collaboration models. This will promote the translation and application of academic achievements, and the university will actively participate in social responsibility projects to help promote the UN Sustainable Development Goals (SDGs) and demonstrate its social responsibility.

Since 2012, NTNU has participated in international higher education sustainability assessments, including STARS, THE Social Impact, and QS ESG. By reviewing its sustainability actions and data, the university has re-examined and optimized its policies, integrating sustainability into university administration and teaching research, making it a consensus in university development. Instead of top-down decision-making, sustainable development is implemented in the teaching, learning, and daily lives of teachers and students through systems, practical actions, and communication. The "Warm Sunshine Sustainability Festival" is a prime example, entirely student-led and

fully supported by the university. It includes lectures on various sustainability topics, a no-package market, and hands-on workshops, truly integrating sustainability into daily life, community, and practice.

Since 2021, the Office of Sustainability Development has published annual reports for 2021, 2022, 2023, and 2024, showcasing NTNU's achievements in implementing 17 sustainability goals. NTNU has committed to a carbon neutrality goal of "reducing carbon emissions by 50% by 2030 and achieving carbon neutrality by 2048." This year, the university completed a third-party certified campus-wide greenhouse gas inventory and, in line with the government's 2050 net-zero emissions target, has launched a campus-wide net-zero green living initiative, starting with lifestyle transformation.

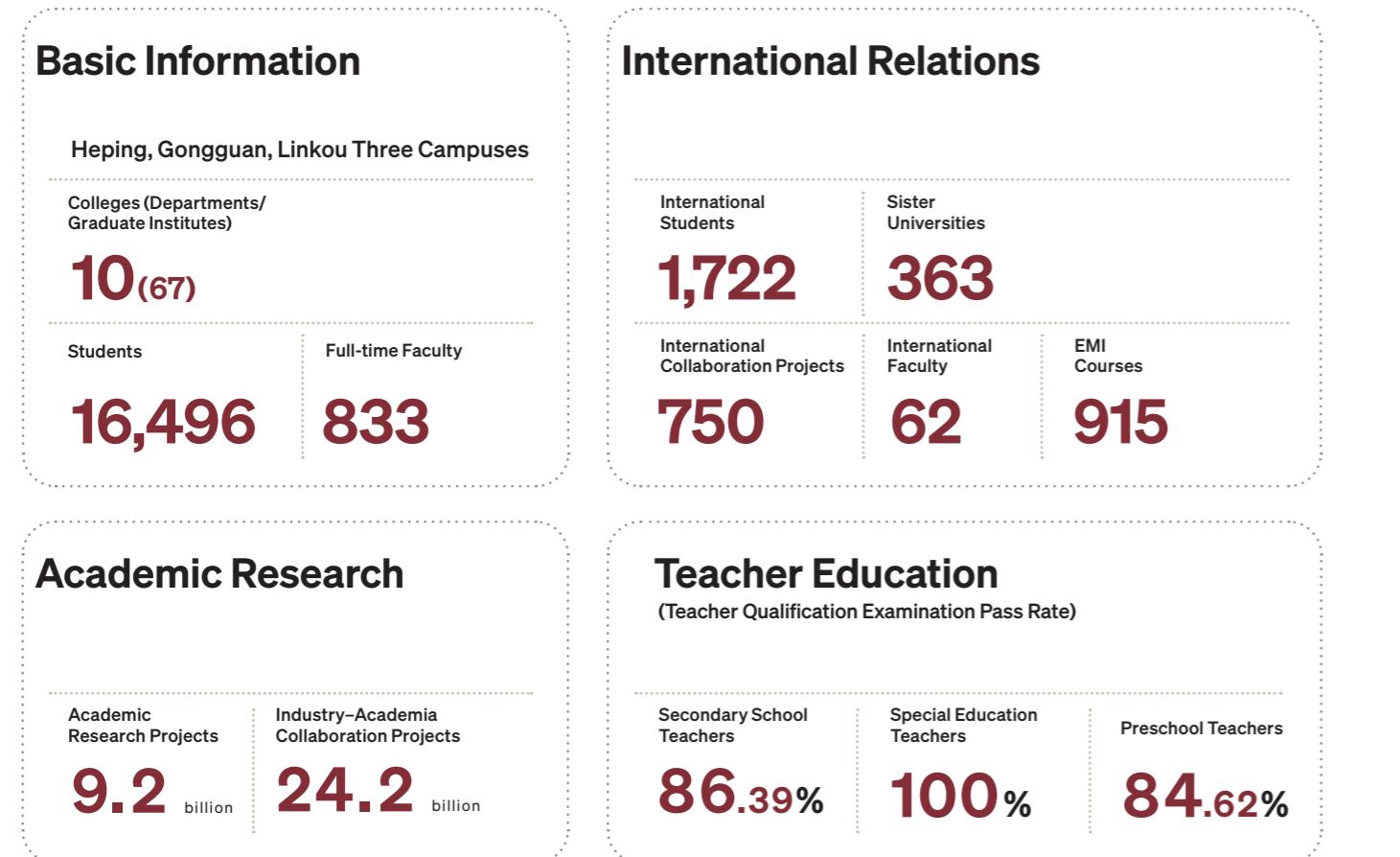
With sustainable development at its core, National Taiwan Normal University (NTNU) balances academic excellence, social responsibility, and talent cultivation and is committed to setting a new benchmark for sustainable governance in higher education.



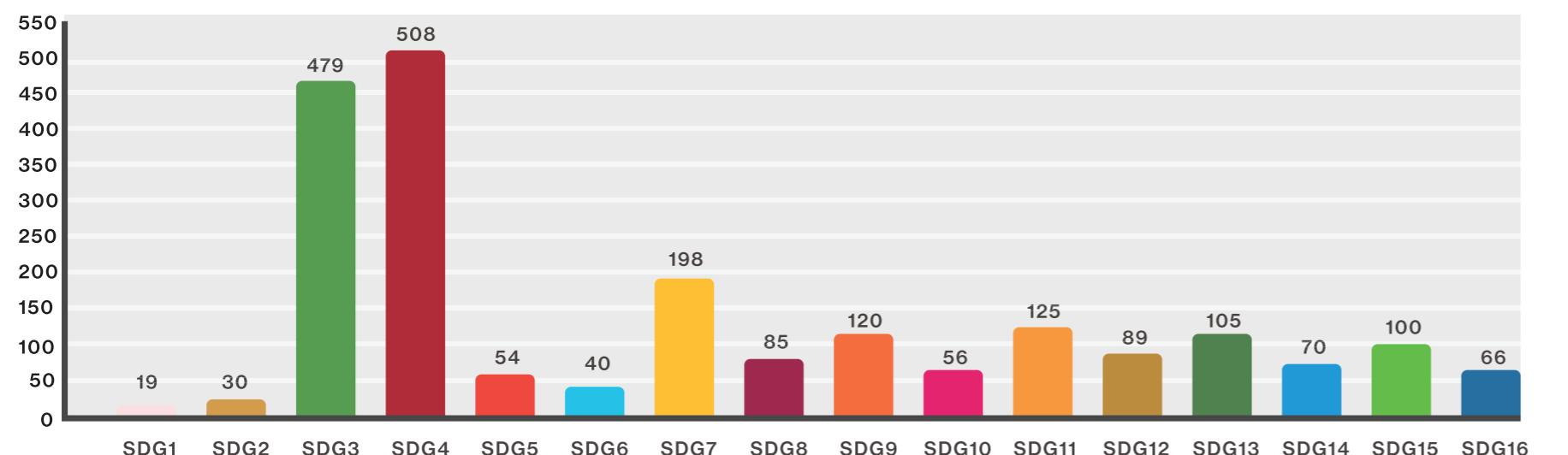
President, National Taiwan Normal University



## About NTNU

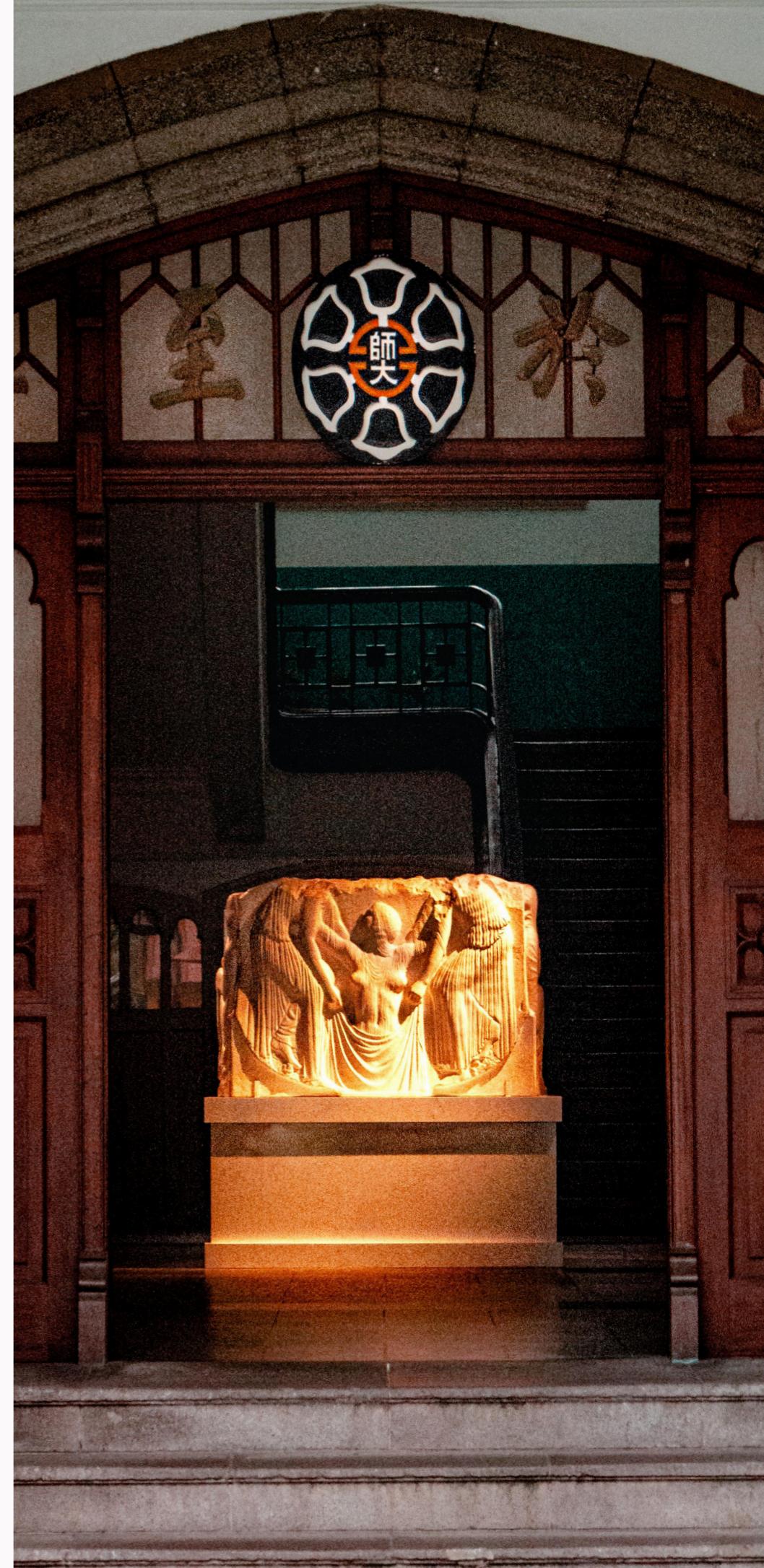


## Distribution of Scopus Publications Across SDGs



### Notes

Unit: Number of Publications  
Data Scope: 2019–2023





## About This Report

### Reporting Principles

This report adopts the United Nations Sustainable Development Goals (SDGs) as its primary disclosure framework, aligning its content with the 17 global goals and their corresponding indicators.

### Reporting Period

The data and information presented in this report primarily cover the period from 1 January to 31 December 2024. Academic-year information is based on Academic Year 2023–2024 (August 1, 2023 to July 31, 2024). To ensure completeness, certain data include information prior to 2024 or the latest updates available up to 2025.

### Reporting Boundary and Scope

The scope of this report encompasses all activities and information related to the three campuses of National Taiwan Normal University: Heping Campus, Gongguan Campus, and Linkou Campus.

### Data Compilation and Verification

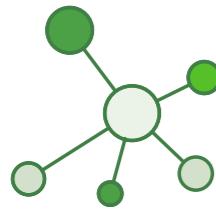
All data and statistics presented in this report were collected and analyzed by relevant university units and consolidated by the Sustainable Development Office. Verification is conducted through a two-stage process in which subject-matter experts first review the accuracy and completeness of the content, followed by deliberation and approval by the Sustainable Development Committee.

### Publication

This report is the fifth Sustainability Report published by National Taiwan Normal University. It is released regularly on the NTNU official website for public access and download.

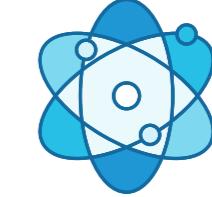
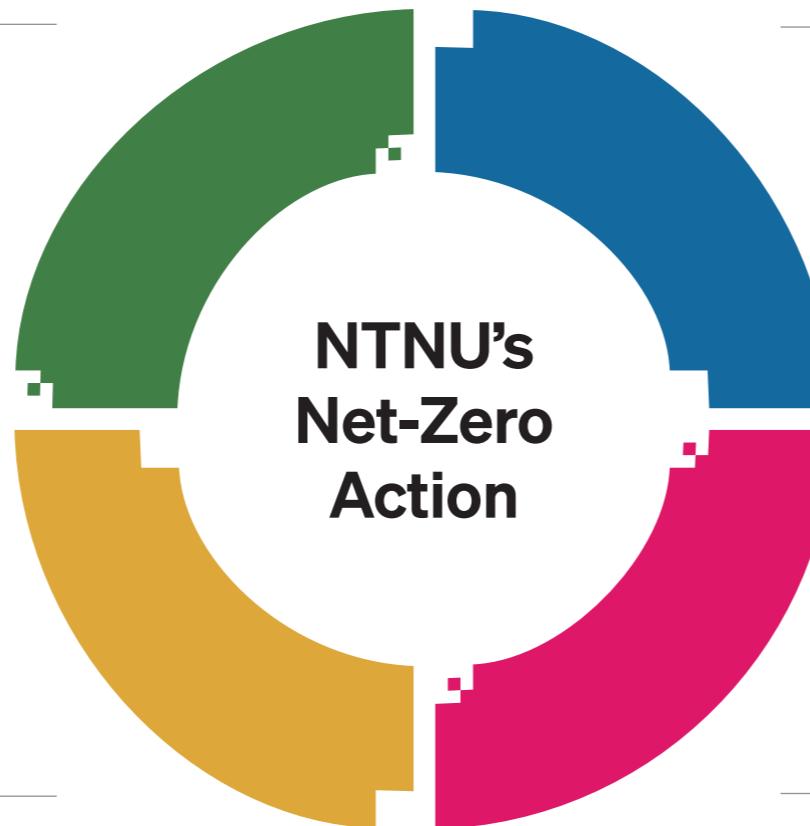
## NTNU's Contribution to Taiwan's 2050 Net-Zero Emissions Goal

NTNU actively aligns with Taiwan's 2050 net-zero emissions policy, committing to a 50% reduction in carbon emissions by 2030 and achieving full carbon neutrality by 2048. Guided by a "lifestyle transformation" strategy, the University promotes a green and low-carbon campus and implements targeted action plans across multiple areas to support its net-zero commitment. These action plans encompass the following dimensions:



### Energy Use

Improving energy efficiency and planning the installation of renewable energy facilities.



### Research and Technological Application

Advancing research on energy technologies and behavioral change, and promoting the adoption of smart energy information systems.



### Policy Implementation

Implementing national green procurement policies and conducting comprehensive greenhouse gas inventories.



### Education and Advocacy

Enhancing sustainability education and literacy, and encouraging low-carbon behaviors as part of daily campus life.

01

## From Source Improvement to Systematic Management: Building a Sustainable Green Campus and Receiving National Energy Conservation Awards

NTNU is committed to integrating energy conservation and carbon reduction into campus environmental management to build a sustainable green campus. In recognition of these efforts, the University received the Ministry of Economic Affairs' Energy Conservation Benchmark Award in 2022, the "Outstanding University" distinction in the Ministry of Education's campus environmental management assessment, and the Water-Saving Excellence Award in the 2023 national performance evaluation for water conservation among government agencies and schools.

NTNU's energy conservation philosophy centers on both "source improvement" and "effective management." In terms of source improvement, the University has replaced all traditional lighting in public areas with LED fixtures, renewed 1,560 outdated air-conditioning units, and replaced 140 drinking fountains to enhance energy efficiency. The upgrade of the main water supply pipeline at the Gongguan Campus has improved water-saving efficiency by more than 80%, and foot-operated

faucets have been installed in restrooms to reduce unnecessary water use.

On the management side, NTNU has established a Campus Energy Conservation Task Force responsible for planning, promoting, and supervising the University's overall energy management. The University has implemented an energy management policy and annual energy-saving plans, and regularly monitors their progress. An energy management system has been developed, including the Eco-Ranger Energy Audit System, which enables real-time online tracking to detect and prevent energy waste. Digital electricity and water meters have also been installed across all campuses to strengthen resource monitoring. These efforts led to NTNU's Gongguan Campus obtaining ISO 50001 Energy Management System certification in December 2021. The University has further promoted digital transformation to reduce carbon emissions, such as establishing a virtual server platform estimated to reduce annual carbon emissions by 990,024 kg CO<sub>2</sub>e.



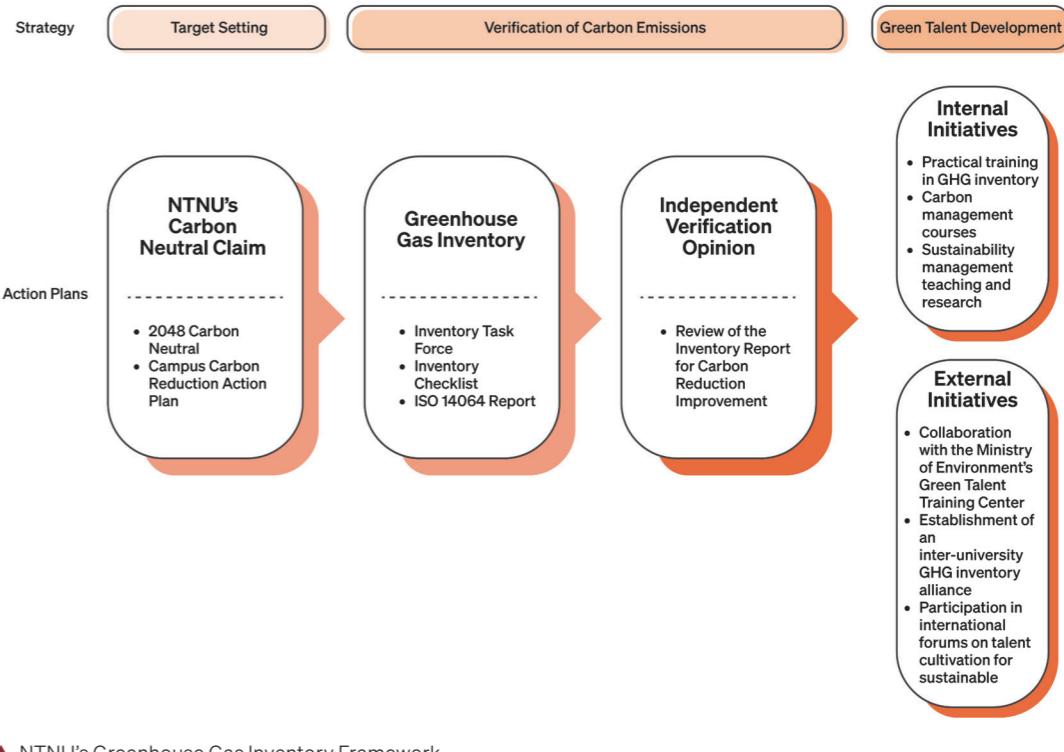
▲ NTNU received the Silver Award of the Ministry of Economic Affairs' Energy Conservation Benchmark Award in 2022

02

## Comprehensive Greenhouse Gas Inventory to Accelerate the Net-Zero Transition

NTNU has established an institutional mechanism for greenhouse gas (GHG) inventory management to advance sustainable campus governance. The University formed the "NTNU Greenhouse Gas Inventory Task Force" to oversee inventory operations, which are conducted in accordance with ISO 14064-1:2018. Through this process, NTNU identifies GHG emission sources and quantifies emissions across campus activities. The organizational boundary covers all four NTNU campuses and additional affiliated facilities. With the collaboration of all campus units, NTNU completed its University-wide 2023 GHG inventory and obtained a verification statement issued by DNV. Going forward, NTNU will continue to conduct annual GHG inventories, publicly disclose the results, and track emission changes to develop targeted carbon reduction measures. In line with the Ministry of Environment's announcement of "Designated Emission Sources Required to Conduct and Report Greenhouse Gas Inventories," NTNU has already begun preparing for mandatory inventory reporting in 2026, further accelerating the University's decarbonization efforts.

Leveraging its educational strengths, NTNU is also committed to cultivating green talent. In collaboration with the Ministry of Environment, the University established the "Northern Regional Training Center for Net-Zero and Green Workforce Development" to train professionals in carbon management, carbon accounting, and related sustainability fields. NTNU additionally provides students with opportunities to participate directly in the University's GHG inventory process, allowing them to gain hands-on experience and deepen their understanding of carbon accounting through real-world practice.



▲ NTNU's Greenhouse Gas Inventory Framework

03

## Establishing Sustainability-Focused Academic Programs to Cultivate Net-Zero and Green Workforce Talent

NTNU's Graduate Institute of Sustainability Management and Environmental Education integrates the teaching goals of "environmental education" and "sustainability management," cultivating professionals equipped with sustainability competencies and a low-carbon economic perspective. In 2023, NTNU established the Graduate Institute of Green Energy and Sustainable Technology to advance green energy development and resource sustainability. Through industry-academia collaboration, the Institute works with enterprises to build cross-disciplinary platforms for green energy applications, cultivate advanced green-energy talent, and strengthen mechanisms for renewable electricity participation, aligning with the national priority area of circular economy.

NTNU also offers the "ESG Sustainability Management Microcredit Program," which allows students to gain systematic knowledge and skills in sustainability management through elective coursework. Faculty members are encouraged to incorporate the SDGs and related indicators into course design so that more students can engage with and learn sustainability-related knowledge. To further enhance the effectiveness of sustainability education, NTNU regularly conducts campus-wide sustainability literacy assessments using its self-developed evaluation tools to measure students' knowledge, actions, and attitudes across different dimensions of sustainability.



▲ Group photo with former President Tsai Ing-Wen at the inauguration and unveiling ceremony of the College of Interdisciplinary Industry Academia Innovation.

04

## Innovations in Green Energy Technologies Recognized as NTNU Advances Toward Net-Zero

NTNU encourages faculty to leverage their expertise and technological capabilities to actively participate in industry collaborations and initiatives related to sustainable governance and net-zero transformation. In 2024, the College of Interdisciplinary Industry Academia Innovation partnered with the Jiangling Group to announce a major breakthrough in "cold fusion technology." This technology uses water as fuel to enable nuclear reactions at low temperatures without radioactive pollution, demonstrating potential applications in energy conservation, carbon reduction, and medical technologies.

NTNU's spin-off company, Pade Technology Co., Ltd., founded on key technologies developed by Professor Jen-Jie Shieh of the Department of Photonics, created one of the world's few AIoT-powered textile sorting and identification systems. By integrating self-developed near-infrared spectroscopy (NIR) with AI recognition algorithms, the system can accurately identify and classify even blended fabrics, enabling them to enter regenerative pathways such as physical or chemical fiber separation, yarn extraction, and textile remanufacturing. This innovation won both the "Climate Award" and the highest honor—the "Global Award"—at the 2025 Digital with Purpose (DWP) Global Awards. The technology supports a high-efficiency, high-purity, and high-reuse textile circularity chain, reducing approximately 73% of carbon emissions, 95% of water consumption, and 64% of energy use per garment.

Associate Professor Shuen-De Wu of NTNU's Department of Mechanical and Electro-Mechanical Engineering led a research team in developing a low-power, high-performance "Smart Underground Internet of Things" (AIoUT) system, which won first place in the 2024 Communication Innovation for Energy Efficiency Optimization Competition organized by the Ministry of Economic Affairs. After implementing the AIoUT system, energy consumption was reduced by approximately 90%, maintenance costs decreased by more than 50%, and the system significantly mitigated losses related to urban disasters such as flooding and pollution, generating substantial socio-economic and environmental benefits.



▲ NTNU spin-off Pade Technology Co., Ltd. winning two top honors at the DWP Global Awards.

05

## Promoting a Low-Carbon Campus Lifestyle and Advancing Carbon and Plastic Reduction Initiatives

NTNU implements low-carbon campus strategies across transportation management, waste treatment, and campus event planning. All retired official vehicles have been replaced with low-carbon electric models, and additional YouBike rental stations and electric scooter battery-swapping facilities have been installed around campus. To support sustainable student commuting, NTNU provides free shuttle buses between campuses, operating more than 30 trips per day with a carrying capacity of at least 1,200 passengers. Through the “University Avenue Project,” NTNU also collaborates with the National Taiwan University System to design three themed bicycle commuting routes, encouraging students to travel by bike.

To further reduce carbon emissions generated by student commuting, NTNU has expanded and upgraded student dormitories to increase on-campus residence capacity. The University now provides more than 5,800 beds to meet student housing needs and began construction on a new International Student Dormitory in 2023, which is expected to be completed in 2027 and add approximately 300 additional beds, helping to further reduce transportation-related emissions.

In the area of campus waste management, NTNU has implemented policies on source reduction, waste sorting, and resource recycling, with progress shown in the figure below.

Since 2022, NTNU has organized the “Go Health” walking challenge, which attracted more than 3,000 participants in 2024 and collectively accumulated over

2017

The free distribution of single-use utensils on campus was prohibited.

2021

NTNU Campus Plastic Reduction Guidelines were established, initiating a campus-wide reduction of plastic and single-use products, led by administrative offices and university meetings.

2022

The Guidelines for Reducing the Use of Disposable Tableware and Packaged Drinking Water were enacted, further advancing waste reduction at the source.

Present

For all on-campus meetings, trainings, and events, disposable tableware, bottled water, and single-use beverage cups are no longer provided. In addition, campus beverage shops offer discounts to customers who bring their own reusable cups.



▲ University Avenue Cycling Rally” of the National Taiwan University System

170,000 kilometers of walking—reducing an estimated 37.57 tons of CO<sub>2</sub> equivalent that would otherwise have been emitted through transportation. NTNU also organized a 900-kilometer “Cycling Around Taiwan” challenge as part of its centennial celebration, during which participants avoided plastic bottled water, used reusable chopsticks at meals, and refrained from using disposable

toiletries during accommodation. This “greenest” challenge reduced approximately 25 kilograms of CO<sub>2</sub> emissions per person per day.

06

## Expanding Solar Photovoltaic Installations to Increase Low-Carbon Energy Use

NTNU supports Taiwan’s national energy transition policy by adopting the PV-ESCO model, under which rooftop areas are leased for the installation of solar photovoltaic (PV) systems. NTNU has completed grid-connected PV installations on multiple building rooftops, with a total installed capacity of 324.675 kW. To further increase the proportion of renewable energy used on campus, NTNU submitted a proposal to the Sustainable Development Committee and conducted a comprehensive assessment of potential solar installation sites. In 2024, NTNU completed grid-connected PV installations at the Linkou Campus, adding an installed capacity of 2,417.85 kWp.

In 2023, NTNU generated 348,888 kWh of solar electricity, achieving a renewable energy usage rate of 1.16%. From August 2021 to June 2024, NTNU sold a total of 1,026,316 kWh of electricity to Taiwan Power Company. Based on current development progress, NTNU is expected to reach the 2030 renewable energy target of 5% ahead of schedule in 2025.

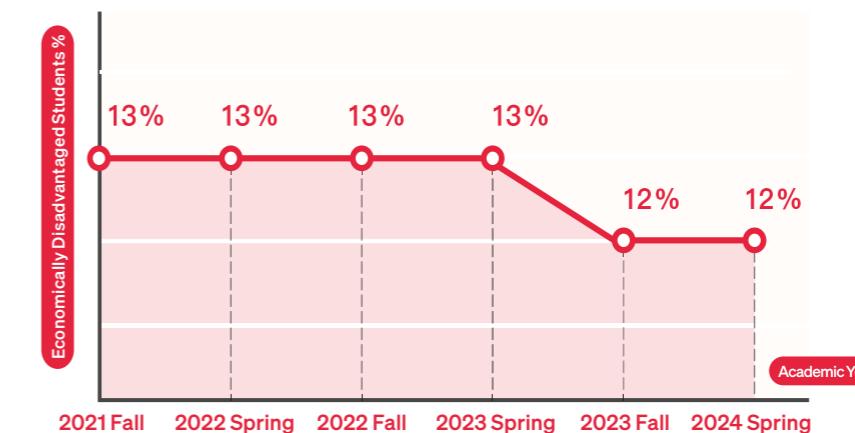
# SDG 1

## No Poverty

In terms of educational support, NTNU safeguards the educational rights of economically disadvantaged students through diversified admission pathways. In community engagement, NTNU develops innovative teaching modules to enhance educational resources in rural schools and supports the economic and industrial revitalization of Hualien following the earthquake.

- In the 2023-2024 academic year, 12% of the students received financial aid, with the total amount of aid exceeding 200,000,000.

### The Proportion of Economically Disadvantaged Students



▲ Fig.1.1 From Academic Year 2021 to 2023, the proportion of economically disadvantaged students remained at 12% of total enrollment each semester, demonstrating NTNU long-term commitment to ensuring admission opportunities for students from low-income backgrounds.

### Promoting Inclusive Admissions and Tailored Support to Expand Educational Opportunities for Disadvantaged Students

To enhance the public nature of higher education and safeguard access for students from economically disadvantaged backgrounds, NTNU adopts diverse admissions pathways to broaden the applicant pool. Under the **“Morning Light Program,”** eligible students are exempted from application fees and may apply for subsidies covering transportation and accommodation during admissions-related activities, thereby encouraging their participation in entrance evaluations.

<b>Morning Light 1.0</b>	Each department participating in the University Admissions Application scheme prioritizes the admission of at least one economically disadvantaged applicant	A total of 54 priority admission places are offered annually.
<b>Morning Light 2.0</b>	To motivate and support students from underprivileged backgrounds, priority admission is extended to those meeting economic hardship criteria as well as children of new immigrants	

NTNU further provides a comprehensive set of tailored support mechanisms for economically and culturally disadvantaged students, including:

<b>Financial Support</b>	Tuition and fee waivers, accommodation and clinic subsidies, a wide range of scholarships and grants, and emergency financial assistance to ensure academic continuity and well-being.
<b>Learning Support</b>	The Morning Light Learning Support Program, departmental tutoring services, and the “Dream-Building Learning Initiative,” which strengthen academic guidance and foster continuous learning.
<b>Career Support</b>	Career assessments, corporate and public-sector internship opportunities, résumé-writing workshops, and job-matching services to facilitate smooth employment transitions.
<b>International Learning Opportunities</b>	Programs such as “MOE Study Abroad for the Economically Disadvantaged” and the “Morning Light Overseas Learning Grant” provide scholarships to ensure equitable access to international exposure.



## Building a Comprehensive Teacher Training System and Advancing Educational Equity in Rural Areas

To address challenges in rural schools—such as insufficient resources and high teacher turnover—NTNU collaborates with the Ministry of Education to implement the PASSION Teaching Innovation Model, which integrates diagnostic assessment, student placement, and holistic teacher training. This initiative equips rural teachers with enhanced professional support, broadens students' learning horizons, and strengthens diverse learning motivations.

NTNU has established the “**PASSION Rural Education Certificate Program**” on campus to cultivate qualified rural educators and enhance teaching capacity in under-resourced areas. Through active collaboration with public agencies, local governments, private organizations, and foundations, the university develops diverse support models to maximize impact.

For example, from 2022 to 2024, NTNU partnered with the Boyo Social Welfare Foundation to integrate the PASSION curriculum into Boyo's teacher training system, cultivating seed teachers and enriching instructional modules and classroom management strategies. Leveraging Boyo's extensive presence across rural Taiwan, this collaboration enabled the localized application of PASSION teaching practices, ultimately strengthening rural education through place-based innovation.



▲ Fig.1.2 The Boyou Foundation's seed teachers conduct in-person classes, and NTNU observes and provides feedback

▲ Fig.1.3 International Teaching Volunteers and Chinese Language Volunteer Teacher Training Course Completed



## Empowering Post-Earthquake Recovery Through Digital Innovation to Revitalize Hualien's Local Economy

Following major earthquakes that disrupted transportation and severely impacted tourism—the economic backbone of Hualien—the university leveraged digital tools to support local revitalization. Professor Hsu Wen-wei, Dean of the College of Liberal Arts and Director of the Digital Opportunity Center (DOC) Program for Yilan–Hualien, mobilized local businesses to launch online group-purchasing campaigns, including “**DOC Post-Earthquake Group Buy**” and “**DOC Good Goods Group Buy**.”

Across two campaigns, 47 local businesses from various Hualien townships participated, offering over 100 products spanning agricultural goods, handicrafts, and specialty snacks. The initiatives received overwhelming support, generating more than NT\$220,000 in sales and earning strong recognition from local merchants.

To further promote local industries nationwide, the university organized the “**DOC Courtesy Time Market**,” bringing together 20 featured vendors from across Hualien County to showcase the region's cultural diversity and industrial charm. The event integrated promotional cash vouchers and the Council of Agriculture's NT\$250 Agri-Fan Points, successfully attracting large crowds and generating NT\$150,000 in sales within just two hours. These efforts contributed meaningfully to the revitalization of Hualien's post-disaster economy.



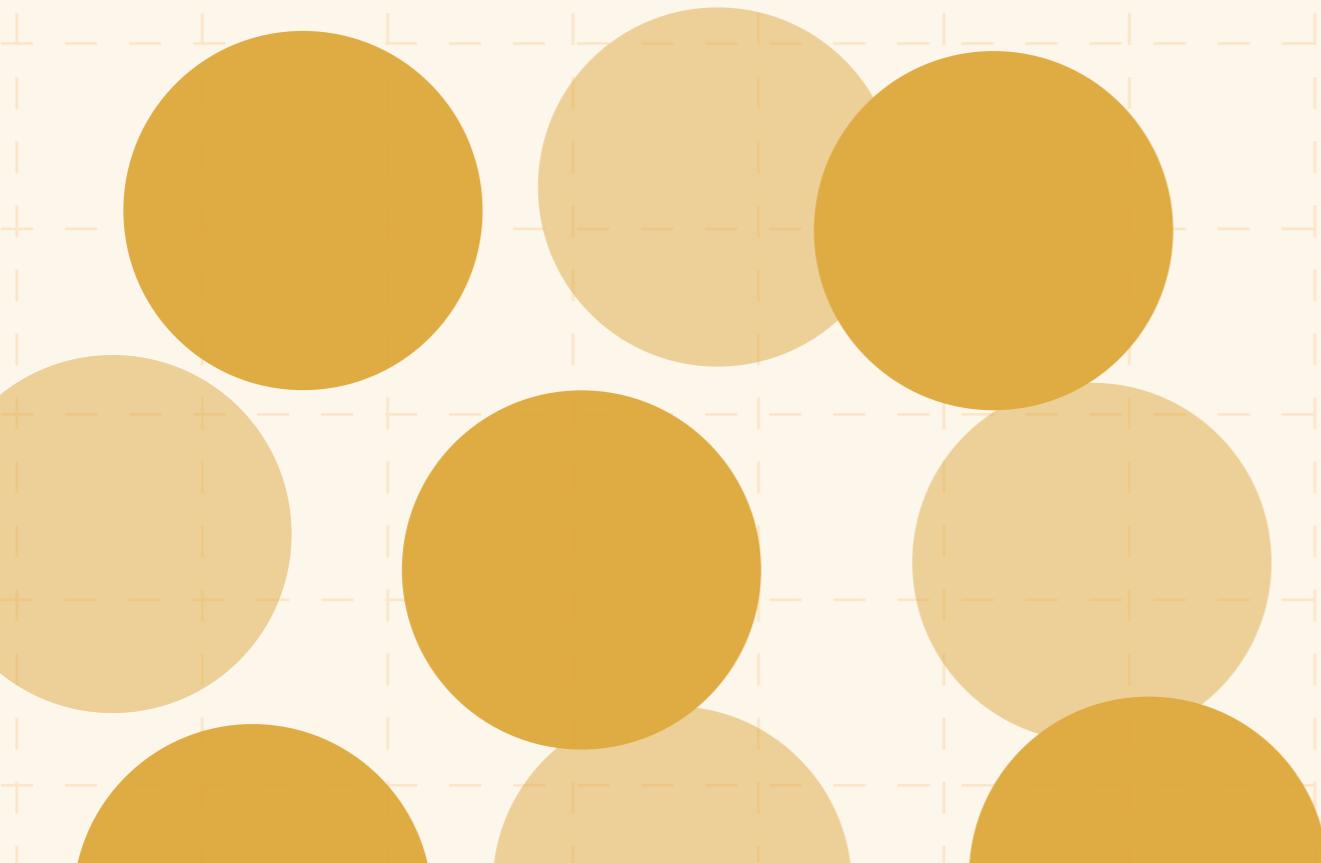
▲ Fig.1.4 The Wanrong Red Leaf Community Development Association designs diffuser stones and handmade soaps using local imagery, hoping to sustain the development of local industries

▲ Fig.1.5 The coaching team organized a live-streaming event to sell local Hualien products

# SDG 2

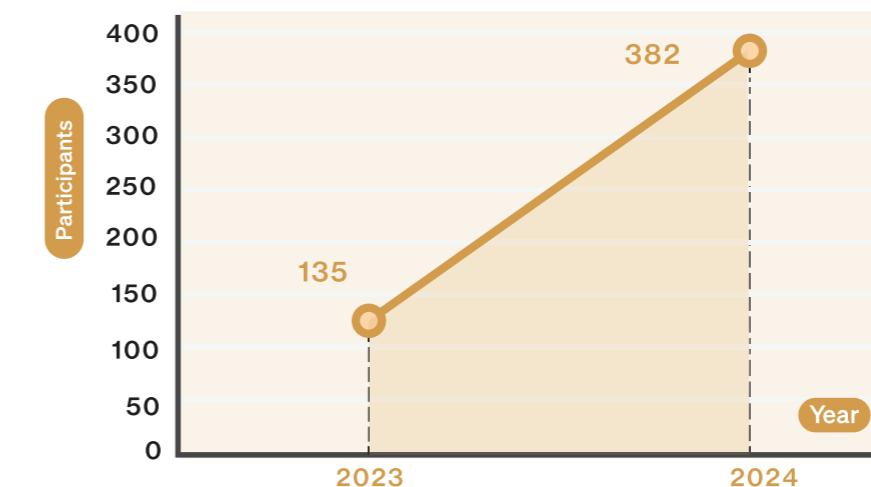
## Zero Hunger

In campus life, the university promotes awareness of sustainable diets through book fairs and market events. In student initiatives, the university supports students in engaging with agricultural issues through innovative approaches, demonstrating the diverse possibilities of sustainable agriculture. In community engagement, the university offers digital learning opportunities for local farmers and helps promote local agricultural products.



- In 2024, a total of 31 precision nutrition services were provided.

### Number of participants in nutrition promotion lectures



▲ Fig.2.1 In 2024, nutrition promotion services included two sessions on sustainable nutrition and sports nutrition, one online talk on local and seasonal food practices, and five sessions in the immune-boosting dietary awareness series, amounting to eight sessions in total and engaging 382 participants

### Partnering with the Taipei City Government to Promote Digital Learning and Empower Local Farmers

Located in Beitou's Yangmingshan area, the Quanyuan Community is one of Taipei City's few remaining rural settlements, where most residents rely on farming for their livelihood. Compared with seniors living in metropolitan areas, elderly farmers face greater disadvantages amid rapid technological advancements. In collaboration with the Taipei City Government Department of Information Technology, the university implemented the **"Taipei Digital Citizen Service Program,"** offering a series of practical and engaging digital courses tailored to the community's needs for farm experience promotion and marketing.

The program included topics such as mobile payment applications, AI-generated content tools, and AR/VR experiences. These diverse courses not only sparked residents' interest in emerging technologies but also encouraged them to actively adopt digital tools to enhance daily living and work efficiency.

In addition to capacity-building courses, the program integrated local culture and natural landscapes through the production of a 360-degree VR video to showcase the community's unique heritage. The video, themed around the Quanyuan Community Development Association's concept of the **"Sulfur in Quanyuan, Staying in Quanyuan, and Flowing in Quanyuan"**, offers an immersive first-person virtual tour of Yangmingshan's sulfuric geological formations, century-old irrigation channels, and scenic farmland, accompanied by professional narration.

The **"Taipei Digital Citizen Service Program"** provides equitable digital learning opportunities for digitally disadvantaged citizens in urban areas, helping bridge digital divides across communities while deepening public appreciation of local culture and encouraging in-person visits.



▲ Fig.2.2 & 2.3 Seniors in Quanyuan Community Experience AI-Generated

## Integrating Book Exhibitions and Campus Markets to Advance Awareness of Sustainable Diets

A sustainable diet emphasizes the consumption of foods with lower environmental impact, contributing to present and future food and nutrition security while promoting healthier lifestyles. NTNU partnered with the Chinese Culinary Foundation—home to Taiwan's only library dedicated to food culture—to organize a thematic book exhibition titled **"Reading Food, Tasting Knowledge."** The exhibition featured works on slow food, sustainable diets, food and agricultural education, plant ecology, and biodiversity, encouraging visitors to reflect on these important issues.

Student organizations have also played an active role in promoting sustainable eating on campus. The student club **"Sustainability Ambassadors"** organized the two-day **"Warm Sun Sustainability Festival,"** which included the **"Warm Sun Sustainability Market."** The market invited local farmers, plant-based food vendors, and gluten-free businesses aligned with sustainability values, creating an open space for students and the public to engage with sustainable food practices and support local producers.

Another student club, **"Veggie People,"** further promoted sustainable diets by sharing vegetarian dining options near campus through social media and participating in the **"2024 Plant-forward Initiative."** Their **"Veggie Little Masters"** events featured plant-based DIY workshops and a campus-wide Vegan Challenge with more than 250 vegan meal submissions. Students also created and sold plant-based tiramisu on campus, encouraging broader engagement with plant-based living and expanding the possibilities of sustainable eating.



▲ Fig.2.4 "Reading Food, Tasting Knowledge" Book Fair  
 ▲ Fig.2.5 2024 Warm Sun Sustainability Market of Warm Sun Sustainability Festival  
 ▲ Fig.2.6 The student club Veggie People launched a "Veggie Little Masters" program, featuring a seven-day vegan challenge.



## Showcasing Youth Innovation to Advance Sustainable Agriculture and Reduce Food Waste

Aligned with SDG 2, which emphasizes universal access to safe, nutritious, and sufficient food, NTNU actively supports innovations that advance sustainable agriculture and improve food systems. For example, students from the Department of Design developed the **“Worm Home”** project, a temporary shelter for earthworms. By placing food scraps and leaves inside the shelter during farming activities, earthworms are naturally drawn to the device, increasing survival rates and contributing to soil restoration. This innovative approach reflects young people’s creative engagement with agricultural sustainability and their commitment to addressing agricultural pollution.

In another initiative, Professor Hsu Ting-Chia from the Department of Technology Application and Human Resource Development guided a team of Taiwanese junior high school students in developing the **“No Waste App”** using App Inventor. Motivated by concerns over food waste and unsold produce, the team designed an application aimed at reducing food waste, minimizing carbon emissions, supporting local farmers and connecting with consumers. The **“No Waste App”** received the Best Design Award at the MIT AI & Education Summit, demonstrating how technological innovation can respond to the needs of sustainable agriculture and food system transformation.



▲ Fig.2.7 ERA (Earthworm Refuge Area) technology serves as a temporary shelter for earthworms that support sustainable farming.

▲ Fig.2.8 Professor Hsu Ting-Chia led a student team to create the “No Waste App,” that can reduce food waste, minimize carbon emissions. The app won the Best Design Award at the MIT AI & Education Summit.

# SDG 3

## Good Health and Well-Being

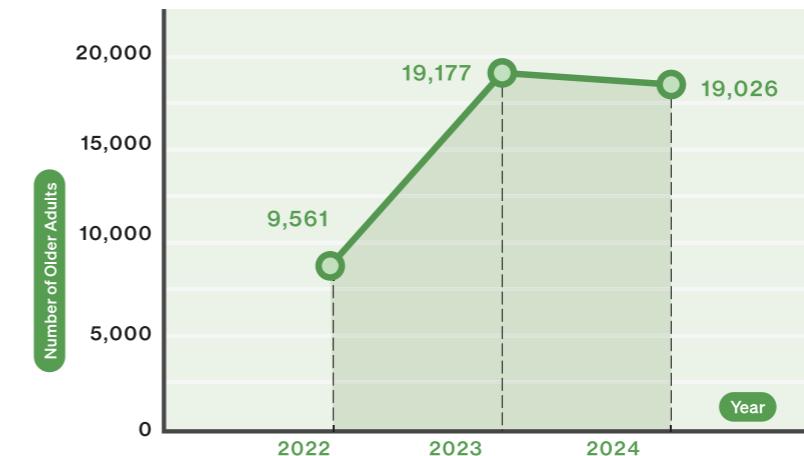
In teaching and research, NTNU hosts a wide range of health-related academic departments and graduate institutes, including programs in Health Promotion and Health Education, Educational Psychology and Counseling, Rehabilitation Counseling, Nutritional Science, and Biotechnology and Pharmaceutical Sciences. These units continually cultivate professionals in healthcare and health promotion while advancing interdisciplinary research to expand both knowledge and practical applications.

Building on three major dimensions—elder care, smart healthcare, and mental health—NTNU actively responds to societal needs, promotes health equity, and fosters innovative practices. Through these efforts, NTNU supports diverse populations in enhancing their physical and mental well-being, demonstrating its responsibility and influence in advancing sustainable health.

- USR Projects Served Over 19,000 Older Adults in 2024
- 1700 Graduates from Health-Related Departments and Graduate Institutes in AY2023



### Annual Number of Older Adults Served by NTNU's USR Program



▲ Fig.3.1 NTNU's USR projects continue to organize a variety of activities that promote the physical and mental well-being of older adults in the community while enhancing their digital literacy. The cumulative number of older adults served over the years is shown in the figure above



### NTNU's USR initiatives supporting community-based older adults have been recognized for five consecutive years by the Taiwan Sustainability Action Award (TSAA)

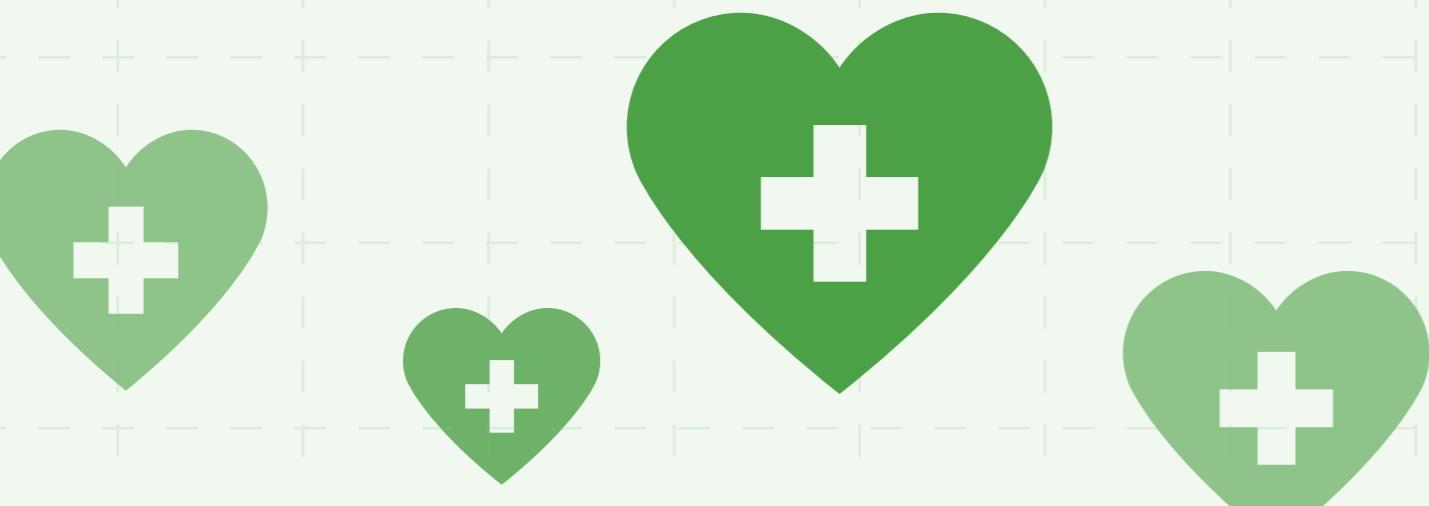
In 2024, NTNU continued to implement the "*Digital Inclusion and Smart Active Aging Program*", a USR project centered on enhancing the well-being of older adults and advancing digital equity. By mobilizing the University's interdisciplinary expertise and resources, the project aims to realize the vision of "aging together, intergenerational co-learning, and thriving communities."

The project team engaged communities across Taipei and Yilan, organizing 36 health-promotion and screening activities. Smart diagnostic devices were introduced to help older adults monitor their physical conditions, accompanied by individualized lifestyle recommendations and exercise prescriptions. At NTNU's Gongguan Campus, the team also held two sessions of a group-based senior fitness program, integrating resources from the Fitness Center, LOHAS, the Community Counseling Center, and the NTNU Sports Center. Using the Senior Fitness Assessment System, the program built a health database for older adults. In 2024, the initiative served a total of 6,650 participants, demonstrating

substantial impact.

In advancing digital inclusion, the project team collaborated with nonprofit organizations and community hubs across Taipei and New Taipei City to design innovative digital courses for older adults. These included creative activities such as workshops led by an animation director who guided seniors in producing animated short films using tablets and smartphones. In partnership with the Taipei City Department of Information Technology, NTNU faculty and students worked with older adults to co-produce a 90-minute film, *Confessions of Time*, and organized Taiwan's first "Intergenerational AI Script Reading and Music Film Festival," showcasing the creativity of intergenerational co-learning.

NTNU also launched the "*The Interdisciplinary Program of Senior Services*" on campus, offering 14 courses that attracted 971 enrollments. The program cultivates future professionals equipped with competencies in active aging, health promotion, and digital literacy.



With years of dedication and continuous innovation, the project has received the TSAA for five consecutive years since 2020 and was awarded the Bronze Prize in the fourth edition of the Taiwan Sustainability Action Award in 2024, demonstrating NTNU's contributions to active aging and digital inclusion.

### Advancing Healthcare Innovation Through Artificial Intelligence

NTNU actively responds to emerging trends in healthcare technology by promoting the application of artificial intelligence in medical and caregiving fields, demonstrating the University's strengths in interdisciplinary integration and societal impact. In November 2024, NTNU research teams participated in the **"AI Ecosystem Integration for Healthcare and Innovative Industry Matchmaking Forum,"** presenting multiple AI-powered solutions that highlight the University's innovation potential and translational capabilities in smart health.

Professor Shih-Hau Fang from the Department of Electrical Engineering developed an AI model trained on acoustic signals, demographic data, and structured medical records to provide an innovative technological approach for detecting glottic tumors. Associate Professor Yun-Cheng Tsai from the Department of Technology Application and Human Resource Development proposed **"NexCare: An Intelligent Nursing Assistant for Enhancing Efficiency and Precision,"** a system capable of automatically generating and managing nursing documentation, providing precise medical translation, and supporting intelligent communication, thereby reducing nurses' workload and improving operational efficiency.

In addition, doctoral students Hung-Yu Chang-Chien and Chia-Hui Chang from NTNU's Department of Health Promotion and Health

Education collaborated with FongAI CO., LTD. and the Taipei Xinyi District Health Service Center to develop an AI-enabled mobile health management tool for older adults. The tool assesses frailty and fall risk while providing real-time, individualized health recommendations. This achievement received the Grand Prize in the "Community Care and Healthcare Solutions for Healthy City" category at the 10th Global Conference of the Alliance for Healthy Cities (AFHC), marking another milestone for NTNU in AI-driven health innovation.

### Addressing Mental Health with Comprehensive Support

NTNU places long-term emphasis on mental health and was the first institution in Taiwan to implement the pioneering **"Mental Health Leave Policy."** Under this policy, students may request leave due to mental health needs without submitting supporting documentation, allowing them time for rest and adjustment. The policy is complemented by support mechanisms such as dedicated advisors and services provided by the NTNU Student Counseling Center, helping students navigate stress and emotional challenges.

To further expand its professional counseling capacity, NTNU established the Hsin-Tien Psychological Counselling Clinic, integrating the University's counseling expertise to provide psychological counseling, mental health services, and educational outreach for the broader community as well as NTNU faculty, staff, and students. Members of the NTNU community are eligible for six free counseling sessions each year.

In 2024, the Hsin-Tien Psychological Counselling Clinic joined the support team for the Chinese Taipei men's basketball



### Award Ceremony Community Care and Healthcare Solutions for Healthy Cities Grand Prize



▲ Fig.3.2 A group-based senior fitness activity held at NTNU's Gongguan Campus

▲ Fig.3.3 Youth Digital Health Ambassadors engaging in co-learning activities with older adults.

▲ Fig.3.4 NTNU doctoral students Hung-Yu Chang-Chien and Chia-Hui Chang receiving the Grand Prize in the "Community Care and Healthcare Solutions for Healthy City" category at the 10th Global Conference of the Alliance for Healthy Cities

national squad during the FIBA Asia Cup Qualifiers, becoming the first university-affiliated counseling clinic in Taiwan to provide psychological services to a national sports team. The Clinic's team offered individual counseling, mental resilience training, and group-based psychological support to help athletes regulate emotions, maintain focus, and strengthen competitive resilience.

This collaboration highlights the importance of professional mental health services in enhancing athletic performance and advancing the development of sports psychology in Taiwan. It also encourages more athletic organizations to recognize and address the psychological needs of their athletes.



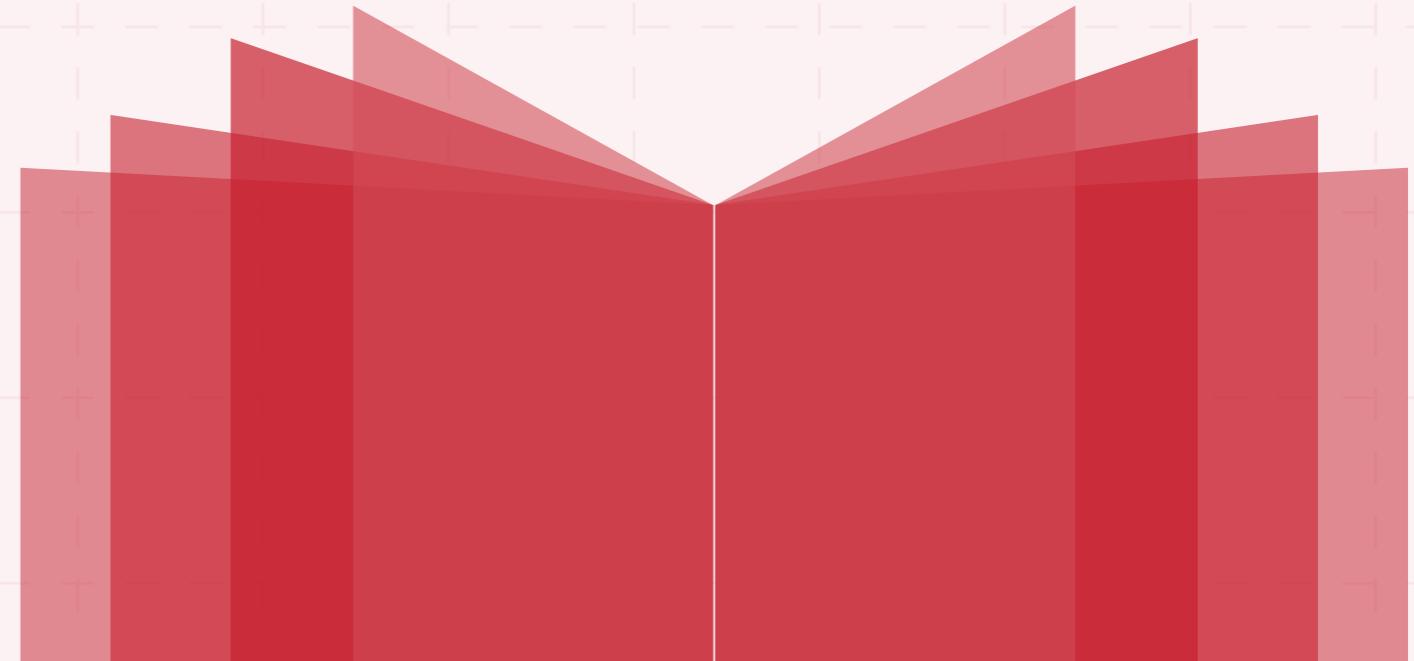
▲ Fig.3.5 Psychologists from the Hsin-Tien Psychological Counselling Clinic delivering a pre-game mental health and support session for the Chinese Taipei men's basketball team.

## SDG 4

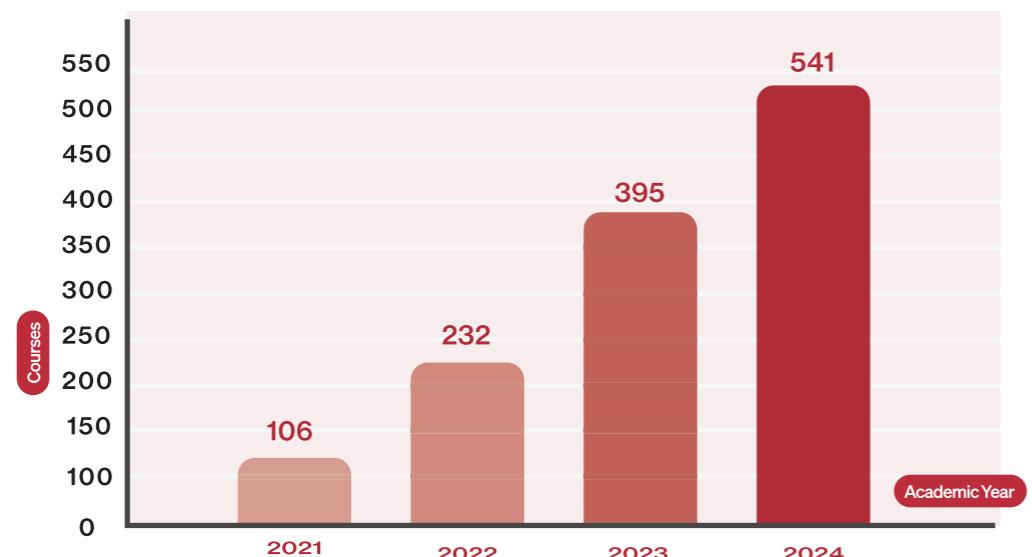
# Quality Education

- In the 2024 QS World University Rankings by Subject, the field of Education was ranked No. 1 in Taiwan and No. 27 globally
- In the U.S. News & World Report rankings, the subject area of Education and Educational Research was ranked No. 7 worldwide

In teaching and curriculum, NTNU promotes arts-based and interdisciplinary approaches, advancing aesthetic education in primary and secondary schools; integrates innovative technologies to develop an AI-driven adaptive reading platform; and collaborates with local governments to support digital learning initiatives. In community engagement, NTNU promotes media literacy education across age groups, cultivating critical literacy for all.



## Cumulative Number of General Education Courses Incorporating the SDGs



▲ Fig.4.1 Since Academic Year 2021, NTNU has integrated the SDGs and interdisciplinary learning into its institutional development plan, encouraging faculty to offer general education courses that combine SDG themes with cross-disciplinary and cross-cultural perspectives. By Academic Year 2024, a total of 541 SDG-related courses had been offered, demonstrating NTNU's strong commitment to sustainable education.

## Expanding International Participation in Science Literacy Reading Competitions and Advancing AI-Driven Reading Education

NTNU SmartReading Adaptive Learning Team has long been committed to promoting digital reading and literacy education. In collaboration with local governments and leading science education institutions, the team utilizes its proprietary AI-based text difficulty assessment technology to precisely diagnose students' reading abilities and generate personalized reading lists, enhancing both reading efficiency and learning outcomes.

Since 2019, the team has organized the Science Popularization Reading Literacy Competition, which entered its fifth year in 2024 and has expanded into an international event. This year's competition included schools from 21 cities and counties in Taiwan and Chinese-speaking schools in Hong Kong, with 667 participating schools and over 3,300 registered students—bringing total participation since inception to more than 15,000 students. Aimed at elementary and junior high school students, the competition encourages the reading and comprehension of science articles, fostering scientific interest and reading literacy while enabling teachers to monitor students' progress and performance.

In 2024, the SmartReading team launched the SmartReading-English (SRE) platform for the first time. Designed for non-native English learners, SRE applies AI and big data analysis to classify English reading materials with precision. After completing a brief diagnostic assessment, learners receive a personalized reading list to guide

individualized learning. The platform features diverse genres—including science, fiction, and practical life topics—and integrates tests and analytics to support teachers and students in tracking learning progress and comprehension, thereby building long-term English reading habits.

By advancing both Chinese and English SmartReading platforms, NTNU not only strengthens literacy and science learning among Taiwanese students but also connects with global partners, showcasing Taiwan's reading education innovations on the world stage and demonstrating leadership in educational equity and digital learning.



▲ Fig.4.2 NTNU developed the SRE Adaptive English Reading Platform and organized the SRE Adaptive English Reading Competition.

## Using Aesthetics as a Core for Cross-Disciplinary Integration of Arts and Sustainability Education

Under the Ministry of Education-commissioned Cross-Disciplinary Aesthetic Education Excellence Initiative, NTNU promotes aesthetic learning as a bridge to explore social issues and the Sustainable Development Goals (SDGs). Through integrated arts-based curricula, the program cultivates empathy, critical thinking, and future-ready competencies among students.

At Qingshan Junior High and Elementary School in New Taipei City, the collaborative course "Chagall: Born from Love" uses painter Marc Chagall's Jewish identity as an entry point. Students performed a silent mime reflecting the persecution of Jewish communities during

World War II, enabling them to experience and reflect on moral dilemmas and historical injustice. The activity was also linked to World Hello Day (November 21, 2024), encouraging students to reflect on contemporary social conflicts and advocate for empathy and peaceful communication.

At Dacheng Arts Experimental Elementary School, the "Playing with Nature" Land Art Festival invited six groups of international artists from Taiwan, Mexico, Belgium, Thailand, Indonesia, and the Netherlands to create site-specific artworks in the school and surrounding community. Inspired by local materials from Tieding Village, the artworks incorporated

natural elements such as wind, wood, water, fire, and earth, merging cultural observation, environmental awareness, and play-based learning. This initiative emphasized harmonious coexistence between people and nature and marked a significant milestone in advancing arts-based sustainability education.

Entering its tenth year in 2024, the Cross-Disciplinary Aesthetic Education Initiative continues to foster teacher collaboration networks, encourage overseas professional development, and deepen global cultural understanding. Through these efforts, the program strengthens the connection between arts education and societal issues, enhances student motivation, and advances the goal of aesthetics-centered sustainability education.



▲ Fig.4.4 At the Land Art Festival, the activity "Playing with Nature" featured a collaborative artwork created by artist Arnont Nongyao and local children titled The Rhythmic Sound of Dacheng's Iron Horses.



▲ Fig.4.3 The Cross-Disciplinary Aesthetic Education course "Chagall: Born of Love" integrates theatrical performance to deepen students' understanding of peace and justice

## Industry-Academia Collaboration to Advance Media Literacy and Strengthen Digital Resilience

While digital technologies provide entertainment and convenience, they also amplify risks such as online fraud and misinformation. Since 2020, NTNU has partnered with the Homeplus Digital Co., Ltd. to establish the Media Literacy Education Hub, which promotes media literacy across age groups by training seed teachers and campus ambassadors, organizing film production workshops, and developing educational board games.

In October 2024, the initiative expanded internationally for the first time. The team was invited to several independent high schools and universities in Malaysia to share best practices in media literacy and lead hands-on workshops featuring their self-developed board game, which teaches students to identify credible news by evaluating images and online content.

To further promote public access to media production, the program has organized more than 30 Mobile Filmmaking Workshops over four years, covering diverse themes such as local culture, social issues, and education. The 2024 workshops, held in Taipei, Taoyuan, and Tainan, attracted nearly 100 participants and resulted in over 100 short films. Completed works are later aired on public-access cable television channels, enabling community members to see their own productions broadcast in their homes and thereby advancing true media access rights.



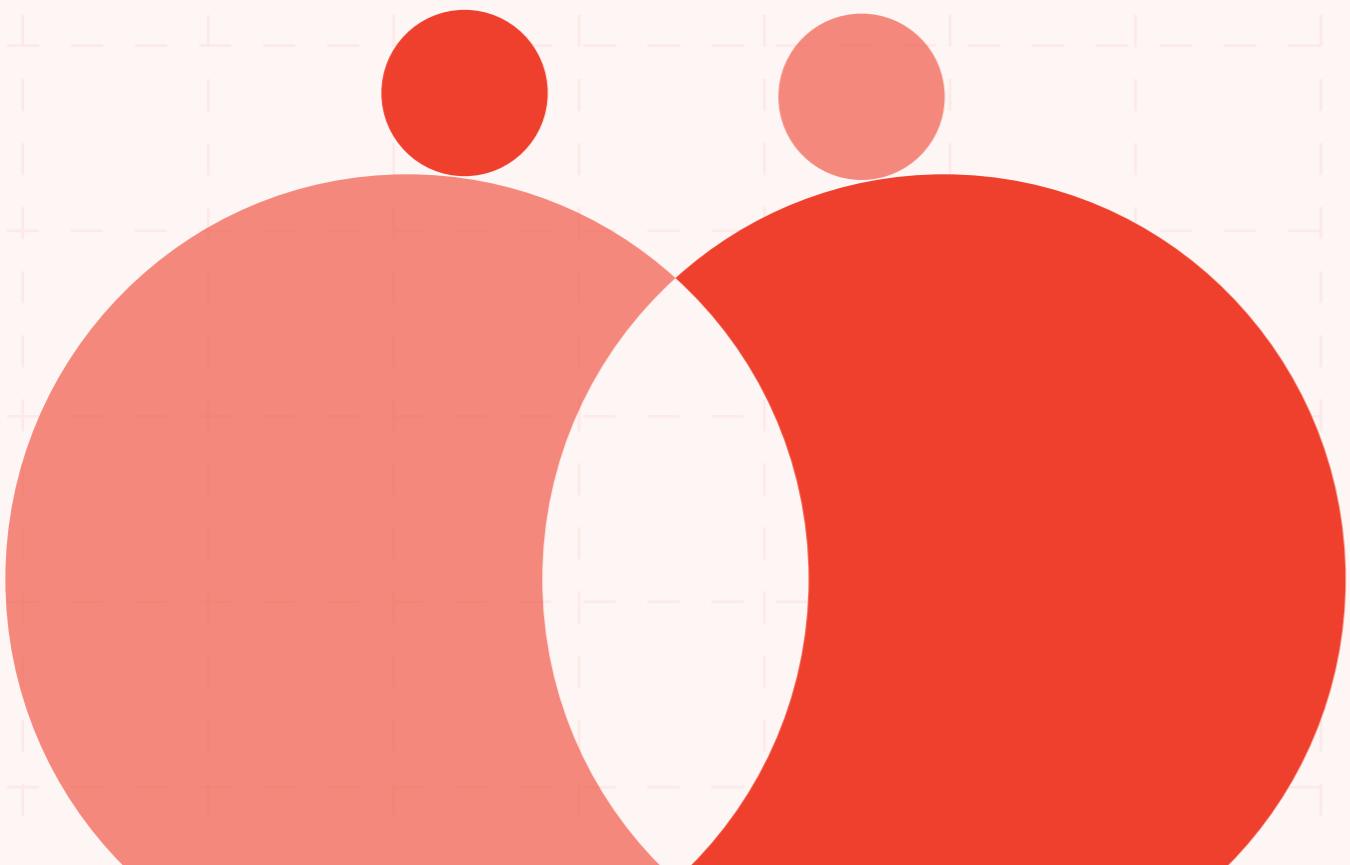
▲ Fig.4.5 & 4.6 Through hands-on tablet activities, the Media Literacy Education Hub highlights that while digital technologies bring convenience and entertainment, they also pose risks such as online fraud and misinformation

▲ Fig.4.7 In the board game, players assume the role of media operators and engage in perspective-taking to understand how media organizations function, thereby enhancing their media literacy and critical thinking skills

# SDG 5

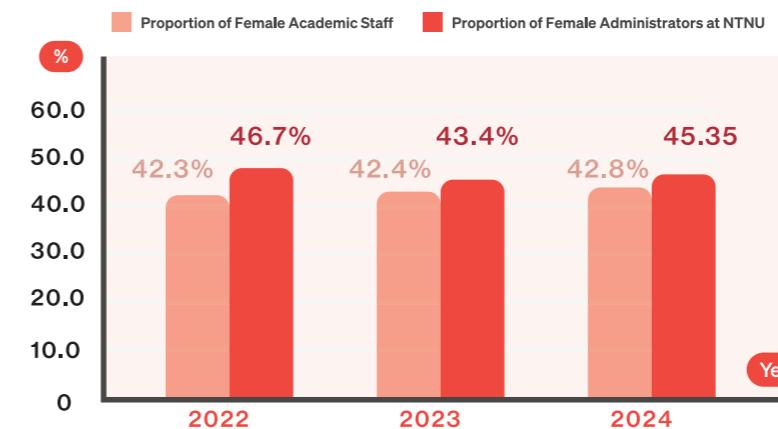
## Gender Equality

NTNU has long been committed to advancing gender equality through a comprehensive set of strategies that strengthen gender equity across the campus. From institutional development and educational outreach to improvements in campus facilities, the University has progressively established a robust and gender-friendly campus system. At the same time, student-led initiatives—such as the EROZLIFE Festival and activities organized by the NTNU Gamily Club—foster public dialogue and support the practice of multiculturalism. NTNU also continues to promote a visiting program that encourages female high school students to pursue studies in the natural sciences. Through these combined efforts across institutional mechanisms, campus culture, and talent cultivation, NTNU continues to advance gender equality.



• Female Full-Time Faculty Reached 42.8% in 2024, Marking Continued Progress in Gender Equality

### Proportion of Female Academic Staff and Senior Administrators at NTNU



▲ Fig.5.1 The proportion of female academic staff and senior administrators at NTNU has exceeded 40% for consecutive years, while the share of female full-time faculty continues to grow, demonstrating the University's commitment to gender equality

### Strengthening Gender Equality and Building an Inclusive Campus Environment

NTNU has long been committed to fostering a campus environment grounded in gender equality and diversity. Through coordinated efforts in governance, education, and spatial planning, the University has progressively built a gender-friendly environment that reflects its core values of equality and inclusion.

In the area of governance, 45.3% of NTNU's first- and second-level academic and administrative supervisors in 2024 were women. From 2022 to 2024, the proportion of female full-time faculty steadily increased from 42.3% to 42.4% and 42.8%, demonstrating consistent growth. In 2024, the College of Science achieved a milestone with women representing more than 70% of its academic leadership positions, marking a significant shift from past male-dominated leadership structures. This development highlights a governance culture characterized by inclusiveness and innovation, recognizes women's professional contributions in research, leadership, and management, and positions NTNU as a model for gender equality governance in higher education.

In terms of educational outreach, the Center for Teaching and Learning Development administers the "**Guidelines for Supporting Gender Equality Educational Activities**," encouraging colleges and administrative units to organize gender-related programs that strengthen gender awareness among faculty and students. The University also offers courses on diverse gender issues and hosts lectures and forums to promote cross-disciplinary dialogue. For example, on 24 October 2024, NTNU held the "**2024 Northern Region Gender and Space Symposium for Higher Education Institutions**," which brought together more than 30 universities and over 40 faculty representatives to examine the relationship between spatial design and gendered experiences, further exploring how campus planning can better address gender needs and embed gender-conscious perspectives into physical learning environments.



▲ Fig.5.2 The “2024 Northern Region Gender and Space Symposium for Higher Education Institutions,” hosted by NTNU Dean of Academic Affairs Mei-Hui Liu, featured a keynote lecture on “Gender and Space” delivered by NTNU Dean of Student Affairs Mei-Chun Lin



▲ Fig.5.3 In 2024, women accounted for 70% of academic leadership positions in NTNU’s College of Science. From left: Department Chair Mei-Chen Yeh (Computer Science and Information Engineering), Department Chair Yu-Tzu Li (Chemistry), Dean Yu-Ying Hsu (College of Life Science), Associate Dean Tsu-Yi Fu (College of Science), Department Chair Ting-Hua Lu (Physics), Department Chair Hui-Hsuan Chen (Earth Sciences), and Institute Director Hsiang-Yao Liu (Graduate Institute of Science Education)

With regard to gender-inclusive campus spaces, all three NTNU campuses provide lactation rooms to support faculty, staff, and students in need of breastfeeding facilities. NTNU also established Taiwan’s first gender-inclusive dormitory floor—featuring a design with mixed-gender floors but separate rooms—to promote respect for diversity and foster learning and interaction among residents. Additionally, NTNU currently has ten gender-inclusive restrooms across its campuses, with plans to add 27 more, aiming to ensure that every academic building has at least one gender-inclusive restroom, thereby providing safer and more comfortable facilities for people of diverse gender identities.

Through integrated efforts across institutional policies, educational initiatives, and spatial planning, NTNU continues to strengthen a culture of gender equality and demonstrates its commitment to fostering a diverse, respectful, and inclusive campus.

### Student-Led Gender Equality Initiatives: The EROZLIFE Festival Fostering an Inclusive Campus Culture

The NTNU Gamily Club, a long-standing student organization dedicated to promoting gender awareness on campus, organizes the EROZLIFE Festival, which has become a key student-led platform for advancing gender equality education. The 13th EROZLIFE Festival in 2024 adopted the theme “Rizz,” examining gender issues from multiple perspectives—including history, literature, religion, and folk culture—to deepen campus understanding and engagement with gender diversity.

This year’s program featured a rich array of activities, including lectures, film screenings,

photography exhibitions, a drag queen music performance, and a literary writing competition. The lectures covered diverse topics ranging from academic research and creative practice to religious culture and frontline gender education, inviting experts from various fields to engage in cross-disciplinary dialogue with students and faculty. The film screenings showcased domestic and international works centering on gender and bodily autonomy—such as Drug Shore and The Great Artist—and included post-screening discussions that encouraged deeper reflection and exchange between audiences and speakers.

For the first time, the Festival also hosted an on-campus drag queen music show, using the power of performance to introduce drag culture to the broader community. The event encouraged participants to embrace self-expression, recognize diverse gender and sexual identities, and appreciate the uniqueness of individual experiences.



▲ Fig.5.4 Poster of the 13th EROZLIFE Festival

As a student-led initiative, the EROZLIFE Festival highlights the strong autonomy and dedication of NTNU students in promoting gender equality. The Festival not only enriches gender awareness on campus but also reflects NTNU's ongoing commitment to fostering a diverse, respectful, and inclusive learning environment.



▲ Fig.5.5 The Drag Queen Music Show featured performances by Marian, Feilibing IceQueen, Honey Ji, and Yugee



## Over a Decade of Collaboration to Inspire Female Students in the Natural Sciences

Since 2012, NTNU's Departments of Chemistry and Life Science have collaborated with the Wu Chien-Shiung Education Foundation to promote the **“Science Outreach Program for Female High School Students,”** an initiative designed to encourage young women to pursue studies in the natural sciences. Through cross-school visits, the program delivers hands-on laboratory courses in subjects such as physics, chemistry, and biology, helping students build practical scientific skills. By incorporating core elements of the International Science Olympiad competitions, the program strengthens students' confidence through experimentation and nurtures their interest and potential in science.

In addition to experimental courses, the program invites recipients of Taiwan's Outstanding Women Scientists Award and Rising Star Award, along with distinguished female professors, to give scientific lectures on high school campuses. These speakers share their academic and research journeys, serving as role models who broaden students' perspectives on future careers in science. Over more than a decade, the program has visited nearly 40 high schools and reached more than 10,000 students.

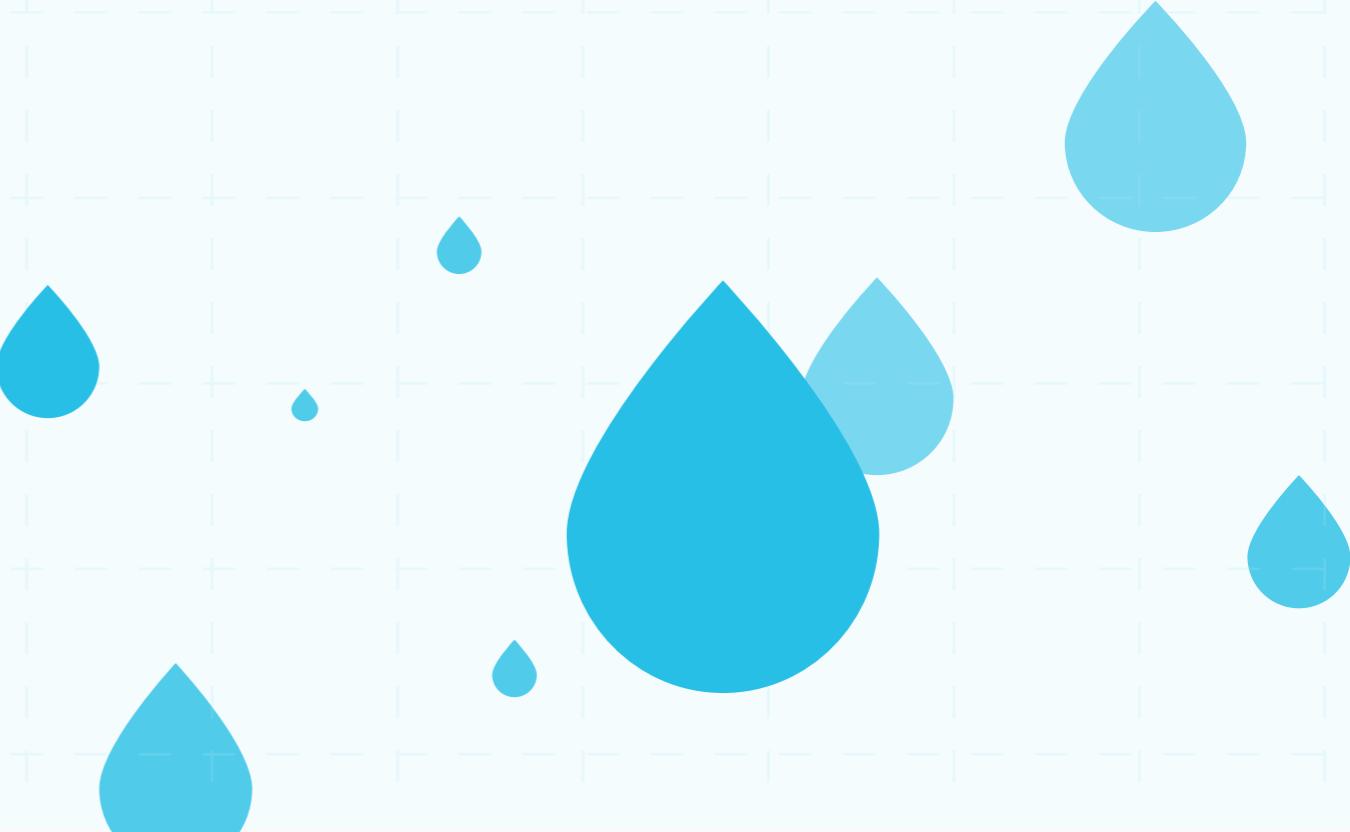
In Academic Year 2023, the outreach program visited 12 high schools, with total participation exceeding 1,600 students. These efforts not only expand female students' exposure to scientific disciplines but also advance the core principles of gender equality and equal educational opportunity. Through sustained promotion and interdisciplinary collaboration, NTNU is committed to fostering a gender-inclusive environment for science education, encouraging more women to enter scientific and research fields, and cultivating a diverse and outstanding pool of future scientific talent.

# SDG 6

- In 2024, water consumption decreased by 3,689 kg/m<sup>3</sup> compared to the previous year, representing a reduction of approximately 0.61%
- The annual volume of rainwater harvested is approximately 8,239 tons

# Clean Water and Sanitation

In educational outreach, the university guided students, faculty, and educators to explore the full life cycle of water resources—from water source catchments to wastewater treatment facilities—providing a comprehensive understanding of water management systems. In academic research, NTNU conducted analyses of Taiwan past, present, and future water resources and proposed adaptive strategies for agricultural water use in response to sustainability challenges under climate change. In media dissemination, NTNU produced a wetlands documentary showcasing Taiwan's wetland ecosystems to raise public awareness of wetland conservation and sustainable water resource management.





## Total water consumption over the past four years.



▲ Fig.6.1 NTNU total water consumption in 2024 was 600,364 kg/m<sup>3</sup>, down from 604,053 kg/m<sup>3</sup> in 2023, marking a reduction of 3,689 kg/m<sup>3</sup> or about 0.61%



## Tracing the Lifecycle of Water Resources from Source to End Use

To enhance awareness and understanding of water sustainability, NTNU organized a series of educational activities centered on the theme of clean drinking water. Participants visited key water resource facilities across Taiwan, exploring the full lifecycle of water—from source areas and water purification processes to supply systems and wastewater treatment. These activities deepened participants' knowledge of integrated water governance and conservation.

The series included visits to the Pinglin and Shiding water catchment areas to understand the importance of source-water protection and related industrial restrictions; the Chihtan Water Purification Plant, the largest in Taiwan and responsible for supplying nearly 70% of potable water to the Greater Taipei region; and the Taipei Water Park, an environmental education site dedicated to water conservation. Participants also visited the Dihua Wastewater Treatment Plant to learn about wastewater

processes and their critical role in public sanitation.

The “*Enhancing Environmental Awareness Among Watershed Residents and Assisting Regional Development Plans*” program brought together environmental education experts, university faculty, and principals, supervisors, and teachers from elementary and junior high schools. Through site visits and professional exchanges, the program facilitated discussions on planning and management of water source protection zones, organizational operations, and relevant regulations. It also strengthened the capacity of educators to integrate local water resource issues into teaching and promoted long-term water education within communities.



## Analyzing Taiwan's Water Resource Transition and Advancing Agricultural Water Adaptation and Sustainable Management

Associate Professor Lee Tsung-Yu of the Department of Geography conducted a research project examining Taiwan's historical, current, and future water resource trends, proposing climate-adaptation strategies for regional water allocation with a focus on agricultural water management (2021–2024). Although Taiwan receives abundant rainfall, its steep topography causes rainwater to quickly run off to the ocean. Combined with stark wet-dry seasonal variability, this results in low per-capita water availability, placing Taiwan among the world's water-stressed regions.

Current assessments show that agriculture accounts for nearly 70% of national water use, representing the primary demand sector. Reservoirs and groundwater supply about 24% and 20% of water resources, respectively; however, sedimentation reduces reservoir storage capacity, with southern Taiwan's reservoirs experiencing sedimentation rates as high as 36.8%. Climate change further intensifies extreme rainfall patterns, increasing pressure on both drought and flood periods and posing significant risks to agricultural water security.

To address these challenges, the study proposes climate-adaptation strategies, including adjusting crop types and planting schedules based on hydrological and climatic zoning to optimize water allocation without exceeding environmental carrying capacity. Additional recommendations include enhancing governance structures through increased use of reclaimed water, strengthening groundwater recharge, improving reservoir management efficiency, and integrating land-use planning to support inter-regional water transfer mechanisms. The research provides a model for climate-adaptive irrigation management in Taiwan and lays a scientific foundation for long-term water security and sustainable resource governance.



▲ Fig.6.2 & 6.3 Visit to Taipei Water Park and Dihua Wastewater Treatment for water resources education activities



## Winning International Recognition for the “Wild Wetlands” Documentary and Advancing Awareness of Wetland Conservation Through Visual Storytelling

Wetlands serve vital ecological functions—including water purification, flood regulation, biodiversity protection, and climate moderation—and play a critical role in sustainable water management. They mitigate the impacts of extreme climate events and provide essential habitats for numerous species, contributing to harmonious coexistence between humans and nature.

Professor Fang Wei-Ta of the Graduate Institute of Sustainability Management and Environmental Education has long been dedicated to wetland conservation and public education. His ecological documentary Wild Wetlands captures diverse wetland landscapes across Taiwan, from alpine wetlands and agricultural wetlands to riverine and coastal ecosystems. The film showcases rare wetland environments and ecological richness, featuring scenes of waterbirds foraging and documenting the behaviors of protected species such as the crab-eating mongoose and the black-faced spoonbill.

Wild Wetlands has gained international acclaim for its educational and environmental impact. It received the “Best of Best Award” jointly presented by the Ramsar Regional Center – East Asia (RRC-EA) and the Asia Chapter of the Society of Wetland Scientists (SWS Asia), recognizing the documentary’s exceptional contribution to promoting wetland conservation and enhancing public environmental awareness.



▲ Fig.6.4 & 6.5 A scene from the documentary “Wild Wetlands,” featuring the crab-eating mongoose, a protected species inhabiting Taiwan’s intertidal zones and alpine wetlands

# SDG 7

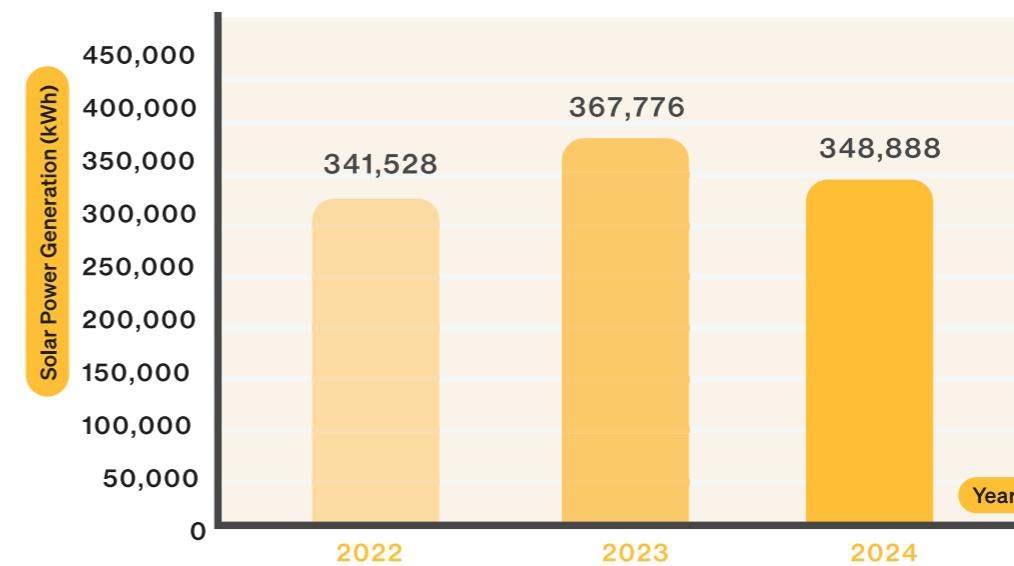
## Affordable and Clean Energy

Universities play a critical role in advancing Sustainable Development Goal 7 (SDG7), which calls for improving energy efficiency and promoting affordable, sustainable, and modern energy solutions. At NTNU, the Department of Mechanical and Electrical Engineering has demonstrated the University's innovative application of smart technologies for urban energy conservation through the "Artificial Intelligence of Underground Things (AloUT)" system.

Industry-academia collaboration projects further accelerate the development and deployment of green energy technologies while strengthening students' practical research competencies. These forward-looking research efforts and implementations lay a solid foundation for clean energy development and energy- and carbon-reduction solutions, contributing to the advancement of smart and sustainable cities.

- A multi-pronged approach, including policy pledges, educational outreach, and on-campus operations, is employed to plan and implement energy conservation and carbon reduction, aiming for sustainable energy management that increases supply and conserves energy
- All newly constructed buildings have received relevant certifications from Taiwan's Green Building Indicators; currently, there are six buildings in total

### Solar power generation (kWh)



	Solar Power Generation (kWh)	Total
2022	341,528	
2023	367,776	1,058,192
2024	348,888	

▲ Fig.7.1 In alignment with the national net-zero emissions policy, NTNU has adopted the PV-ESCO (Solar Photovoltaic Energy Service Company) model to install solar photovoltaic systems on building rooftops. Total power generation reached 341,528 kWh in 2022, 367,776 kWh in 2023, and 348,888 kWh in 2024. In 2020 and 2021, the University completed grid connection for the solar facilities on the Bo-Ai Building and the College of Education Building at the Heping Campus, with a total installed capacity of 324.675 kW. Furthermore, the solar power system at the Linkou Campus was completed and connected to the grid in 2024, contributing an installed capacity of 2,417.85 kWp

### Showcasing Smart Technology and Clean Energy: Implementing Energy Conservation and Carbon-Reduction Strategies

Driven by the goals of smart cities and sustainable development, energy efficiency and clean energy technologies play a pivotal role. At NTNU, Associate Professor Shun-Te Wu and his team from the Department of Mechanical Engineering have developed the **"Artificial Intelligence of Underground Things (AloUT)"** system, which won first place in the 2024 Ministry of Economic Affairs Communication Innovation and Energy-Saving Optimization Competition. This achievement highlights how smart technologies can advance energy conservation and enhance the resilience of urban infrastructure.

The NTNU team addressed three major technical challenges—limited signal transmission, high power consumption, and elevated maintenance costs—through innovative research. The core system adopts the Wi-Fi HaLow communication protocol, which provides both high penetration capability and low power consumption, enabling stable data transmission. When combined with low-power sensing devices, the system

reduces energy use to just 10%–12% of traditional solutions, while extending battery life by more than fivefold, substantially lowering energy consumption and replacement costs.

Furthermore, by integrating an AI analytics platform with radar, water-level sensing, and real-time image recognition technologies, the system significantly reduces manual inspection and maintenance needs, thereby improving energy efficiency and optimizing public resource allocation. Following system implementation, overall energy consumption decreased by 90%, and maintenance costs were reduced by more than 50%. These outcomes directly support SDG 7 targets related to improving energy efficiency and promoting affordable, sustainable, and modern energy.

In addition, the system enables real-time monitoring of water levels and anomalies in sewer networks, helping prevent flooding and environmental pollution. This capability reduces secondary energy losses and social costs associated with disaster events, strengthening the city's green resilience. The system's potential applications extend beyond sewer infrastructure and can be expanded to other sustainability-related fields, including smart agriculture, air-quality monitoring, river management, and wind-power generation.



▲ Fig.7.2 NTNU's "Artificial Intelligence of Underground Things (AloUT)" system won first place in the 2024 Communication Innovation and Energy-Saving Optimization Competition

## Industry-Academia Collaboration Accelerates Innovation in Clean Energy Technologies

NTNU collaborates with the Jiangling Group to integrate industry-driven innovation and research capacity into the University's academic development. This partnership has yielded significant scientific progress, including a breakthrough in cold fusion technology—also known as Low-Energy Nuclear Reactions (LENR)—resulting in a publication in *Scientific Reports*, a journal under *Nature*. This marks the first cold fusion-related paper to appear in a mainstream scientific journal in 30 years.

LENR technology utilizes water as a fuel source and operates at low temperatures without generating nuclear pollution, offering potential applications in energy efficiency, carbon reduction, and medical technologies, as well as providing a pathway toward more efficient energy solutions.

Through this collaboration, the University and industry partners jointly promote academic inquiry, innovation, and technological development. The miniaturized cold fusion reactor design advances the integration of science and engineering, while industry-academia cooperation strengthens NTNU's capacity for practical research and innovation. Students enhance their hands-on research competencies through experiential learning, and collaborative research teams—both domestic and international—continue to investigate the fundamental mechanisms of LENR to further advance cold fusion technology.



▲ Fig.7.3 NTNU's research team achieved a breakthrough in cold fusion technology and secured an industry-academia collaboration project

# SDG 8

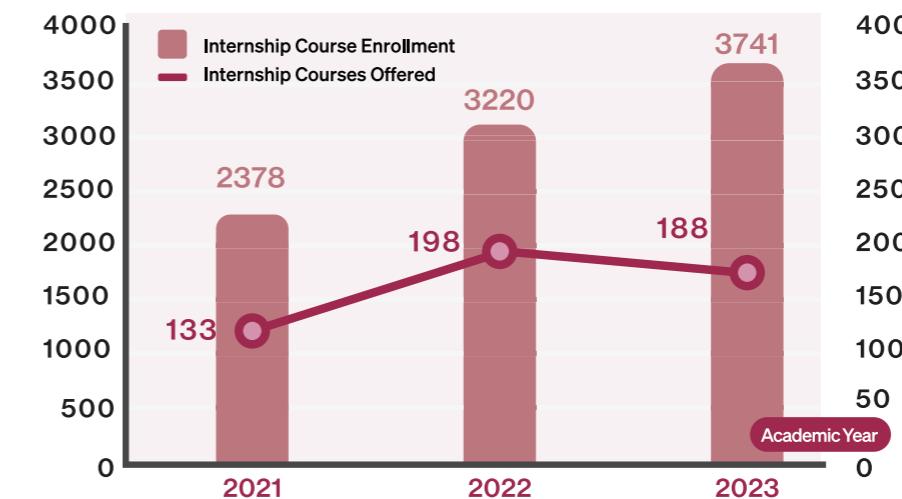
## Decent Work and Economic Growth

NTNU is committed to cultivating future talent equipped with both educational professionalism and practical competencies. Through its systems of teaching internships and industry internships, the University enables students to apply their knowledge in diverse settings—including schools, businesses, and community organizations—allowing them to gain valuable hands-on experience, strengthen their professional skills, and enhance their employability. NTNU also hosts annual job fairs and employer engagement events to connect students with industry resources, supporting a smooth transition from campus to the workplace and expanding students' pathways for career development.



- 188 internship courses offered, 3,741 students enrolled, and 510 industry internship partners

### Number of Internship Courses Offered and Student Enrollment at NTNU



▲ Fig.8.1 Through a diverse range of internship courses, NTNU supports students in gaining practical experience and enhancing their employability. The cumulative internship statistics over the years are shown in the figure above

### Strengthening Internship Systems to Cultivate Future Talent with Professional Teaching Skills and Workplace Competitiveness

As a leading institution for teacher education in Taiwan, NTNU has long been committed to cultivating future talent equipped with both educational professionalism and workplace competitiveness. To enhance students' employability and practical capabilities, the University continues to advance an internship-centered framework for teaching preparation and career development.

Teaching internships form a core component of NTNU's teacher education curriculum, providing preservice teachers with opportunities to immerse themselves in real teaching environments. Through the application of educational theories and instructional methods in classroom settings—and with guidance from professors and secondary school mentor teachers—students accumulate teaching experience, strengthen instructional skills, and progressively build professional teaching competence. In 2024, NTNU offered 79 teaching internship courses with a total enrollment of 1,404 students.

Beyond the field of education, NTNU also

actively promotes industry internships, offering students a diverse range of experiential learning opportunities to broaden their career pathways. The Career Development Center implements the "Enhanced Industry Internship Subsidy Program," which supports departments in offering internship courses aligned with industry trends and needs. Over the past three years, 42 departments have developed and institutionalized industry internship courses, enabling students to apply their disciplinary knowledge in businesses, communities, and field-based settings. This approach strengthens students' practical skills and expands their professional horizons. Between Academic Years 2021 and 2024, the percentage of bachelor's degree graduates who participated in industry internships increased steadily from 28.2% to 30.2%, 33.4%, and 35.7%.

Through teaching and industry internships, NTNU enhances students' career readiness and supports sustainable employment.



▲ Fig.8.2 Award Ceremony for the Career Development Center's Internship Story Competition, with participation from students and faculty

▲ Fig.8.3 Career Development Center Internship Story Competition Award Ceremony

▲ Fig.8.4 Group photo from NTNU's "Career Lead to the Future" Job Fair in 2024

## Strengthening Career Readiness and Expanding Pathways for Diverse Career Exploration

In response to the rapidly evolving industry landscape and the employment challenges faced by young people, NTNU actively strengthens the bridge between campus and the workplace by hosting job fairs and a wide range of career development activities. These initiatives support students in exploring career directions, understanding industry trends, and enhancing their readiness for entering the labor market. The **"Career Lead to the Future"** Job Fair held in March 2024 brought together more than 50 companies across sectors such as technology manufacturing, digital marketing, and professional services. In collaboration with government agencies and 104 Job Bank, the event also offered résumé clinics and other professional services, attracting strong student participation and broadening their career perspectives.

To enhance students' professional capabilities, NTNU actively promotes interdisciplinary curriculum development, establishing programs such as the Interdisciplinary AI Applications Curriculum and the Graduate Institute of Green Energy Technology. In 2024, the University further partnered with TSMC to launch the **"NTNU x TSMC Semiconductor Microcredit Program,"** aimed at cultivating technologically

skilled professionals with strong industry competitiveness. Currently, more than 60% of NTNU graduates enter the private sector, demonstrating the University's successful transformation from a teacher education-focused institution into a comprehensive university with diverse academic strengths. The Career Development Center also offers a series of workshops—including résumé writing, interview techniques, and professional etiquette—to strengthen students' soft skills in communication, adaptability, and problem-solving, thereby enhancing their confidence and career planning capabilities.

To support international students seeking to develop their careers in Taiwan after graduation, NTNU's Office of International Affairs and the Taiwan External Trade Development Council co-hosted the **"Career Strategies for International Students in Taiwan"** seminar. The event featured briefings from the National Immigration Agency and the Ministry of Labor on residency and work regulations, along with recruitment information from companies such as Delta Electronics, Keding Enterprises, and LCY Group, helping international students better navigate the Taiwanese job market. Looking ahead, NTNU will continue to



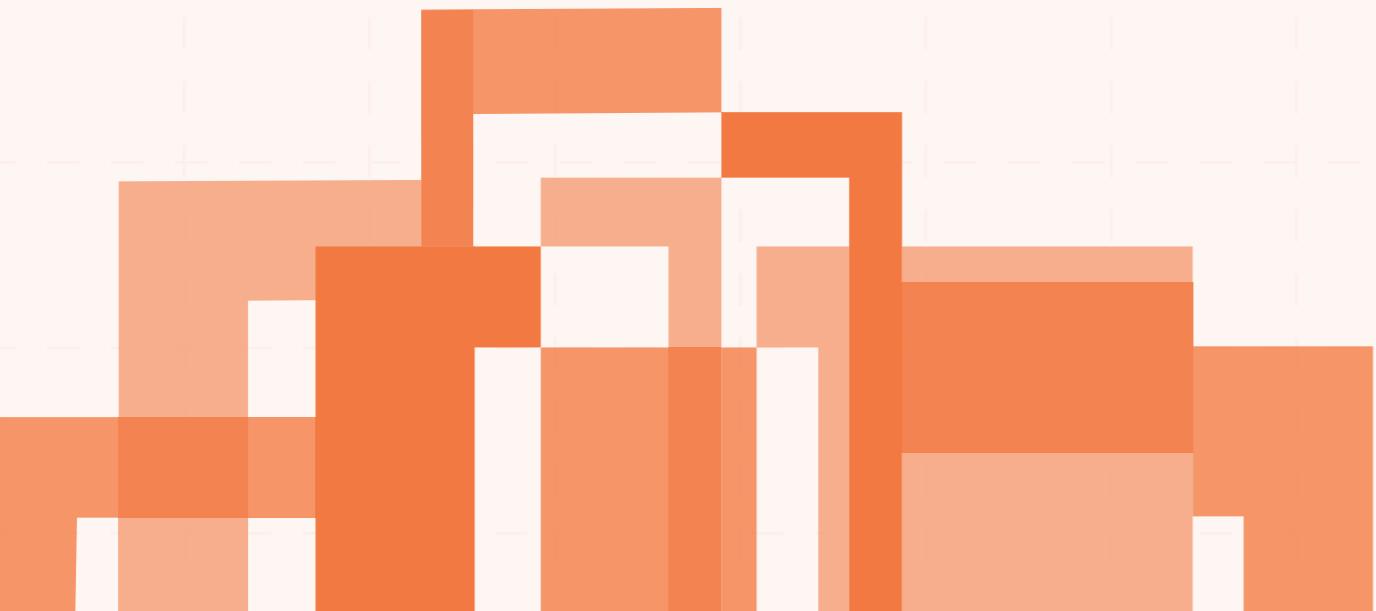
strengthen collaboration with industry and government partners, expand career development programs, and increase opportunities for internships and employment. These efforts aim to support students in building diverse career pathways and ensure a smooth transition into the next stage of their professional journeys.

▲ Fig.8.5 The Office of International Affairs hosting the "Career Strategies for International Students in Taiwan" seminar.

# SDG 9

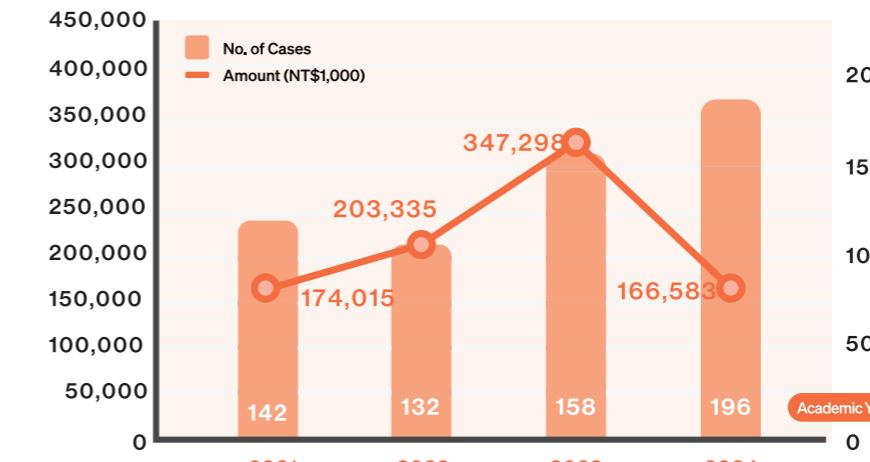
## Industry, Innovation and Infrastructure

NTNU's efforts in this area focus on strengthening research and development capacity and enhancing the societal impact of research outcomes in advancing progress and transformation. The University also promotes collaboration among professional research teams to provide students with academic programs and learning experiences that cultivate innovative thinking.



• The number of NTNU's industry-academia collaboration projects with non-governmental partners has increased each year, rising from 142 in 2021 to 196 in 2024

### Volume and Quantity



▲ Fig.9.1 From 2021 to 2024, the number of industry-university cooperation projects undertaken by non-governmental organizations reached hundreds of millions of yuan in funding for several consecutive years, increasing from 142 cases in 2021 to 196 cases in 2024

	2021	2022	2023	2024
Amount (in thousands of NT\$)	174,015	203,335	347,298	166,583
No. of Cases	142	132	158	196

### Successful Examples of Green Energy and the Circular Economy

NTNU's College of Interdisciplinary Industry-Academia Innovation and Dr. Yi-fa Lee, Chairman of Cheng-Teh Oils, have maintained a long-standing collaboration with their alma mater. Cheng-Teh Oils has actively promoted Taiwan's energy transition and sustainable management, achieving significant reductions in carbon emissions and environmental pollution. The company has consistently engaged with global issues such as climate change, environmental protection, and carbon taxation, and has been committed to circular economy production models and bioenergy research and development for many years.

Cheng-Teh Oils has also partnered with international petrochemical companies, including BP and Shell, and its industry-academia collaborations have resulted in invention patents in multiple countries. In recognition of his contributions to both the technology industry and fundamental sciences, Dr. Lee was awarded the Industry Contribution Award by the Taiwan Physical Society in 2022.

Beginning in 2023, NTNU and Cheng-Teh Oils initiated an interdisciplinary collaboration project through the College of Interdisciplinary Industry Innovation Research, and established a Solar Energy and Engineering Credit Program within the Department of Physics. This initiative aims to continuously advance green energy technologies, cultivate talent for the green industry, and promote the sustainable development of global energy systems.



▲ Fig.9.2 The donation facilitated the establishment of the Solar Energy and Engineering Credit Program and the creation of the Solar Cell Principles and Practice Laboratory

▲ Fig.9.3 Multiphysics simulation – integrates a sophisticated physics engine to accurately simulate vehicle dynamics and sensor outputs

▲ Fig.9.4 Establishing an Intelligent Computing Research Center to Advance Sustainable Development Goals

## Industry-Academia Collaboration Advances Research in Smart Grids and Intelligent Vehicles

Leveraging its expertise and extensive academic resources within Taiwan's higher education sector, NTNU has become a key implementing institution of the *"National Key Research Areas Institute Project."* In 2024, NTNU launched a collaborative initiative with Sibo Technology to cultivate talent in digital simulation engineering, focusing on two major technological areas: smart grid development and intelligent mobile vehicle control simulation systems. This project has effectively accelerated the development of professionals with specialized expertise in these domains.

By integrating project-based teaching with practical applications, students enhance both their theoretical knowledge and hands-on skills, thereby narrowing the gap between industry and academia. Sibo Technology provides advanced digital and modular hardware and software support, enabling students to acquire systematic and virtual-physical integrated engineering competencies essential to the automotive, information technology, electronics, and semiconductor industries.

During the collaboration, multiple teaching modules and practical platforms were jointly developed, fostering a deep integration of industrial technologies and academic research. By leveraging the University's academic resources and aligning them with industry needs, a comprehensive talent cultivation framework has been established to nurture future R&D leaders. This partnership not only strengthens the international competitiveness of Taiwan's technological education but also provides critical talent support for the digital transformation of domestic industries.

## Establishment of the Intelligent Computing Research Center for Sustainable Development

In response to the rapid advancement of artificial intelligence and big data, NTNU established the Intelligent Computing for Sustainable Development Research Center. The center integrates faculty expertise and research resources from eight departments within the College of Science, focusing on three primary research domains: the Real and Virtual Physical Science Computing Group, the Multi-Hazards Forecast Group, and the Health Informatics Group. Each group promotes interdisciplinary collaboration and the application of intelligent computing, thereby strengthening research capacity and enhancing international visibility.

The center's three core missions are to cultivate talent in Industry 4.0 technologies, advance interdisciplinary innovative academic research, and establish an international industry-academia collaboration platform. Through monthly academic seminars and thematic discussions, the center fosters knowledge exchange and industry engagement, supporting businesses in monitoring technological trends and cultivating professionals who meet societal and industry needs.

# SDG 10

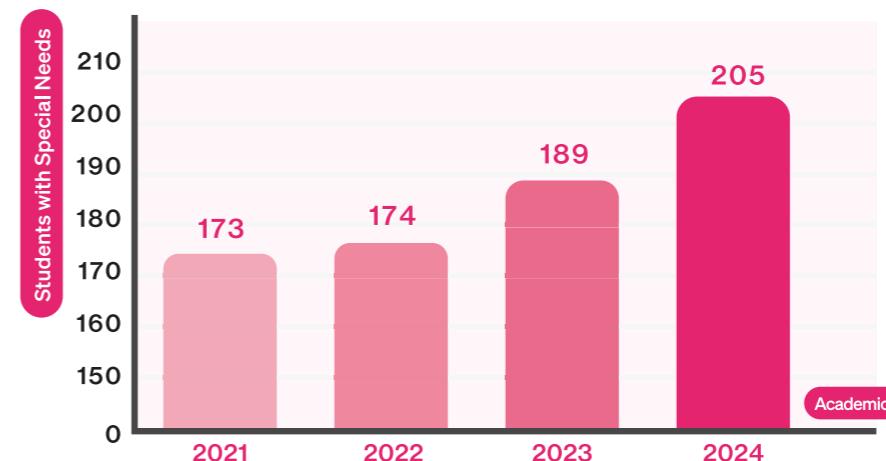
## Reduced Inequalities

The university is committed to promoting educational equity and inclusiveness by ensuring admission opportunities for students from diverse backgrounds and those facing economic or cultural disadvantages through multiple pathways such as the Stars Program, special admissions for students with disabilities, and Indigenous student admissions. In 2024 (Academic Year 113), students receiving special education services accounted for 1.2% of the total student population, a figure higher than the 1% average across all higher education institutions.

The number of special education students at the university was 173 in Academic Year 110, 174 in Academic Year 111, and 189 in Academic Year 112. As of the first semester of Academic Year 113, the university has 205 special education students, demonstrating a steadily increasing trend.

- The student dormitories include 17 accessible rooms and 1 room designated for students with hearing impairments, providing accommodation for up to 47 students with disabilities and 6 students with hearing impairments

### Trend in the number of students with special needs over the years



▲ Fig.10.1 The proportion of such students at the university has steadily increased, ensuring an equitable learning environment for students with diverse conditions

### Creating an equitable admissions environment: Special education students account for 1.2% of total enrollment

The university has established the *“Morning Light Dual Admission Program”* for undergraduate students. In Academic Year 113, a total of 471 students were admitted through this pathway. Over the past three years, students from economically or culturally disadvantaged backgrounds admitted through this program have consistently accounted for more than 17% of the total undergraduate admissions. These students receive priority admission, followed by comprehensive support services in daily life, learning, and career development after enrollment. In addition, the university offers a “Study Abroad Dream-Building Program” to help students realize their potential and pursue personal growth.

To support students with special needs, all university entrance examinations allow applicants to request accommodations based on individual needs, which are reviewed and arranged by the Special Education Center. The number of students receiving special education services has steadily increased in recent years; in Academic Year 113, they accounted for 1.2% of the total student population, exceeding the national higher education average of 1%. This reflects the university’s strong commitment and effectiveness in supporting students with special needs.

The university also provides a wide range of academic and daily living supports for students with disabilities, including assessment accommodations, accessible-format learning materials, assistive technologies, accessible dormitory rooms, and housing discounts. The Special Education Center offers individualized and diversified support services such as academic tutoring, psychological counseling, and career guidance. Furthermore, in line with government policy, the university has established an Adaptive Physical Education Development Center to promote adaptive physical education courses, further expanding opportunities that support the holistic development of students with disabilities.



## Creating an Inclusive and Accessible Environment for Persons with Disabilities and Advancing Related Research

The university is dedicated to improving accessibility on campus and conducts annual reviews to maintain and enhance accessible facilities. An online campus accessibility map is publicly available, displaying features such as accessible ramps, restrooms, and elevators. Every building on campus is equipped with accessible ramps, and major buildings also provide accessible restrooms and elevators for universal access.



Accessible Ramp



Accessible Elevator



Accessible Restroom



Accessible Parking Space

The university implements the “Adaptive Physical Education Action Blueprint for Higher Education Institutions,” commissioned by the Sports Administration, Ministry of Education. Through this program, the university organizes various activities promoting disability awareness and campus equity, including adaptive sports experiences and practitioner sharing sessions. Workshops on adaptive physical education teaching are also held to advance the development of adaptive PE courses and to encourage the growth of student organizations dedicated to disability sports on campus.



## Capacity Building and Exchange in Special Education

Assistant Researcher Ko Hui-Ching and Counselor Tseng Yu-Hsiang from the Special Education Center led nine resource-room students—representing different colleges, departments, and types of disabilities—on an academic exchange to the University of Texas at Austin (UT-Austin) and Leland Stanford Junior University (Stanford University) in the United States. Through on-site visits, immersive experiences, discussions, and reflection, the program broadened the students’ global perspectives and enhanced their practical skills.

During the exchange, students engaged in both theoretical and practical learning, experiencing educational environments different from those in Taiwan, gaining insights into local cultures, and sharing the features of NTNU’s resource center and its support services for students with disabilities. The group also examined accessible facilities on the visited campuses.

Since its establishment 50 years ago, the university’s Special Education Center has continuously advanced innovation and progress in Taiwan’s special education field. In 2024, with support from the Education Departments of Taipei City and New Taipei City, the Center launched a pilot *“Postsecondary Transition Program for Individuals with Intellectual Disabilities.”* This program provides opportunities for high school graduates with intellectual disabilities to experience university life and utilizes both university and community resources to help participants strengthen self-determination skills, enhance social participation, and improve employment readiness before transitioning to vocational rehabilitation centers for continued career support.

After one year of implementation, the pilot program has achieved remarkable results, with participant and parent satisfaction reaching 95%. It is hoped that this successful model can be expanded nationwide in the future, allowing more families of individuals with intellectual disabilities to benefit.



▲ Fig.10.2 Team members discussing disability-related issues in higher education during the exchange at UT Austin



## Alumni associations across various regions have formed “Hometown Service Teams” to provide educational resources to schools in rural areas

With the end of the pandemic, NTNU's regional hometown alumni associations were finally able to fully revive their “Hometown Service Teams.” During the winter break, students returned to their hometowns, applying their passion for their communities, their dedication to education, and their professional expertise to serve schools in rural areas with limited educational resources. They organized camp activities that were educational, engaging, and entertaining, integrating local cultural issues and providing children with more opportunities for learning and personal growth.

During the six-month preparation period for the service program, team members not only wrote lesson plans and created teaching materials but also frequently participated in meetings, team rehearsals, and other preparatory activities, dedicating significant time and energy almost every day. As many service locations were in remote areas, students often faced challenges such as outdated infrastructure leading to water or power outages. At times, when hot water systems could not be repaired in time, they had to seek assistance from local shops to meet basic needs such as showering. While providing educational resources to local children, the students themselves also grew through the processes of planning, organizing, and overcoming difficulties.



▲ Fig.10.3 Students participating in campus activities



▲ Fig.10.4 Students participating in housekeeping job training



▲ Fig.10.5 Documentation of the Hometown Service activities

# SDG 11

## Sustainable Cities and Communities

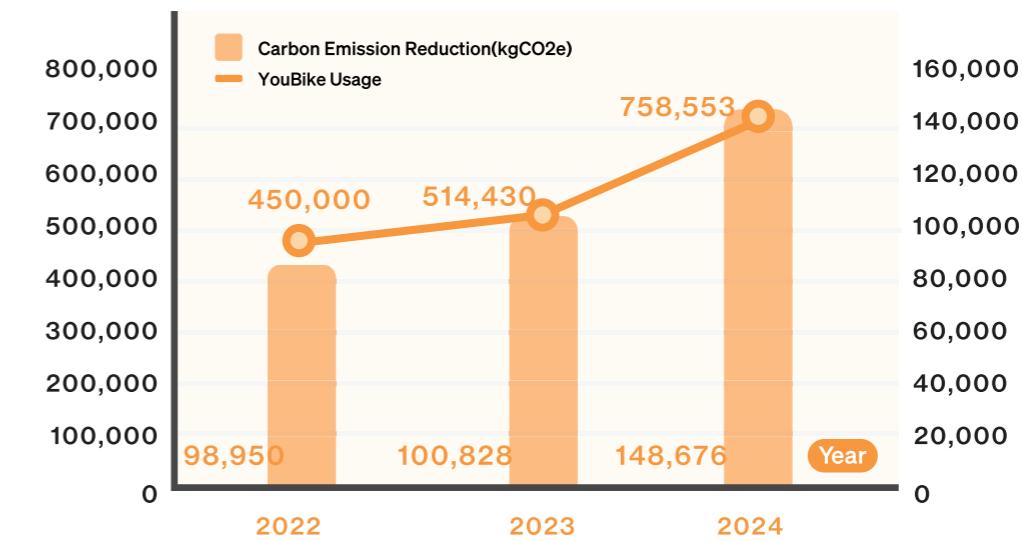
The university actively supports the United Nations Sustainable Development Goal 11 (Sustainable Cities and Communities) and collaborates closely with the local community. Campus spaces and facilities are shared with residents, promoting cultural preservation as well as arts and cultural activities. Through the University Social Responsibility (USR) program, the university has been deeply involved in Kinmen's local revitalization, systematically preserving its unique cultural heritage and partnering with local museums to implement multilingual guided tours, ensuring the intergenerational transmission of local traditions.

Additionally, the university launched the "University Way" bicycle commuting initiative to encourage low-carbon transportation. This program connects faculty and students from the three universities to jointly establish safe and comfortable bicycle paths, effectively reducing pollution, enhancing local quality of life and traffic safety, and demonstrating the university's commitment and achievements in building a livable and sustainable city.



- Over 250 arts and cultural performances are scheduled for 2024.
- NTNU actively promotes green transportation, achieving increasing success each year and advancing the vision of a healthy, low-carbon, and sustainable city

### YouBike Usage Frequency and Carbon Emission Reduction



▲ Fig.11.1 The university has a total of 357 UBIKE parking stations on and around the campus. Usage increased steadily from 2022 to 2024, resulting in a significant reduction in carbon emissions. Assuming a reduction of 0.196 kg CO2e per ride, the cumulative carbon savings from 2022 to 2024 reached 348,454 kg CO2e.

### A Globally Local Approach to Kinmen's Local Revitalization and Youth Entrepreneurship Empowerment

The NTNU University Social Responsibility (USR) program, designed to rebuild social resilience and promote local development, guides students through a theoretical and practical learning process centered on *"global localism."* This approach enhances cultural governance in Kinmen by systematically conducting interviews and research to compile traditional stories from the island's elders. The program also organizes workshops, field trips, and lectures to disseminate and preserve these narratives. Additionally, in collaboration with the Kinmen Museum of History and Folklore, the program supports a multilingual exhibition project in the museum's main building, completing the planning and recording of multilingual audio guides to ensure the transmission of Kinmen's unique culture across generations.

### Contributions to Long-Term Intangible Cultural Heritage

The Graduate Institute of Ethnomusicology at NTNU has long focused on the study of Indigenous music, musical iconography, and music documentaries. Through audio and video recordings as well as scholarly publications on traditional music and folk

songs, the institute has undertaken significant efforts to safeguard Indigenous music, language, and cultural heritage. In the process, it has also rediscovered numerous ancient folk songs that are rarely performed today, providing a crucial contribution to the preservation of intangible cultural heritage.



▲ Fig.11.2 NTNU collaborates with the Yami people to revitalize the nearly lost intangible cultural heritage of the "Clapping Song Festival."

## Open Campus Green Spaces

Beyond the school buildings and sports fields, the remainder of the campus is designed as green space and is freely accessible to the public. The Puzi Building, Wenhui Hall, the Auditorium, and the Administration Building are designated Taipei City Historic Sites, reflecting their significant historical value. The former residence of Liang Shiqiu, another site of great historical significance, is also open to the public and offers guided tours.



▲ Fig.11.3 The University provides open campus spaces, where local community members gather every morning for recreational and social activities.

## The "University Path" Cycling Initiative: Developing a High-Quality, Sustainable University Town

Initiated by NTNU, the "*University Path*" cycling commuting initiative was launched in observance of World Cycling Day. This collaborative effort brings together faculty and students from National Taiwan University, National Taiwan University of Science and Technology, and NTNU, promoting low-carbon, resilient, and sustainable transportation while integrating local cultural characteristics to create a safe, comfortable, and economically sustainable university town.

The initiative features three distinctive cycling routes—along the riverbank, through bustling commercial areas, and near historical sites—providing diverse low-carbon commuting options for nearly 100,000 students and faculty traveling between campuses. This project effectively reduces pollution from public transportation and private vehicles while promoting the health and fitness of participants.

In addition to enhancing local quality of life and stimulating community economic development, the project, supported by industry, government, academia, and local neighborhoods, has improved sidewalks and traffic safety infrastructure. This cross-sector collaboration exemplifies low-carbon living and transportation resilience, demonstrating NTNU's commitment to building a safe, comfortable, and economically sustainable university town. The initiative is expected to expand to include additional neighboring schools in the future.

### UNIVERSITY PATH RIVERSIDE CYCLING DECLARATION

1 Faculty and students of the National Taiwan University System commit to using low-carbon, resilient transportation for commuting, contributing to a more sustainable urban environment.

2 Leverage the university town commuting environment to inspire knowledge creation that addresses local needs.

3 Enhance the quality of life in the university town through interdisciplinary knowledge collaboration and production.

4 Engage with stakeholders to implement the university's social responsibility and community practice.

5 Utilize experiences from university town transportation to enrich perspectives on the development of urban transportation resilience.



▲ Fig.11.4 Faculty and students from the three universities within the National Taiwan University System participated in a joint riverside cycling event.

# SDG 12

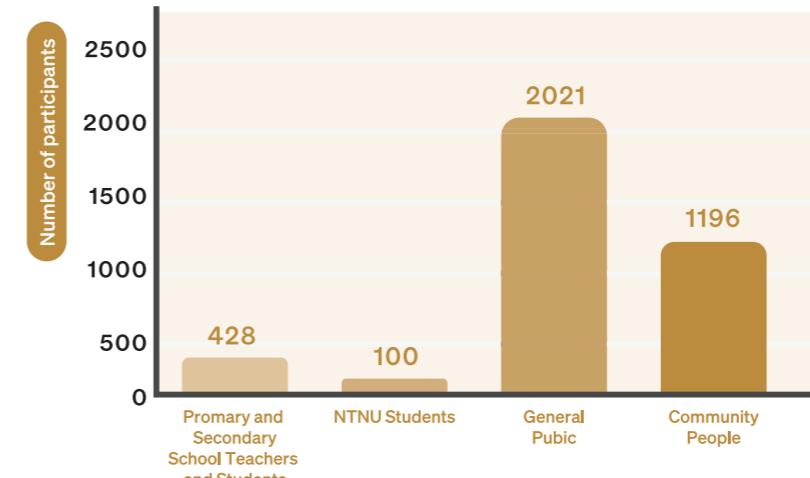
## Responsible Consumption and Production

The university is committed to promoting plastic reduction policies and fostering a sustainable consumption environment. Since 2021, NTNU has actively advanced campus-wide plastic reduction initiatives, supported by the Plastic Reduction Promotion Center, which leads education and outreach on sustainable, low-plastic living. In addition to planning instructional activities, the Center also organizes events such as the Gold Plastic Award, continually expanding the impact of plastic reduction education each year.



- In 2024, the Plastic Reduction Center served more than 3,000 people, continuing to expand its social impact

### 2024 Number of participants in NTNU Plastic Reduction Center



▲ Fig.12.1 Number of participants served through NTNU's Plastic Reduction Center courses, workshops, and outreach activities in 2024

### Implementing Campus Action: Establishing Plastic Reduction Guidelines and Advancing Plastic Reduction Education

The university has established a series of measures and policies to reduce the use of single-use items, including: banning convenience stores and campus restaurants from providing disposable chopsticks and spoons free of charge since 2016; prohibiting the use of plastic straws on campus since 2019; introducing the *"NTNU Campus Plastic Reduction Regulations"* in 2021 to encourage administrative units to reduce their use of plastic and disposable products; and requiring meetings and events to minimize the use of disposable tableware and bottled water starting in 2022. Beginning in 2025, the university will no longer provide any disposable plastic tableware free of charge.

NTNU also established the *"Plastic Reduction Promotion Center,"* which advocates for plastic reduction through social media and podcasts, and collaborates with local communities and organizations to host various outreach activities such as plastic-free markets, street cleanups, beach cleanups, and workshops. The Center has also developed multiple sustainability-themed board games and teaching materials, which are promoted through teacher training programs to expand the reach of sustainable



▲ Fig.12.2 Participants visiting a waste incineration plant with the Plastic Reduction Center

▲ Fig.12.3 The Plastic Reduction Center promotes education through sustainability-themed board games

## Professor Hsieh Chen-Chieh of the Institute of Electro-Optical Science and Engineering has developed an AI textile sorting system capable of processing up to 740 metric tons of textiles per year

The NTNU electro-optical research team has implemented a Ministry of Economic Affairs project and developed an “**Intelligent Textile Material Sorting System**,” which integrates near-infrared rapid remote sensing with AI learning algorithms. The system assists textile recycling businesses in accurately classifying materials, which are then sent to downstream processors for appropriate recycling and reuse. Capable of processing up to 740 metric tons of textiles annually, the system helps industry address the “last mile” challenge in establishing a circular economy for textiles.

Advances in textile technology have resulted in clothing predominantly made from high-performance, cost-effective synthetic materials, fueling the global “**fast fashion**” trend. While modern textile technologies make garments affordable and high-quality, they have also led to significantly reduced average usage rates—many items are discarded even before their packaging is removed. This generates massive waste. Polyester (PET, Polyethylene Terephthalate), the same material used in plastic bottles, is one of the primary materials in fast fashion. As a petrochemical product, its manufacturing process consumes excessive water resources and produces large amounts of carbon emissions. Therefore, textile and plastic recycling has become an urgent issue.

The “Intelligent Sorting for Sustainable Textiles” system uses AI-driven learning algorithms and big data accumulation to continuously improve identification accuracy—

achieving a rate of over 95%. As waste textiles and used clothing move along the conveyor belt, the optoelectronic sensing modules analyze blended compositions through qualitative and quantitative detection. Beyond polyester, the system can identify the proportions of multiple common textile fibers, recognizing various material types and their purity. Items are then directed by air valves into corresponding sorting bins, after which they are sent to downstream recyclers using appropriate remanufacturing methods. This resolves key bottlenecks in sustainable textile circulation and optimizes material and energy flows for other recycling processes as well.

This research aims to address the sorting needs that currently hinder the development of a sustainable textile circular economy, enabling waste textiles and plastics to regain value and contributing to the early establishment of a sustainable economic system.



▲ Fig.12.4 Operation of the “Intelligent Sorting for Sustainable Textiles” system

## Warm Sun Sustainability Festival Market promotes sustainable consumption through packaging-free sales

The NTNU Student Association and NTNU Sustainability Pioneers co-hosted the second Warm Sun Sustainability Festival, inviting 70 vendors to promote diverse social issues and sustainability concepts. All 70 market vendors adhered to sustainability principles: food vendors sold products without packaging, requiring visitors to bring their own containers or rent reusable ones on-site.

The festival team also invited representative social organizations focused on key issues—such as animal protection, plastic reduction, and LGBTQ+ equality—to participate in the market and promote their causes. Through interactive installations, mini-games, and other engaging activities, the event enabled participants to deepen their understanding of sustainability and social advocacy while enjoying the market experience.

## The “Gold Plastic Award” received 214 creative submissions, promoting plastic reduction and sustainable consumption concepts

In November 2024, NTNU’s Plastic Reduction and Sustainable Consumption Promotion Center held the 7th “**Gold Plastic Award**,” actively responding to the United Nations’ “**Global Plastics Treaty**” initiative launched in 2022. A total of 214 creative submissions were collected from across Taiwan and abroad, covering four categories: board games, LINE stickers, sustainability actions, and picture books, all aiming to promote plastic reduction and sustainable consumption concepts.

The event incorporated innovative formats such as a board game design exhibition, teacher professional development workshops, and a sustainability showcase area. It also practiced environmental responsibility by using eco-friendly materials such as “**Hsiuan-Ying Fabric**” and partnering with catering vendors who support reusable dishware systems. The award ceremony featured invited speakers, including You Hsin-Ying from Renou Plastic-Free and Chen Peng-Hung from Dear International, who offered innovative perspectives on sustainable consumption. Through their insights, the event sought to provide diverse professional viewpoints to guide discussions on sustainability issues and deepen participants’ learning across multiple dimensions.



▲ Fig.12.5 The Warm Sun Sustainability Festival embodies sustainable principles by selling products in a packaging-free manner



▲ Fig.12.6 Award ceremony of the 7th Gold Plastic Award — Exhibition of publications by the Plastic Reduction Center

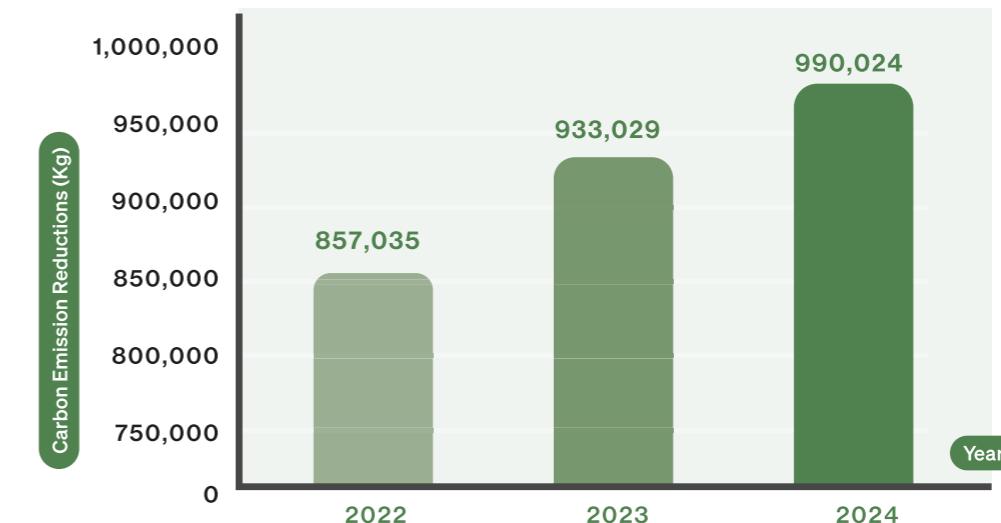
# SDG 13

## Climate Action

NTNU actively addresses the challenges of climate change through its Net-Zero Emissions Policy Declaration, promoting low-carbon policies and encouraging behavioral change across campus. The university also enhances students' and faculty members' understanding of the importance of resilience under extreme weather conditions through its curriculum and diverse educational activities, thereby strengthening both mitigation and adaptation capacities. Furthermore, NTNU encourages participation in relevant initiatives and projects at the local, national, and international levels, demonstrating a strong commitment to advancing Sustainable Development Goals through integrated education and practical engagement.

- The university conducted a greenhouse gas inventory in accordance with the international standard ISO 14064-1:2018, obtained a third-party verification statement, and publicly disclosed the results

### Estimated Carbon Emission Reductions of Virtual Hosting Platform Systems (2022–2024)



	physical host	(Virtual Hosting) VM	平臺實體主機 每年用電度數	虛擬機換成實體主機 (1換1)每年用電度數估算	Reduce Carbon Footprint
2022	29	435	120,269	1,804,032	857,035
2023	29	471	120,269	1,953,331	933,029
2024	32	501	132,710	2,077,747	990,024

▲ Fig.13.1 The NTNU virtual hosting platform employs VMware vSphere virtualization technology and currently operates 501 virtual hosts. Since each virtual machine would otherwise require a dedicated physical server, the estimated annual electricity consumption and associated carbon emission reductions from 2022 to 2024 are summarized in the table above.

### Greenhouse Gas Inventory

In 2018, NTNU conducted its first greenhouse gas (GHG) inventory at the Gongguan campus in accordance with ISO 14064-1:2006, obtained third-party verification, and laid the foundation for campus carbon management. In 2024, following the updated ISO 14064-1:2018 standard, NTNU completed the 2023 GHG inventory for all campuses—including Heping, Gongguan, and Linkou—and received verification from DNV AG. The 2023 inventory results serve as the baseline year, with emissions to be tracked annually thereafter.

The 2024 inventory covers emissions from Categories 1 through 5, as defined in ISO 14064-1:2018. According to the results, total campus emissions in 2024 amounted to 33,450.503 tCO<sub>2</sub>e, with Category II and Category IV as the main sources, contributing 15,920.162 tCO<sub>2</sub>e (47.62%) and 14,212.007 tCO<sub>2</sub>e (42.49%), respectively. This indicates that energy consumption on campus and procurement of products and services are the primary contributors to the university's carbon footprint. Compared to the baseline year (2023), total emissions in 2024 decreased by 0.81%. The reduction was mainly attributable to Category 4.1: Purchased Products and Services and Category 5.2: Energy

Use of Downstream Leased Assets. Categories 1 and 2 showed slight increases, primarily due to higher annual electricity consumption.

Going forward, NTNU will continue to implement energy-saving and low-carbon measures, promote efficient energy management and the use of renewable energy, and progressively work toward achieving net-zero emissions on campus, based on scientific GHG inventory and monitoring.

	Category Definitions	Emissions (tCO2e)	Percentage
Category I	Direct GHG Emissions	1,173.548	3.51%
Category II	Energy-related Indirect Emissions	15,932.162	47.62%
Category III	Indirect GHG Emissions from Transportation	44.941	0.13%
Category IV	Indirect GHG Emissions from Products Used by the Organization	14,214.007	42.49%
Category V	Indirect GHG Emissions from the Use of Products Generated by the Organization	2,090.845	6.25%
Total Campus Emissions		33,455.503	

energy and carbon reduction. Pei-Te Sustainable will join the National Science Council at the Consumer Electronics Show (CES) to showcase the world's first AI-enabled textile recycling bin, with its flagship model incorporating an AI chatbot to enhance the consumer ESG recycling experience and support Taiwan's ambition to become a global leader in AI-driven ESG innovation.



▲ Fig.13.2 Pei-Te Sustainable received the First Prize in the Ecological Sustainability Category of the IMV Technology Innovation Award for Enterprises, presented by the ESG Technology Innovation Promotion Alliance

## Sustainable Circular Economy Technology Wins Top Innovation Award

Pei-Te Sustainable Technology Co., Ltd., an NTNU spin-off company, applies core technologies developed by Professor Chen-Chieh Hsieh of the Department of Optoelectronic Engineering. By employing optoelectronic AIoT-based sorting technology, the company has addressed a critical global bottleneck in textile circularity. This innovation enables fast and highly accurate identification and sorting of various textile materials, effectively surpassing the limitations of manual inspection.

In 2024, Pei-Te Sustainable received the First Prize in the Eco-Sustainability Category of the IMV Technological Innovation Award, presented by the ESG Technology Innovation Promotion Alliance. The technology's core contribution lies in advancing Sustainable Materials Management (SMM) through Information and Communication Technology (ICT), establishing an essential foundation for resource management and cost accounting in the upcoming carbon-fee era. It also allows high-value processing equipment within the circular ecosystem to implement feedstock management and maintain carbon-footprint records.

Established by WPG Holdings—the world's largest semiconductor distributor—the IMV Technological Innovation Award promotes innovations in eco-sustainability and

## Cross-Domain Actions at the Student Sunshine Sustainability Festival

In 2024, NTNU student clubs organized a three-week Sunshine Sustainability Festival, featuring a market event with 70 participating vendors to promote diverse social issues and sustainability concepts. Multiple sustainability-focused organizations were invited to share their insights and practical experiences, covering themes such as media, environmental protection, animal welfare, child and youth education, and mental health.

Participating organizations included Aiwuyou Biodegradable Packaging, the Reusable Cup Sharing Platform, United Daily News Advocates, the Tasteme Zero-Waste Sharing Platform, the Taiwan Animal Society Research Association, Micro Light Box, the Sunshine Association, and the Overblue Association for Supporting Individuals with Depression. On-campus contributors included the Office of Social Practice, the Center for Sustainable Development, and the Center for Plastic Reduction and Sustainable Consumption.



▲ Fig.13.3 The market featured sustainable food vendors and a reusable tableware rental service

The event encouraged students to explore sustainability from multiple perspectives and broaden opportunities for hands-on engagement. It highlighted the importance of interdisciplinary collaboration and sustainable partnerships as essential pathways for collectively responding to global sustainability challenges and fostering a more inclusive and resilient society.

## Integrating Educational Expertise to Advance Green-Collar Talent Development

NTNU's Institute of Sustainable Management and Environmental Education integrates the objectives of environmental education and sustainable management to cultivate professionals with core sustainability competencies. In 2023, NTNU established the Institute of Green Energy Technology and Sustainable Governance to advance green energy development and resource sustainability. Through industry-academia collaboration, the university works with enterprises to build an interdisciplinary green energy application platform, develop high-level green energy talent, and strengthen mechanisms for participation in green electricity, thereby supporting national priorities in the circular economy.

In partnership with the Ministry of Environment, NTNU established the Northern Region Training Center for Net-Zero Green-Collar Talent to enhance national capacity in areas such as carbon management and greenhouse gas (GHG) inventory methodologies. Under the theme "GHG Inventory in Higher Education Institutions," NTNU convened nine member universities of the Taiwan Sustainable Governance University Alliance to review campus carbon management strategies and explore frameworks for inter-university collaboration and university social responsibility.

To strengthen institutional GHG governance, NTNU completed GHG inventories across all three campuses and provided students with free access to the full inventory process. Through direct participation and case-based learning, students gained hands-on experience and a deeper understanding of GHG accounting procedures and standards.

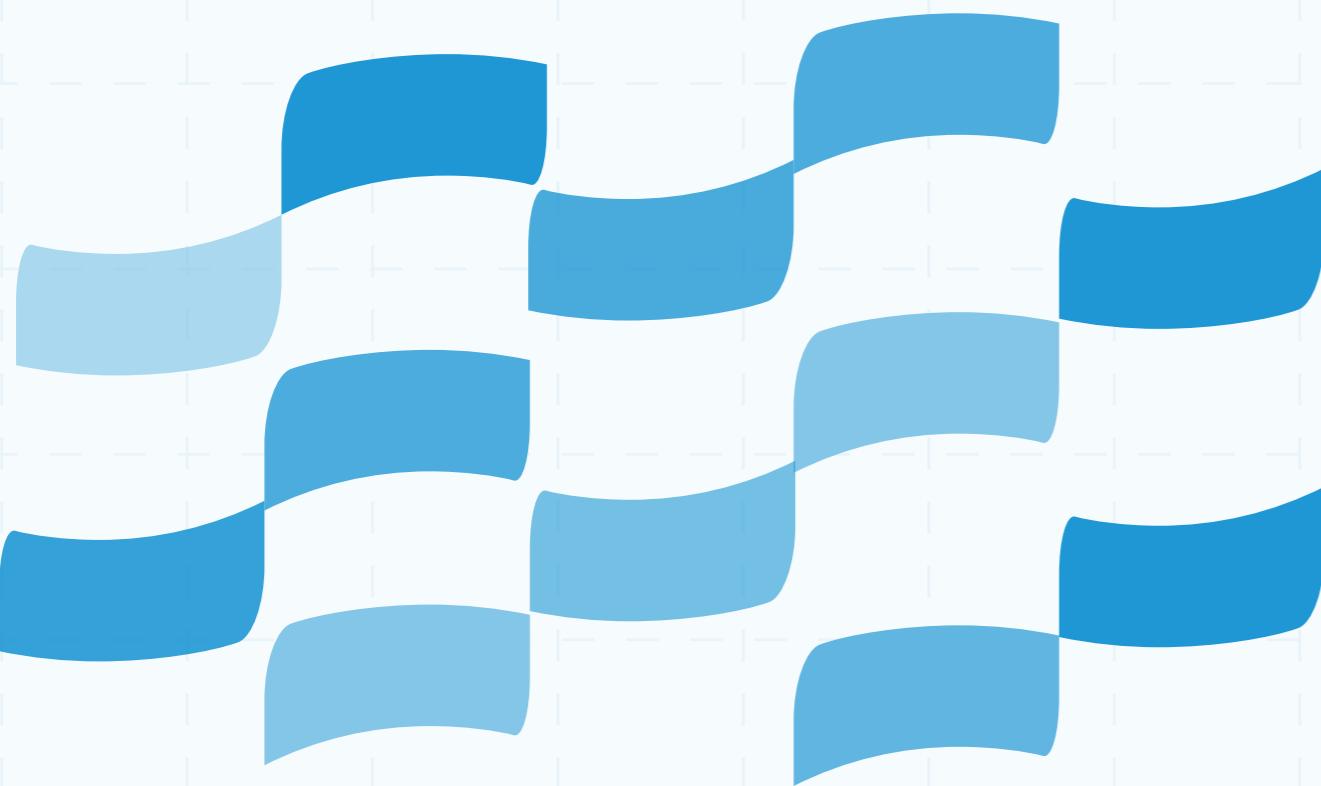


▲ Fig.13.4 NTNU hosted the "Greenhouse Gas Inventory in Higher Education Institutions" workshop under the Taiwan Sustainable Governance University Alliance.

# SDG 14

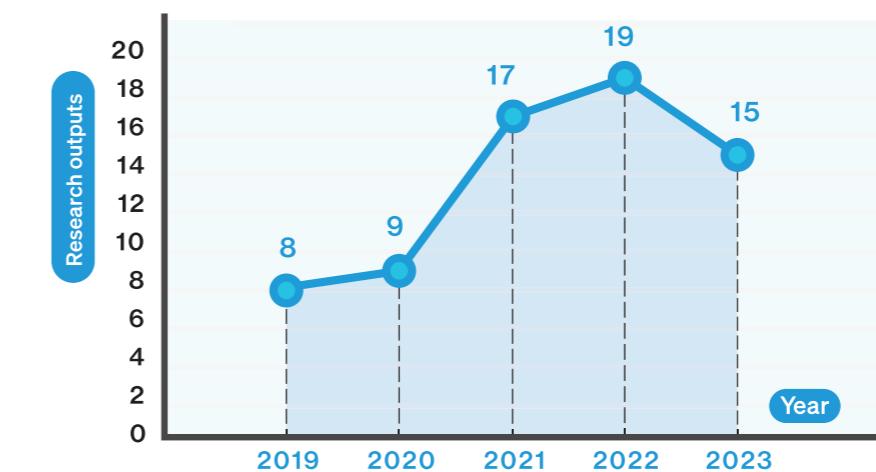
## Life Below Water

The university continues to advance marine education and foundational research, encouraging students to participate in the development of educational programs and to design innovative teaching plans that enhance the depth of marine education. At the same time, the university strengthens basic research by engaging in large-scale research teams and establishing data collection platforms to expand academic contributions in the marine field. Over the past five years, the university has consistently published research in this area, achieving double-digit output in recent years and steadily deepening its research impact in marine studies.



- In Academic Year 2023–2024, the university offered 105 courses related to Life Below Water

### Number of SDG14 Research Publications

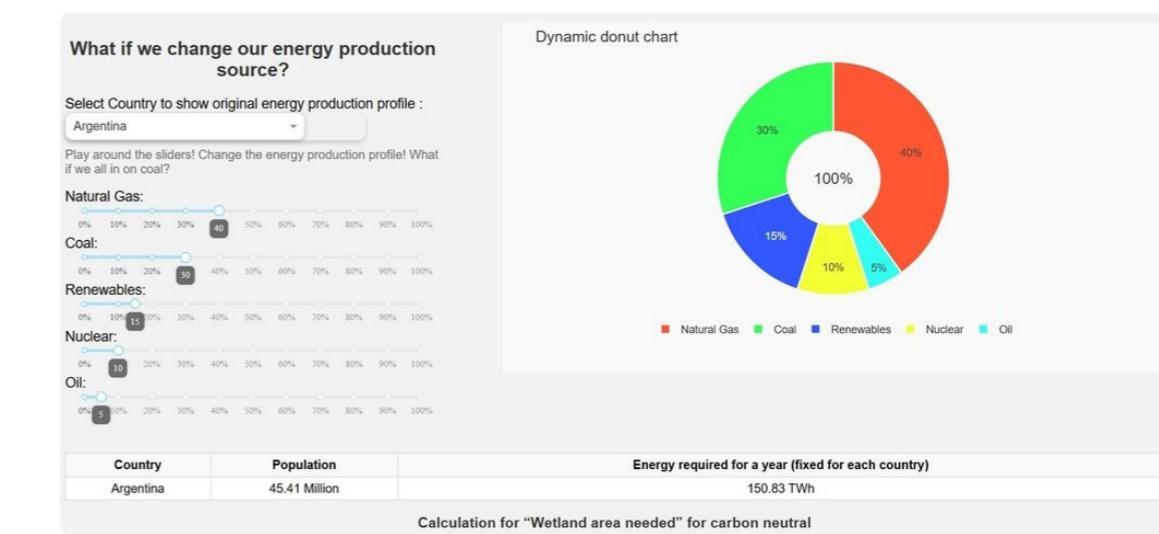


▲ Fig.14.1 Over the past five years, the university's research output has steadily increased, reaching 17 publications in 2021, and has continued to maintain double-digit output

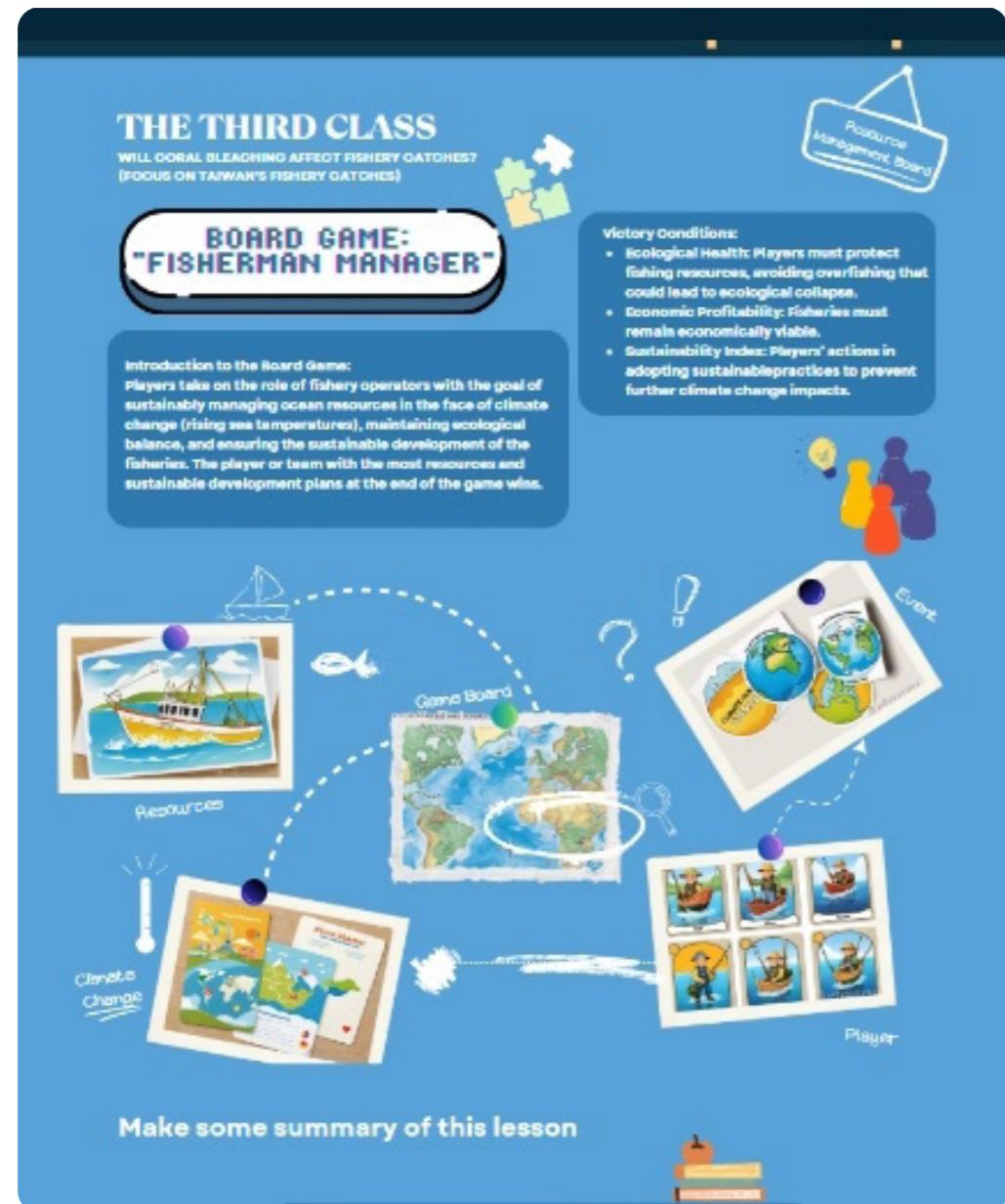
### Advancing Sustainability Education: Students Achieve Double Medals in International Competitions Through Educational Research and Practice

The university continues to advance sustainability education by developing and implementing innovative educational programs. Under the guidance of Professor Meng-Wan Yeh from the Department of Earth Sciences, two student teams designed education projects centered on climate change and ecological environments, earning a gold medal and a silver medal at the **NASA Space Apps Challenge** (hereafter “**NASA Hackathon**”).

The gold-medal team created an online platform titled “**Wetland Formula & CO<sub>2</sub> Earth**”, which visualizes the carbon-sequestration capacity of wetlands. The silver-medal team developed an “**SDG Marine Education Kit**” aimed at enhancing high school students’ understanding of climate change and marine ecosystems.



▲ Fig.14.2 Screenshot of the “Wetland Formula & CO<sub>2</sub> Earth” web platform



▲ Fig.14.3 The “SDG Marine Education Kit” guides students to learn how to balance human needs with sustainable development through data analysis, role-playing, and interactive game activities

The university implements the Ministry of Education’s “**Project for Supporting Sustainability-Integrated Curriculum Development in Elementary and Junior High Schools**.” Through guidance in school-based curriculum development, the project integrates local life, production, and ecological contexts into instructional applications. By incorporating regional marine resource issues, students examine changes and causes in local fisheries and reflect on the relationship between the ocean and the community, thereby providing knowledge, innovation, and solutions that support local sustainable development.

The Graduate Institute of Sustainability Management and Environmental Education has long encouraged and supported students in forming the self-directed ECO Team, which conducts routine maintenance and management of the university’s artificial wetland on the Gongguan Campus—such as removing invasive species and carrying out ecological

surveys. Since its establishment in 2018, the ECO Team has continued its work each semester, collaborating with teachers from secondary schools in the Greater Taipei area—including Xihu Experimental Middle School, Zhishan Junior High School, and Jingxing Junior High School—to lead high-concern students in environmental education activities at the artificial wetland.

### The Department of Life Science Collaborates with Multiple Schools to Collect Marine Data and Advance Climate Research

Professor Chi-Chung Chen of the Department of Life Science leads the Northwestern Pacific Ocean Blue Carbon Integrated Research Project under the “*Navigating the Blue Ocean Master Plan*.” The research team conducted a 24-day expedition aboard the Taiwan-built research vessel *New Ocean Researcher I*, covering 25,000 nautical miles to investigate various oceanographic physical parameters and atmospheric conditions.

Meanwhile, the research team led by Associate Professor Lin-Hu Shen of the College of Life Science conducts global investigations and analyses of marine plastic pollution. Their findings show that 80% of marine plastic pollution originates from rivers, with Asia contributing the largest share. The study emphasizes that efforts to reduce plastic waste should focus on improving waste management and recycling systems, as well as encouraging the development of alternative materials to replace single-use plastics—otherwise, plastics may return to humans through the food chain.



▲ Fig.14.4 Group photo of the *New Ocean Researcher I* research team



## The 15th Wetland Symposium Hosted by the University Highlights Wetlands, Human Well- Being, and Climate Change

The university, in collaboration with the Taiwan Wetland Society, hosted the 15th Taiwan Wetland Ecosystem Symposium, centered on the themes “**Wetlands and Human Well-Being**” and “**Wetlands and Global Change: Mitigation and Adaptation**.” Scholars and civil society organizations with extensive experience in wetland research and monitoring were invited to share their findings and conservation practices. The symposium brought together more than 200 scholars, experts, and graduate students.

A total of 56 wetland research papers were presented, covering topics such as wetlands and climate change, international perspectives on wetlands, wetland scientific assessment and management, wetland biodiversity, ecosystem services and **Nature-based Solutions (NbS)**, wetland socioeconomics and culture, wetland communication and education, and wetlands and national policies. The symposium contributed to a comprehensive advancement of wetland conservation, restoration, and education efforts, addressing global climate change and extreme weather while underscoring the value and importance of wetlands.



▲ Fig.14.5 The 15th Taiwan Wetland Ecosystem Symposium



## Professor Deng-Chiu Lin Leads the Establishment of a Long-Term Socio-Ecological Core Observation Platform to Build a Foundational Data Collection System

Since 2021, Professor Deng-Chiu Lin of the Department of Life Science has served as the principal coordinator of the National Science and Technology Council's project "Long-Term Socio-Ecological Core Observation Platform Research" through 2024. This project differs from traditional ecological monitoring initiatives by emphasizing not only long-term research and observation, but also the integration of ecological and social systems. Its aim is to address the impacts of global change on socio-ecological systems and to promote a new model for long-term socio-ecological research networks.

Using the concept of core infrastructure, the project establishes long-term research stations in representative socio-ecological systems across different regions. These stations build foundational facilities and monitoring systems. At the Changhua and Green Island stations, in addition to long-term monitoring of marine and intertidal environments, the project conducts interviews within local communities to collect perspectives from various stakeholders on environmental, economic, and social issues.



▲ Fig.14.7 Long-Term Socio-Ecological Core Observation Platform

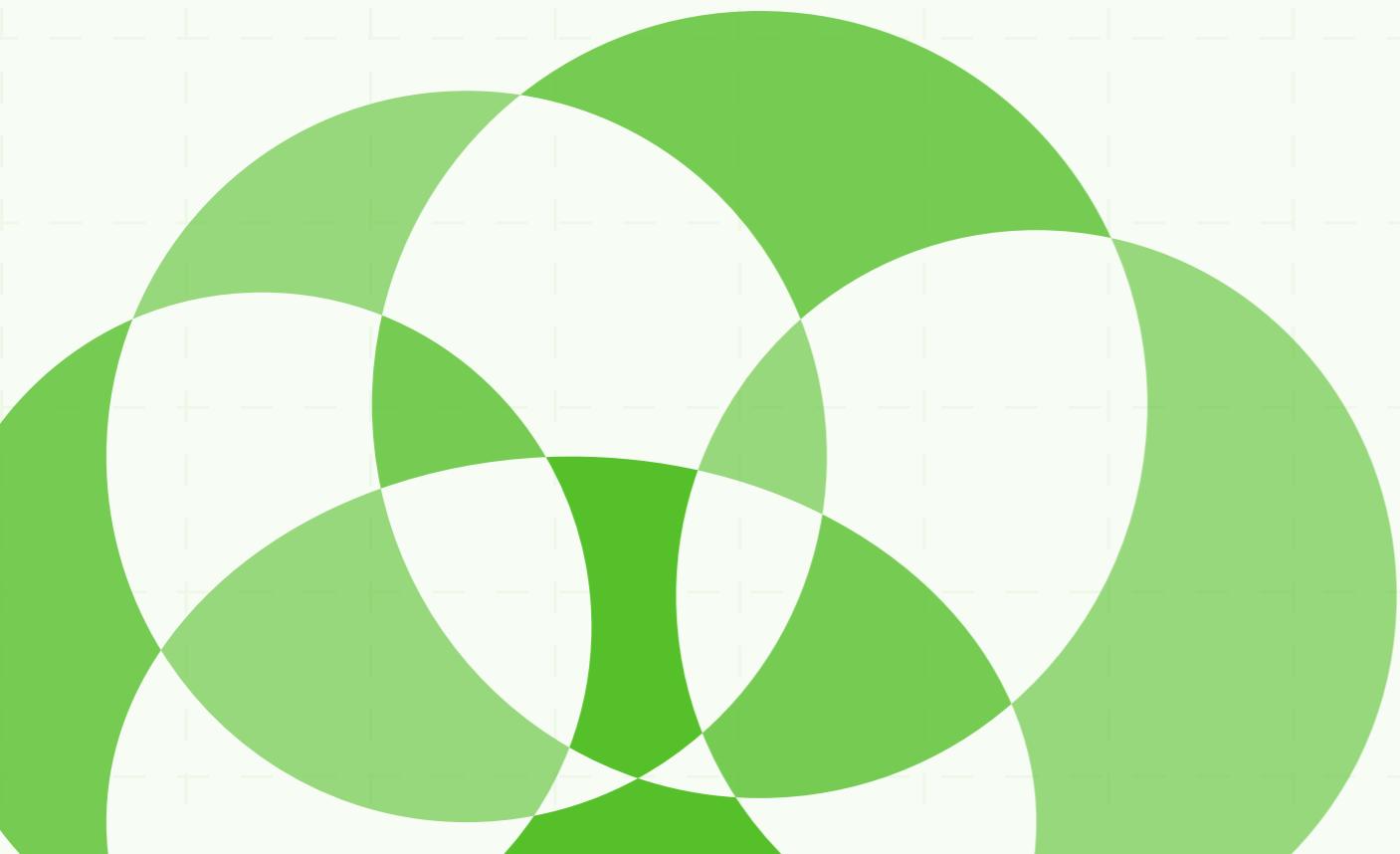


▲ Fig.14.6 The Six Long-Term Socio-Ecological Core Observation Platforms

# SDG 15

## Life on Land

The university is committed to fundamental research on ecological environments, including surveys and monitoring of rare and endangered protected species, and it leads students on visits to satoyama (village-mountain) environments. Through education, monitoring, and research, the university aims to maintain the integrity of ecosystem services. In recent years, the university has consistently produced double-digit research publications in this field, continuously advancing conservation research and sustainable management of terrestrial ecosystems.



### Number of SDG15 research publications



▲Fig.15.1 Research outputs in this field have remained in the double digits over the past five years, surpassing 20 publications after 2022

### The university's transnational research on the endangered Eurasian otters in Kinmen has revealed that the population possesses distinct and unique characteristics

Professor Shou-Hsien Li from the Department of Life Science participated in an international research team and discovered that the endangered Eurasian otters found in Kinmen represent one of the three genetically distinct populations across the Eurasian continent. Among these three populations, one is located in northern Eurasia, while the other two are in southern East Asia—specifically South China and Kinmen. These populations are differentiated both genetically and geographically and therefore should be treated as separate conservation management units.



▲Fig.15.2 Otter Confronting a Wild Bird (Photo credit: Kinmen County Government)

Although the Kinmen population occupies a relatively small distribution range, its level of genetic diversity is comparable to that of the other two populations, showing no signs of genetic bottlenecking or inbreeding depression typically associated with small populations. Given its unique genetic characteristics, introducing individuals from other populations to increase population size would not be appropriate. The findings of this study were published in the international journal *Evolutionary Applications*, and the research will serve as an important scientific basis for advancing the conservation of Eurasian otters in Kinmen.



## Wild Wetlands documentary preserves Taiwan's precious wetland imagery and has received international awards and recognition

The documentary *Wild Wetlands* was produced in 2023 with funding from the National Science and Technology Council and created by Director Fang Wei-Ta, Director of the Graduate Institute of Sustainability Management and Environmental Education at NTNU. Director Feng Chen-Long spent ten years filming wetland ecosystems, documenting stories of interactions between humans and wildlife across Taiwan's expansive wetlands—from high mountains to the ocean.

The English promotional trailer was screened at the 2023 Society of Wetland Scientists (SWS) Annual Meeting in the United States and at the 2023 SWS Asia Chapter Meeting in Korea. Narrated by BBC journalist Richard O'Connor, the film received the Best of Best Award, jointly presented by the Ramsar Regional Center—East Asia and the Society of Wetland Scientists Asia Chapter, marking a significant international recognition.



▲Fig.15.3 The ecological documentary *Wild Wetlands*, produced by NTNU with support from the National Science and Technology Council, received the "Best of Best Award" from international wetland organizations. Director Feng Chen-Long (left) accepted the award on behalf of the production team

## 野性濕地-台灣

聯合國永續發展目標  
台灣濕地生態系



## 野性濕地-台灣

聯合國永續發展目標  
台灣濕地生態系



▲Fig.15.4 & 15.5 The documentary *Wild Wetlands* features footage of many precious protected species in Taiwan (the image above shows a yellow-throated marten, and the image below shows a monk crab).



## The Magnificent Earth: Nature's Gift presents the beauty of ecology through art

As part of the 2024 Society of Wetland Scientists (SWS) Annual Meeting in Taipei, the exhibition The Magnificent Earth: Nature's Gift — A Joint Exhibition by Huang Su-Mei and Yuan Chin-Ta opened in November on the third floor of the NTNU Art Museum. The exhibition invites visitors to closely observe the rare and exotic birds depicted by Huang Su-Mei (1939–2021) and to experience the ecological concerns embodied in the conceptual installations of Professor Emeritus Yuan Chin-Ta from NTNU's Department of Fine Arts, revealing the deep connections these artists share with the land.

Through exquisite ink paintings and mixed-media artworks, the exhibition allows audiences to appreciate the beauty of the environment while gaining a deeper understanding of the key roles played by ecosystems.



▲Fig.15.6 The Magnificent Earth: Nature's Gift — Joint Exhibition by Huang Su-Mei and Yuan Chin-Ta



▲Fig.15.7 Family Affection, ink painting, 175 × 90 cm, 2012



## Watershed Restoration — Students visit satoyama environments to engage in sustainability education through hands-on learning in natural settings

In November, NTNU's Office of International Affairs and the CDIB Education and Cultural Foundation organized the “*Exploring Watershed Guardianship Journey*”—a place-based international exchange activity—held in Pinglin District, New Taipei City. Guided by the local brand Taiwan Blue Magpie Tea, the event attracted 30 NTNU students. Centered on the theme of “**watershed restoration**,” the activity promoted pesticide-free tea farming practices and encouraged farmers within the catchment area to transform into satoyama guardians.

Beyond deepening both local and international students' understanding of Taiwan's conservation efforts and place-based revitalization, the program also supported local revitalization teams in advancing environmentally symbiotic support systems. The initiative reflects NTNU's commitment to environmental action and to the practice of sustainability education.



▲Fig.15.8 Students experiencing tea picking

# SDG 16

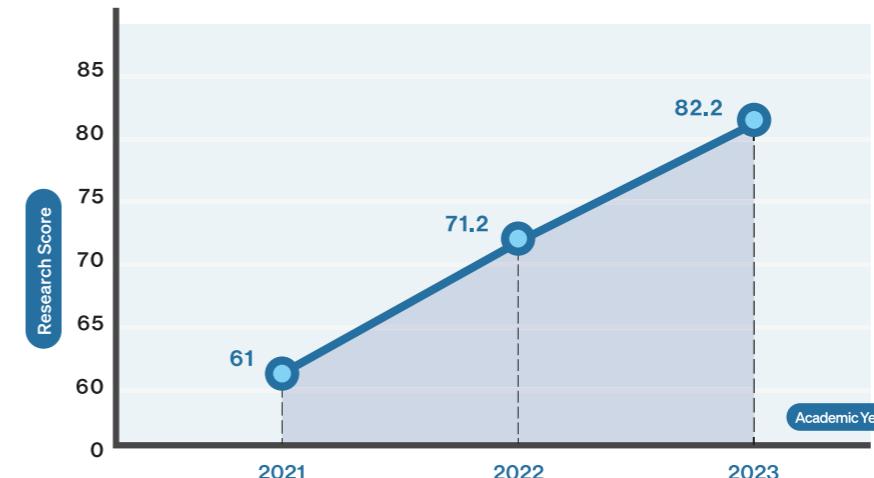
## Peace, Justice and Strong Institutions

In stakeholder engagement, NTNU actively collaborates with domestic and international alumni associations, strengthens alumni networks, and develops diverse participation platforms to incorporate stakeholder perspectives into institutional development. In student initiatives, NTNU supports student self-governance, encourages youth involvement in public affairs, and nurtures democratic literacy and social responsibility.

- In Academic Year 2023-2024, a total of 449 courses related to peace, justice, and strong institutions were offered.
- Over the past five years, NTNU has produced 66 Scopus-indexed publications



### Historical scores in THE Impact Rankings – Research dimension



▲ Fig.16.1 “Research” is one of the four core pillars in THE Impact Rankings. It evaluates a university’s academic output and impact in relation to a specific SDG, including indicators such as publication volume, research influence, international collaboration, and SDG relevance. From 2023 to 2025, the university’s research score for SDG 16 has continued to rise, demonstrating its growing academic contribution to peace, justice, and strong institutions.



### Strengthening Global Alumni Networks to Enhance Institutional Connectivity and International Impact

NTNU, now in its 102nd year, has cultivated a global alumni community of more than 180,000 graduates and over 30 alumni associations worldwide. NTNU continues to build strong relationships with its alumni through diverse outreach efforts. In 2024, NTNU hosted the first-ever NTNU North America Alumni Summit in Los Angeles, gathering representatives from eight North American alumni organizations and more than 200 alumni and their families. The summit focused on topics such as **“Challenges in Higher Education”** and **“University Sustainability Development”**, marking an important milestone in overseas alumni engagement.

To further strengthen alumni ties, NTNU established the President’s Alumni Fellowship and the Osaka Alumni Fellowship, providing alumni with platforms for networking and staying informed about university developments. As a leading institution in teacher education, NTNU has trained countless secondary school teachers and education administrators who play a critical

role in Taiwan’s education system. In 2024, approximately 40% of secondary school principals nationwide and six directors or commissioners of education bureaus were NTNU alumni, reflecting NTNU substantial influence on educational leadership across the country.

NTNU also hosts Taiwan’s largest Mandarin learning center, attracting over 8,000 learners from more than 80 countries each year, contributing to a rapidly growing international alumni network. In 2024, NTNU organized its first International Alumni Reunion, inviting alumni from more than 30 countries to return to campus to share career insights, providing graduates with employment guidance and expanding their career aspirations. NTNU values the collective momentum of its alumni and looks forward to expanding its global network, strengthening international engagement, and channeling alumni support toward advancing NTNU long-term sustainability goals.



▲ Fig.16.2 & 16.3 & 16.4  
NTNU North America Alumni Summit,  
President's Alumni Fellowship and  
Osaka Alumni Fellowship in 2024

## Establishing Multi-Stakeholder Engagement Platforms to Strengthen Institutional Governance

NTNU has established a comprehensive system of multi-stakeholder engagement platforms to promote transparent communication and gather feedback from students, faculty, staff, alumni, parents, and the general public. Through meetings, forums, events, and publications, the university collects diverse perspectives and integrates them into institutional planning and governance. Engagement efforts encompass four major areas:

<b>University Governance Meetings</b>	Regular university-wide governance meetings involve representatives from administrative and academic units as well as student delegates. These meetings address major institutional decisions and policy directions, and all meeting minutes are publicly disclosed for stakeholder reference.
<b>Institutional Development Consultation</b>	Through self-assessment, institutional evaluation, departmental reviews, and research center evaluations, NTNU invites external experts, alumni, and industry representatives to provide recommendations on development strategies and resource allocation.
<b>Student Participation Mechanisms</b>	In addition to representation in university governance meetings, student association leaders participate in student affairs meetings and related committees to voice student needs and concerns. University administrators also hold regular dialogue sessions with student representatives to gather feedback on academic programs, student life, and campus facilities.
<b>Alumni and Community Engagement</b>	Through the NTNU Alumni Association, curriculum committees, departmental organizations, and regional alumni chapters, the university actively incorporates alumni perspectives into curriculum and institutional development. NTNU also engages parents and community stakeholders through alumni reunions, "Legacy" mentorship activities, new student parent forums, and community dialogues, strengthening two-way communication and building shared commitment to institutional advancement.

## Supporting Student Self-Governance to Foster Democratic Values and Social Awareness

The highest autonomous organization of students is the National Taiwan Normal University Student Union, which has established the National Taiwan Normal University Student Union Constitution. Its mission is to cultivate students' capacity for self-governance, foster democratic values, and advocate for student rights.

The Student Union carries out a wide range of activities related to governance engagement, student support, and social issue advocacy. Since 2016, it has organized the annual Humanities Film Festival, which uses films and post-screening discussions to help participants engage with social



issues through an accessible and relatable format. The 2024 edition, the ninth in the series, was themed “*Intertidal Zone*”—a dynamic space between land and sea characterized by uncertainty yet abundant life. This theme symbolized the festival’s vision of embracing diverse perspectives and creating a space for open dialogue. Through each film, audiences are encouraged to reflect on life’s fluctuations and challenges, find comfort, and consider new pathways for the future, expanding their capacity for critical thinking and social engagement.



▲ Fig.16.5 In 2024, the Student Union hosted the “*Intertidal Zone*” Humanistic Film Festival

# SDG 17

## Partnerships for the Goals

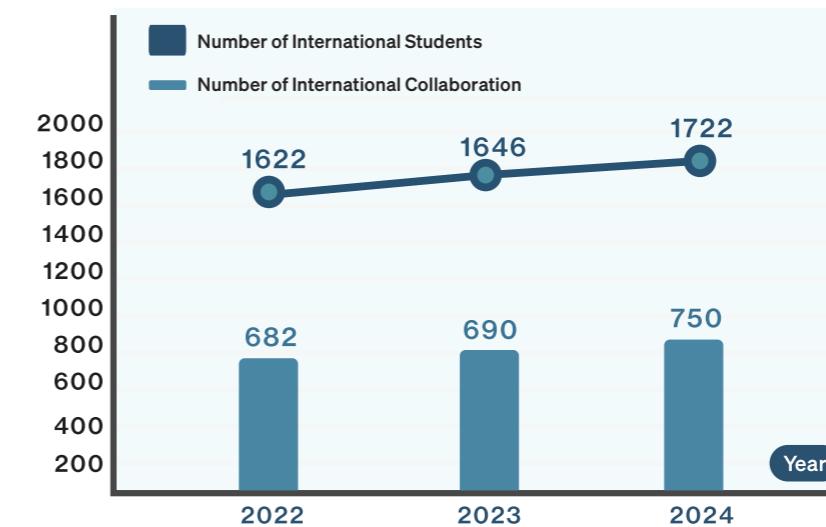
NTNU actively cultivates diverse partnerships with government agencies, leading global universities, and international academic networks to strengthen its professional influence in education and expand global connections. Domestically, the University undertakes multiple initiatives commissioned by the Ministry of Education and local governments—ranging from student affairs and teacher education to gerontology education and adaptive physical education—providing policy recommendations and driving institutional innovation. NTNU also plays a key national role in EMI teacher training and collaborates with institutions such as the University of Texas at Austin and Columbia University to enhance bilingual teacher education programs in Taiwan. At the same time, NTNU actively promotes interdisciplinary and international academic exchange, engaging in joint discussions on sustainability, culture, and education. By continually deepening its diverse collaboration networks, the University strengthens its global connections and enhances its impact on sustainable development.



- 750 international collaborations and 1,722 international students in 2024



### Number of International Collaboration Projects and International Students at NTNU



▲Fig.17.1 NTNU continues to strengthen international partnerships and advance SDG 17 through global collaboration and international student engagement, with steady growth in both international cooperation projects and international student enrollment



### Leveraging Educational Expertise to Strengthen Collaborative Networks for Sustainable Education

NTNU draws on its strengths in education to maintain close, long-term collaboration with government agencies and to actively participate in the development of educational policies and systems. The Office of Student Affairs serves as the convener of both the Ministry of Education's "Northern Region Coordination Center for Student Affairs" and the "**Student Counseling Coordination and Advisory Center**," coordinating communication among 45 higher education institutions in northern Taiwan. Through these efforts, NTNU supports the advancement of student affairs and counseling policies, promoting youth development and mental well-being.

In teacher education, NTNU advances university social responsibility (USR) through programs that integrate gifted education resources and mentoring mechanisms for beginning teachers in partnership with the New Taipei City and Keelung City Governments. The University also undertakes projects commissioned by the Ministry of Education and local governments, including in-service bilingual education programs designed to strengthen schools' bilingual curriculum implementation and align with national policy needs.

Amid the challenges of an aging society, the Higher Education Sprout Project Office and the Office of Educational Think Tank at NTNU published the Policy Recommendations for Middle-Aged and Older Adult Education in 2024. The document offers recommendations on four core competencies and integrated learning resources for middle-aged and older learners, supporting the government in building a forward-looking lifelong learning system. Additionally, NTNU collaborates with National Taichung University of Education, National Kaohsiung Normal University, and National Taiwan Sport University to jointly implement the Ministry of Education's 2024 "Adaptive Physical Education Promotion Master Plan." As the lead institution, NTNU produced the Policy Recommendations

for Sustainable Development in Adaptive Physical Education, outlining the challenges and future directions of current policies and providing concrete action strategies for promoting sports equity and supporting learners with special needs.

Through its substantive involvement and policy contributions in student affairs, teacher education, aging education, and adaptive physical education, NTNU actively fulfills its social responsibilities and strengthens its public impact, demonstrating the role and commitment of higher education institutions as key partners in sustainable governance.



▲Fig.17.2 Group photo from the press conference for the release of the Policy Recommendations for Middle-Aged and Older Adult Education



▲Fig.17.3 Group photo from the Joint Achievement Presentation of the Adaptive Physical Education Promotion Master Plan

## Partnering with Leading Global Universities to Build a Bilingual Education Collaboration Network

Since 2021, NTNU has been designated annually by the Ministry of Education as a key institution under the “Bilingual Education for Students in Colleges” initiative. In 2022, the University established the EMI Teaching Resources Center, assuming the national responsibility of EMI teacher training. To date, hundreds of instructors have completed professional courses and obtained certification through the Center, laying a solid foundation for the advancement of bilingual education in Taiwan.

Building on this foundation, NTNU has further expanded its international collaborations to connect EMI teacher training with global academic networks. In 2024, the University partnered with the University of Texas at Austin to develop an overseas summer training program, selecting 20 higher education faculty members nationwide to participate in curriculum design workshops and teaching practicums in the United States, followed by continued expert mentoring upon their return. This initiative not only strengthened cultural and academic exchange but also infused new momentum into Taiwan's bilingual higher education development. NTNU also collaborated with Teachers College, Columbia University to launch Taiwan's only EMI professional development program grounded in teaching practice research. Through synchronous and asynchronous online instruction, on-site mentoring, and fieldwork, the program provides comprehensive learning experiences that enhance teachers' practical EMI teaching capabilities.

In addition to curriculum partnerships, NTNU hosted the international conference “**Collaborative Construction of Knowledge through EMI**” in October 2024, bringing together 21 scholars from Austria, Belgium, Hong Kong, the Netherlands, Spain, Sweden, and the United Kingdom, along with participants from 28 countries. The conference featured presentations on EMI teaching research and roundtable discussions exploring interdisciplinary collaboration, its challenges, and its pedagogical applications. This event not only strengthened NTNU's engagement with global partners but also showcased Taiwan's bilingual education initiatives on the international stage.

From national policy implementation to international academic collaboration, NTNU demonstrates both governance leadership and global connectivity. Through the sustained development of EMI initiatives and international partnerships, the University actively advances SDG 17, promoting bilingual education in Taiwan while contributing to and sharing innovative educational outcomes with the world.

▲Fig.17.4 Signing ceremony for the NTNU-UT Austin collaboration on the EMI Overseas Training Program

▲Fig.17.5 Group photo from the "Collaborative Construction of Knowledge Through EMI" conference

▲Fig.17.6 NTNU faculty and students visiting UNESCO-APCEIU, where staff introduced the center's regional initiatives in global citizenship education

▲Fig.17.7 NTNU faculty and students presenting their research in Norway, advancing international exchange and engagement with environmental issues



## Advancing International Exchange and Interdisciplinary Dialogue to Promote Sustainable Development

NTNU continues to deepen international academic exchange and interdisciplinary dialogue on sustainability, collaborating with universities around the world to support global sustainable development. For example, faculty and students from NTNU's Department of Design participated in the **"Fukuoka Cultural Sustainability Design Workshop"** at the School of Design, Kyushu University, where students explored concepts of circular design and applied design thinking to real-world challenges, strengthening their understanding of cultural sustainability. Assistant Professor Chen-Wei Chang from the Department of Education led 27 students to Seoul National University for academic and cultural exchange, engaging in discussions on multicultural education and visiting organizations such as Good Neighbors International and UNESCO-APCEIU to learn about efforts to reduce educational inequality and support disadvantaged children.

Professors Hannes Berghaller and Yi-Ping Liang from the Department of English also

led nine students to the University of Stavanger in Norway to attend the international conference **"Storytelling for Environmental Futures."** Scholars from around the world examined human–nature relationships through perspectives in literature, media, religion, history, philosophy, and the arts, while NTNU students presented papers on topics such as Formosan black bear conservation, feral cat eradication in Australia, and ecological disasters in Saint Vincent.

Through diverse international academic exchanges and field visits, NTNU students and faculty deepen their understanding of global sustainability issues, gain practical experience through interactions with international partners, and strengthen their cross-cultural communication and interdisciplinary collaboration skills. These experiences enhance the University's engagement and contributions to global sustainable development and further support long-term knowledge exchange and international partnership building.