SDG7: Affordable and Clean Energy

SDG 7.2.1 Energy-efficient renovation and building

Have a policy in place for ensuring all renovations or new builds are following energy efficiency standards

1. Energy-efficient building

NTOU complies with the Public Construction Commission's sustainable construction and carbon-reduction policy. In December 2021, one green building was completed, and one green building is under construction.

New projects need to obtain green building marks. The design concept not only considers the safety, diversity, and integrity of teachers, students, and the community but also integrates the viewpoints of sustainable development, environmental maintenance, and community service to guide the faculty and students.

Evidence:

(1) Administrative Directions of Applying for Approval of Green Building Label.
https://glrs.moi.gov.tw/EngLawContent.aspx?lan=E&id=600

(2) Green buildings:

(3) Green buildings under construction:

候選智慧建築證書

建築物名稱：國立臺灣海洋大學電資暨綜合教學大樓新建工程

建築物概要：地上 9 層，地下 1 層，鋼筋混凝土構造，休閒文教類建築

有效期限：自 107 年 11 月 28 日至 112 年 11 月 27 日

評估版本：2016 年版

智慧建築等級：合格級

內政部 部長

中華民國 107 年 11 月 28 日

候選綠建築證書

建築物名稱：國立臺灣海洋大學進修教育推廣大樓新建工程

建築物概要：地下 1 層，地上 7 層鋼筋混凝土構造住宿、學校及其他類建築

有效期限：自 108 年 11 月 14 日至 113 年 11 月 13 日

評估版本：住宿類（2015 年版）

綠建築等級：合格級

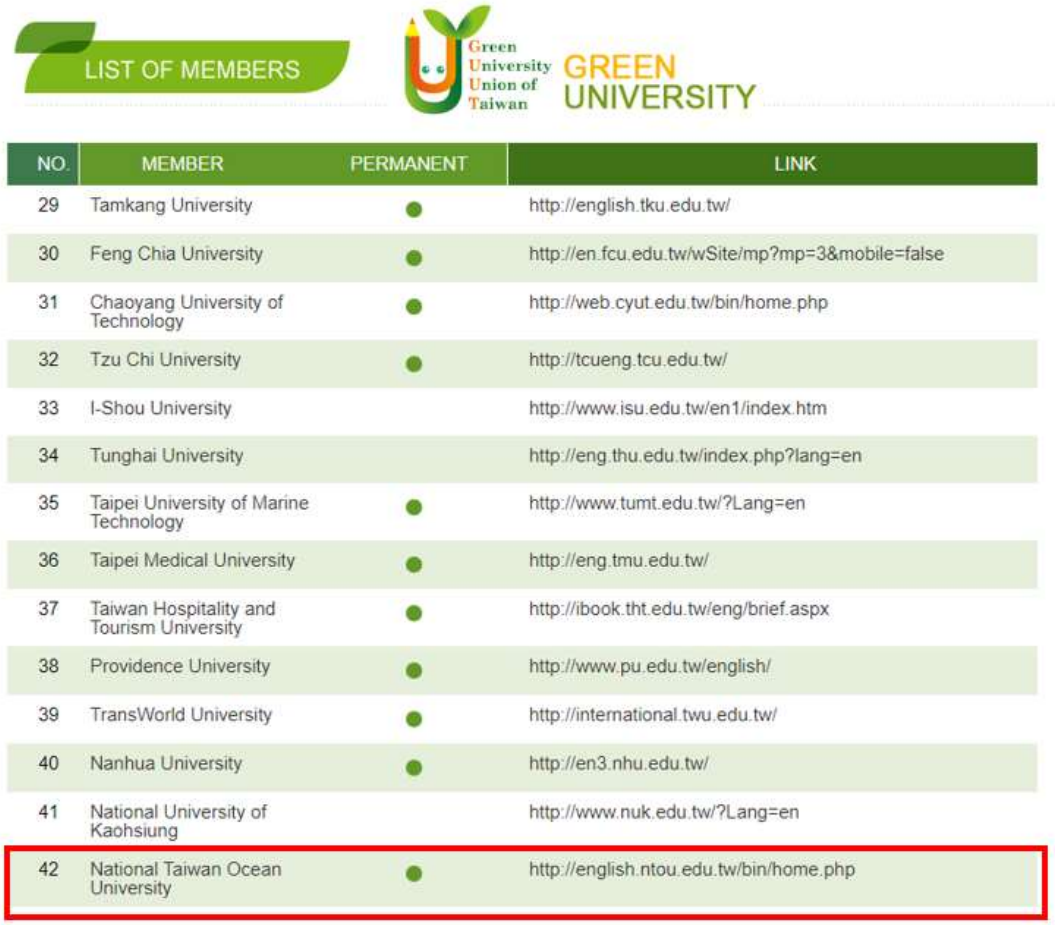
內政部 部長

中華民國 108 年 11 月 14 日

(3) Join the Green University Union of Taiwan (GUUT)

Green University Union of Taiwan (GUUT) is a non-profit organization. The goal of the GUUT is to enhance the university's sustainable development in Taiwan. Development resources for promoting Green University can be strived jointly through encouraging cooperation and building partnerships between universities. Further, NTOU will fulfill the social responsibility of the university.

Evidence: http://www.guut.org.tw/en_about_people.php?page=3



LIST OF MEMBERS

Green University Union of Taiwan GREEN UNIVERSITY

NO.	MEMBER	PERMANENT	LINK
29	Tamkang University	●	http://english.tku.edu.tw/
30	Feng Chia University	●	http://en.fcu.edu.tw/wSite/mp?mp=3&mobile=false
31	Chaoyang University of Technology	●	http://web.cyut.edu.tw/bin/home.php
32	Tzu Chi University	●	http://tcueng.tcu.edu.tw/
33	I-Shou University		http://www.isu.edu.tw/en1/index.htm
34	Tunghai University		http://eng.thu.edu.tw/index.php?lang=en
35	Taipei University of Marine Technology	●	http://www.tumt.edu.tw/?Lang=en
36	Taipei Medical University	●	http://eng.tmu.edu.tw/
37	Taiwan Hospitality and Tourism University	●	http://ibook.tht.edu.tw/eng/brief.aspx
38	Providence University	●	http://www.pu.edu.tw/english/
39	TransWorld University	●	http://international.twu.edu.tw/
40	Nanhua University	●	http://en3.nhu.edu.tw/
41	National University of Kaohsiung		http://www.nuk.edu.tw/?Lang=en
42	National Taiwan Ocean University	●	http://english.ntou.edu.tw/bin/home.php

2. Energy-efficient renovation

(1) NTOU cherishes water resources and water conservation significant deeds:

a. Rainwater Park (rainwater recycling system) in the college of engineering district: installed in 1997 and expanded in 2015.

b Rainwater recycling system in the Male 1st Dormitory: installed in 1998.

c. Raft-based rainwater recycling system in the gymnasium: installed in 2015. The storage capacity of the recycling system could reach 10,250 metric tons. The recycled water is used in the lavatory, gymnasium, and activity center.

d. Completed the installation of the rainwater recycling system in the college of engineering in 2018.

(2) The main achievements of NTOU in water conservation

N0	Installation location	Water storage capacity (ton)	Water saving efficiency
1	Rainwater Utilization Park (rainwater recycling system)	Total 121 tons. a. 16 tons combined storage tank: 1 set. b. 24 tons underground combined storage tank: 2 sets. c. 6 tons FRP underground tank: 2 sets. d. 15 tons storage tank: 2 sets. e. 2 tons storage tank: 6 sets. f. 1 ton storage tank: 3 sets	Reduction in tap water use. Over 5,000 tons/year
2	Male 1st Dormitory: rainwater recycling system	Total 35 tons. a. 10 tons PE rainwater storage tank: 1 set b. 5 tons PE rainwater primary/secondary tank: 2 sets c. 2 tons PE rainwater distribution tank: 2 sets d. 10 tons PE rainwater primary/secondary tank: 1 set	Reduction in tap water use. Over 1,700 tons/year
3	Gymnasium	a. Gymnasium raft base: 10,250 m^3 b. 2 tons storage drums = 7 sets	Reduction in tap water use. Over 2,500 tons/year
4	Activity center	Total 4 tons. a. 2 tons PE rainwater distribution tank: 2 sets	Reduction in tap water use. Over 1,000 tons/year
5	college of engineering district: 4 buildings reuse rainwater for flushing toilets	Total 86 tons. a. 2 tons PE rainwater distribution tank: 16 sets b. 54 tons underground combined storage tank: 1 set	Reduction in tap water use. Over 9,660 tons/year
Total water saving benefits			19,860 tons/year

Evidence: NTOU Rainwater Park

http://ind.ntou.edu.tw/~linuf/

SDG 7.2.2 Upgrade buildings to higher energy efficiency

Have plans to upgrade existing buildings to higher energy efficiency

According to the Smart Green Building Promotion Plan of the Ministry of the Interior of the Republic of China, the total construction cost of new public buildings is over NT$200 million, and the application for qualified smart buildings is required.

Evidence: Smart Green Building Promotion Plan
https://reurl.cc/xQY8e4

SDG 7.2.3 Carbon reduction and emission reduction process

Have a process for carbon management and reducing carbon dioxide emissions

NTOU sets the annual energy conservation measures for water, electricity, paper, and fuel consumption to reduce CO2 emissions. These measures are regularly reviewed and approved by the Administrative Meeting each year and implemented accordingly.

1. Total electricity savings reach 830,900 kilowatts from 2015-2021.
2. Total fuel savings reach 984.19 liters from 2015-2021.
3. The percentage of the electronic meeting will reach 60.76% in 2021, saving 70,468 sheets of paper.
4. Our EUI benchmark value is "98" (annual usage/floor area), and our EUI value is "94.2" in 2021.
5. From January to December 2021, NTOU reduced our electricity consumption by 1,705,600 units (-8.22%) compared to 2020. The electricity consumption decreased by NT$4,721,790 compared to 2020. The water consumption reduces by 19,146 units (-3.61%). The water charges decreased by NT$242,533 compared to 2020.

SDG 7.2.4 Plan to reduce energy consumption

Have an energy efficiency plan in place to reduce overall energy consumption

1. Energy Conservation Working Group Meeting

In recent years, the government has been promoting energy conservation, and the "Energy Conservation Action Plan for Government Agencies and Schools (2016-2019)" has been used to manage energy usage regularly. The Executive Yuan has been promoting the "Electricity Efficiency Management Plan for Government Agencies and Schools (2020-2023)" since 2020. The overall goal is to increase the efficiency of electricity consumption by 10% in 2023 compared to 2015. To cooperate with the Executive Yuan in implementing the plan, the university holds regular meetings to set annual energy-saving targets and measures, reviewing and improving them yearly.

Evidence:

(1)Energy Conservation Project for Governmental and Educational Institutions

https://www.moeaboe.gov.tw/ECW/english/content/Content.aspx?menu_id=8685

(2) General affairs meeting minutes:

https://ga.ntou.edu.tw/p/412-1015-7124.php?Lang=zh-tw

https://ga.ntou.edu.tw/var/file/15/1015/img/1041/769204873.pdf

(3) Energy Conservation Measures

https://photos.app.goo.gl/YdkFEdrdezxhBUF46

SDG 7.2.5 Energy wastage identification

Undergo energy reviews to identify areas where energy waste is the highest

1. Track energy usage

NTOU is tracking and analyzing the energy usage of the school every month. If any abnormal data appears, we pay attention to that and immediately control energy usage.

2. Inventory the most power-consuming equipment on campus and develop solutions to reduce energy waste.

(1) Implement measures to control electricity use by high energy-consuming equipment to reduce waste.

(2) Recording the consumption data of various energy sources monthly. By comparing and analyzing those data to the previous one, we can notice which unit does not comply with annual energy conservation measures. The units are going to pay attention to electricity consumption.

Evidence:

(1) Electricity, water and oil consumption in 2021 was show negative growth compared to 2020.

110年度	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月	小計	
用電度	1,648,400	1,428,000	1,081,800	1,568,200	1,525,400	1,811,000	1,587,600	1,669,200	1,650,000	1,745,400	1,761,400	1,557,400	19,033,800	
電費	4,233,952	3,653,368	2,872,304	4,068,026	3,972,281	4,497,632	5,117,995	5,418,216	5,391,521	5,680,958	4,455,766	4,039,777	53,401,796	綠電平均 2.81
用水度	45,804	54,873	59,420	42,955	48,099	46,240	54,579	52,781	37,411	35,829	47,443	45,867	511,368	
水費	591,843	765,807	830,327	555,037	620,133	596,712	449,080	426,343	484,933	464,899	611,817	593,880	6,608,762	綠電平均 12.92
用油量	333.45	60.00	228.33	85.00	80.00	52.57	126.30	60.00	90.00	200.24	168.71	148.87	1,633.47	
油費	7,551	1,491	5,913	2,246	2,305	1,504	3,272	1,597	2,495	5,358	4,883	3,891	42,306	綠電平均 25.90

109年度	1月	2月	3月	4月	5月	6月	7月	8月	9月	10月	11月	12月	小計
用電度	1,605,200	1,291,000	1,173,400	1,597,000	1,481,800	2,043,800	2,250,400	2,009,600	1,895,400	1,949,200	1,752,600	1,690,000	20,739,400
電費	4,002,735	3,259,258	3,139,037	4,082,576	3,842,889	4,957,238	7,190,595	6,503,834	6,008,726	6,371,267	4,393,242	4,280,191	58,123,586
用水度	41,675	38,255	39,221	42,355	42,950	47,629	48,315	43,249	44,421	39,971	50,562	51,911	530,514
水費	538,852	495,586	507,811	547,451	554,979	614,169	622,849	558,763	573,930	517,294	651,273	668,338	6,851,295
用油量	212.55	59.46	198.86	208.47	138.98	167.25	140.00	166.02	258.00	163.71	159.49	90.00	1,962.79
油費	5,807	1,534	3,829	4,958	2,377	3,530	3,243	3,593	5,307	3,353	3,280	2,100	40831

110年度用電與109年度相較	用電度：	-1,705,600	成長率：	-8.22%
	用電費：	-4,721,790	成長率：	-8.12%
110年度用水與109年度相較	用水度：	-19,146	成長率：	-3.61%
	用水費：	-242,533	成長率：	-3.54%
110年度用油與109年度相較	用油量	-329.32	成長率：	-16.78%
	用油費	1,475	成長率：	3.61%

(2) Water, electricity and oil information of NTOU

https://ga.ntou.edu.tw/p/405-1015-45072,c7341.php?Lang=zh-tw

SDG 7.2.6 Divestment policy

Have a policy on divesting investments from carbon-intensive energy industries, notably coal and oil.

1. Get rid of investment policies (especially coal and oil)

NTOU has refrained from investing in coal- and oil-related industries. Should such investment opportunities arise, we will advise against investment according to the sustainable development indicators.

2. Investment Exchange Traded Fund

To implement the energetic spirit of a" Sustainable environment" in the "University's Social Responsibility" program, consider profitability and safety. Our university has authorized the investment management team's index equity funds (ETFs) to invest within predetermined limitations in periodic batches since May 2021. The "Yuanta FTSE4Good TIP Taiwan ESG ETF" constituent stocks are chosen from listed stores for sustainable management. This university is now investing approximately 30% of the investment fund by purchasing the fund that tracks the Taiwan sustainability index of ETF. It is meant to invest indirectly in high social responsibility or environmental sustainability. A sustainable firm might consider the university's social commitment in addition to improving investment income for the university.

Evidence: NTOU stock investment situation

項目	股票名稱	股票股數	110持有成本	扣除當年度清算股利	110/12/30止成本(1)	平均單位成本(2)	110年12月30日股價	目前市價(3)	未實現餘絀(3)-(1)	預估損益(%)
	本校投資									
1	0050元大台灣50E	46,688	6,399,358	6,200	6,393,158	136.93	145.5	6,793,104.0	399,946	6.26%
2	0056高股息ETF	191,736	6,399,829	258,266	6,141,563	32.03	33.58	6,438,495.0	296,932	4.83%
3	00850元大臺灣永	186,062	6,399,046	171,460	6,227,586	33.47	35.91	6,681,486.0	453,900	7.29%
4	00679B元大美債2	25,173	1,039,729	6,274	1,033,455	41.05	41.22	1,037,631.0	4,176	0.40%
5	00635U期元大S&F	43,024	1,039,765		1,039,765	24.17	23.85	1,026,121.0	-13,644	-1.31%
	投資股票小計	492,683	21,277,727	442,200	20,835,527			21,976,837	1,141,310	5.48%
18	3702大聯大	179,960	1,799,600		1,799,600	10.00	52.60	9,465,896.0	7,666,296	
	捐贈股票小計	179,960	1,799,600		1,799,600			9,465,896	7,666,296	
	合計	672,643	23,077,327		22,635,127			31,442,733	8,807,606	

SDG 7.4.1 Local community outreach for energy efficiency

Provide programs for the local community to learn about the importance of energy efficiency and clean energy.

1. Inform and support governments in clean energy and energy-efficient technology policy development.

In recent years, renewable energy has become the mainstream global energy industry, and hydroelectric power is one of the renewable energy sources.

Taiwan Power Company commissioned the Geographic Information System Research Center of National Taiwan Ocean University to develop an integrated information platform for hydrological and hydraulic analysis and hydropower investigation. To comprehensively evaluate the hydropower reserves of a river basin, Taiwan Power Company established a complete set of analysis tools embedded in a GIS spatial operation platform. To provide Taiwan Power Company with a time-saving and accurate way to carry out development planning and maintenance management of hydropower.

Evidence:

(1) Hydrological and Hydraulic Reservoir Analysis System Framework

(2) Integrated information platform for hydrological and hydraulic reservoir analysis

http://www.gis.ntou.edu.tw/RR10901.html

2. Green Energy Technology - Let's Make Thermoelectric Generator Camp

It was held by NTOU on the Matsu campus. It provided various courses for students and teachers in Mazu, such as DIY activities, science activities, and knowledge of sustainable development. There were 50 participants to join this camp.

Evidence: Activity Introduction

https://www.matsu-news.gov.tw/2010web/news_detail_101.php?CMD=open&UID=237545

SDG 7.4.2 100% renewable energy pledge

Promote a public pledge toward 100% renewable energy beyond the university

1. Set up The Center of Excellence for Ocean Engineering (CEOE)

The Center of Excellence for Ocean Engineering (CEOE) is established to resolve two fundamental ocean problems concerning the "development of key technology for the offshore wind farm and ocean energy" and "river and coastal disaster prevention" in the world. In the field of offshore wind and ocean energy, the following six topics are focused on:

(1) The 3D coupled NTOU further improved the Atmosphere-Ocean Model (3D-AtOM) to enhance the coupled predictability of wind waves, storm surges, ocean currents, and coastal topographical changes.

(2) Based on the newly measured data and 3D-AtOM-based numerical results of the offshore wind farm near Changhua, Taiwan, the extreme distributions of significant wave height and wave period are analyzed using various revolutionary value distribution functions such as Gumbel and Log-Pearson Type 3.

(3) Feasibility for combined offshore wind and wave energy systems is discussed based on the various arrangements, sheltering effect, and energy generation capacity;

(4) Pile souring, soil response, and liquefaction in the offshore wind farm near Changhua, Taiwan, are investigated by experiments and numerical simulations. In addition, a new technique of anti-corrosion protection for offshore wind turbines is proposed for on-site tests;

(5) An integrated multi-trophic aquaculture system in the offshore wind farm near Changhua, Taiwan, is built to improve the economic performance of offshore wind turbines, the income of fishermen, and the utilization of coastal area;

(6) Ocean power devices are developed for complete scale tests. Two generations of current turbines and three different ocean wave converters are designed for the actual test at the test site nearby NTOU.

Evidence:

(1) About CEOE http://ceoe.ntou.edu.tw/eng/a_page.aspx?MID=43

(2) Research Results for Offshore Wind Power and Ocean Energy in 2021
http://ceoe.ntou.edu.tw/eng/a_page.aspx?MID=2078

2. Support the national green energy policy with forward-looking technology and cultivate cross-disciplinary talents.

The government actively promotes green energy policies. Offshore wind power is a critical development project in Taiwan and involves several professional knowledge and technologies. The demand for talent continues to heat up. NTOU provides marine professional education regarding

teachers, environment, software, and hardware equipment. It is the most complete and will continue to provide research results and practical experience as the most effective support for formulating relevant national policies and cultivating cross-disciplinary marine technology talents to promote the green energy technology industry.

Evidence: Promote renewable energy
https://mprp.ntou.edu.tw/p/404-1017-67433.php?Lang=zh-tw
https://www.youtube.com/watch?v=8d4cBM8yRQo

3. Summary of Key Technology on Offshore Wind Farm

Two novel thermal spray coating processes are developed in the research on anti-corrosion protection for offshore wind turbine foundations. The main goal is to reduce the corrosion rate of offshore wind turbine foundations. Moreover, the eigenfrequency of the failure mode of the plenary gearbox is obtained by monitoring the vibration behavior of the transmission system in wind turbines. Furthermore, NTOU applied comb optimization and deep learning theory in Taiwan's offshore wind farm to the ant colony system (ACS) algorithm to evaluate the shortest path of electric cables in the No. 29 wind farm. Besides, the wind farm layout optimization reduces the attenuation of wind speed and generates higher power. A high-resolution CCD camera system is used to catch the white dolphin trajectory at the hotspots. Engineering and ecological restoration are proposed to reduce the impacts of coastal engineering on white dolphins.Evidence:

Evidence: Research results
(1) http://ceoe.ntou.edu.tw/a_page.aspx?MID=7084
(2) http://ceoe.ntou.edu.tw/eng/a_page.aspx?MID=2074

4. 2021 Taiwan science festival.

In this case, we have AR interactive items demonstrating ocean and offshore wind energy. The green energy house shows our local solar energy technology. The intelligent elevator energy recycling device teaches visitors how to recycle energy from energy-efficient buildings. Joined with the Taiwan science festival, this base opened on November 6st. We invited our undergraduate students to serve as tour guides from Nov. 6st to Nov. 14th, 2021. People can interact with all our exhibitions and discuss our focus on green energy and environmental issues. The accumulated number of visitors has passed one hundred thousand people.

Evidence: Activity Introduction
https://www.chinatimes.com/realtimenews/20211026003347-260405?chdtv

SDG 7.4.3 Energy efficiency services for industry

Provide direct services to local industry aimed at improving energy efficiency and clean energy (energy efficiency assessments, workshops, research renewable energy options)

1. Build key technology on offshore wind energy to upgrade and promote the marine industry

Set up a long-term and integrated plan to develop novel offshore technologies (e.g., anti-corrosion protection for the turbine foundation, monitoring the vibration behavior of transmission system, combing optimization, and deep learning theory for wind farm layout) and build a local supply chain.

Evidence: Seminar Information

(1) http://ceoe.ntou.edu.tw/a_page.aspx?MID=7084

(2) http://ceoe.ntou.edu.tw/eng/a_page.aspx?MID=2078

2. The Conference of key technologies for offshore wind power (V)

In order to achieve the government's policy of planning an offshore wind farm site capacity of 5.5GW by 2025, the government has vigorously promoted offshore wind power in recent years. The construction of Taiwan's first offshore wind power plant started in May of 2019 and completed in October of the same year. In view of the current and future development of offshore wind farms, the Association held a series of seminars on key technologies for offshore wind power. The topics of this seminar are mainly on related technologies of floating offshore wind turbines, including current needs of the industry, key technologies for the future development, technologies of floating offshore wind turbines, scale test results, and the technique for forecasting the sea weather conditions. Those who are interested in offshore wind power can participate and be trained so Taiwan's offshore wind power industry can be enhanced and promoted to a state of sustainable development.

Evidence: Research results

(1) https://www.beclass.com/rid=2446295605bdf7487df6

(2) https://www.youtube.com/watch?v=iI1keIBMQBA

3. The conference of Taiwan wind power 2021

The topics of this seminar are research on key technologies of offshore wind power, grid connection and energy storage technology, localization of offshore wind power industry and talent cultivation, and operation and maintenance of offshore wind power.

Evidence: Seminar Information

(1) https://www.beclass.com/rid=2546487612365ef467d5

(2) https://windenergy.ntou.edu.tw/?page_id=1574

4. Environmental Impact Assessment of the project on the update and rebuild of Hsieh-Ho Power Plant.(experiments of hydraulic model on cold-warm drain water diffusion)

The update and rebuild of Hsieh-Ho Power Plant is evaluated through the Environmental Impact Assessment (EIA) in this project. A series of experiments using hydraulic model of cold-warm drain water diffusion is applied to the EIA of Hsieh-Ho Power Plant.

5. Erosion and sedimentation investigation on the nearby coastlines of Linkou and Tai-Tam Thermal Power Plants (eperiments of hydraulic model on sediment transports)

The causes of erosion and sedimentation of the nearby caostlines of Linkou and Tai-Tam Thermal Power Plants are investigated using a hydraulic model of coastal sediment transport. The experiments focused on the Linkou Thermal PowerPlants are completed.

6. Analysis on Extreme Condition of Monsoon and Typhoon Waves for Offshore Wind Farm

First, this sub-project is focusing on the potetial anad assessment of soil liquefaction using hybrid empirical method. Second, the studies on the numerical experiments of soil liquefaction are collected for building a numerical model that is based on the methods of finite element and finite difference. Outcomes from laboratory experiemnts are collected for validations. The base model of soil liquefaction is built and compared against the observed soil liquefaction obtained from median wind energy field. The changes of pore water pressure are calculatd to estimate influinses of reducing the soil liquefaction parameters on the shape changing of the bases. The differences of stiffness before

and after the soil liquefaction will be compared.

7. Wind turbine safety and durability evaluation

In this project, a hybrid semi-empirical method was utilized to conduct potential and risk assessment of soil liquefaction. And collected past numerical simulation studies under soil liquefaction conditions. Three-dimensional numerical models were established by finite element and finite difference methods. The laboratory soil liquefaction test results were applied to the model verification for the jacket-type foundation. The simulation result was compared with the in-situ measured data of the Zhongneng wind farm. The influence of the parameter reduction after soil liquefaction on the foundation stress and deformation behavior was calculated from the pore water pressure change.

8. Offshore wind turbine underwater structure cathodic protection system simulation and demonstration

This study focused on the corrosion protection system of offshore wind turbine underwater structures, establishing a cathodic corrosion protection system for unpainted steel foundation piles and coated foundation piles from the Singda marine structure. The foundation piles are placed at the boat wharf of NTOU. Measure the efficacy of the cathodic protection system for foundation piles, install a long-term monitoring system to establish a corrosion data database

9. Based on Deep Learning Applied at Wake Effects of Offshore Wind Power Plants

In this project we collaborate with China Steel Power Corporation to solve the problem of wind farm operation. China Steel Power Corporation provides us the wind speed data from 2019 to 2020 for the operating wind farms, and we could estimate the wind speed distribution of the overall operating wind farms. In addition, by developing a deep learning prediction model, we could also estimate the future wind speed distribution of the operating wind farms.

10. Analysis and research on monitoring program for the topographic change of the offshore bar of the Boziliao Harbour

This study activates the functions of the Boziliao Harbour, and develops a feasibility assessment for the extension plan of the breakwater of the Boziliao Harbour. It will improve the siltation and harbor tranquility of the harbor. The feasibility assessment is carried out by means of numerical simulation, and the most appropriate improvement strategy is selected.

SDG 7.4.4 Policy development for clean energy technology

Inform and support governments in clean energy and energy-efficient technology policy development.

1. Assisted the Maritime Port Bureau, MOTC, and ROC in developing an offshore wind power policy

   Green shipping, crewless ships, or innovative ships are all important development trends in the future. A good policy can be formulated if there are professional and abundant academic resources from NTOU to make professional suggestions through a rigorous research process so that Taiwan can have a better environment for shipping development.

Evidence:

(1) https://mprp.ntou.edu.tw/p/404-1017-66624.php?Lang=zh-tw

(2) https://www.youtube.com/watch?v=HKhmkxmbA8Y&t=1s

2. Promote and research sustainable and renewable green energy

   The development of low-polluting renewable energy has become the mainstream of the global energy industry. The Taiwan Power Company once pointed out that Taiwan remains 2,967MW of hydropower needing to be developed. Therefore, a complete set of analysis tools for searching the optimal dam site was necessary to evaluate the spatial distribution of hydropower reserves comprehensively. The Geographic Information System Research Center of National Taiwan Ocean University assisted the Taiwan Power Company in developing an integrated information platform for hydrological and hydraulic analysis and hydropower investigation by combining topographic analysis, hydrology, hydrodynamic theory, and engineering economic estimates.

Evidence:

http://www.gis.ntou.edu.tw/RR10901.html

SDG 7.4.5 Assistance to low-carbon innovation

Assist start-ups that foster and support a low-carbon economy or technology

NTOU assists start-ups that foster and support a low-carbon economy or technology. In 2021, the following research projects related to clean energy will be commissioned by the enterprise.

Department	Project Director	Project Consignment	Title of Proposal
Center of Excellence for Ocean Engineering	Tai-Wen Hsu	China Steel Corporation	離岸風電開發設計安全及運維管理評估
Center of Excellence for Ocean Engineering	Tai-Wen Hsu	China Steel Corporation	離岸風電開發設計安全及運維管理評估 II
Center of Excellence for Ocean Engineering	Wen-Kai Weng	Pacific Engineers & Constructors,	協和電廠更新改建計畫環境影響評估案(冷溫排水擴散水工模型試驗)
Department of Harbor and River engineering	Wen-Kai Weng	Sinotech Engineering Consultants,	林口電廠暨大潭電廠鄰近海岸線侵淤成因委託技術服務工作 (林口電廠海岸漂砂水工模型試驗)"
Department of Harbor and River engineering	Kwan Tun Lee	Taiwan Power Company	和平溪、南澳溪及花蓮溪流域水文與水力蘊藏量分析整合資訊平台
Department of Harbor and River engineering	Chia-Ming Fan	Ministry of Science and Technology	Floating Pendulum Wave Energy Converter (Fpwec): Developments and Comparisons of Computer Simulation Models
Department of Marine Engineering	Jian Hua	Longchen Paper & Packaging Co., Ltd.	海洋環境保護及永續發展計畫-清淨海洋大策略大聯盟
Department of Transportation Science	Sin-Der Lee	Sinotech Engineering Consultants,	「彰濱離岸風電運維基地計畫」規劃作業委託技術服務案-快時操船模擬試驗
Department of Communications, Navigation and	Shwu-Jing Chang	Unitech New Energy Engineering	鍾美離岸風力發電計畫環境影響評估工作-船舶航行影響先期評估作業

Department	Project Director	Project Consignment	Title of Proposal
Department of Communications, Navigation and	Shwu-Jing Chang	Unitech New Energy Engineering	北部三座離岸風力發電開發計畫船舶航行影響先期評估作業
Department of Merchant Marine	Juan-Chen Huang	Pacific Engineers & Constructors,	協和電廠更新改建計畫基隆港錨泊區範圍研究
Department of Merchant Marine	Juan-Chen Huang	Pacific Engineers & Constructors,	協和電廠更新改建計畫暨燃料供應可行性研究
Institute of Earth Sciences	Chao-Shing Lee	Bafang energy technology Co., Ltd.	微地震陣列探勘地熱儲集層研究工作案
Institute of Earth Sciences	Chao-Shing Lee	Bafang energy technology Co., Ltd.	低頻地震接收儀設備
Institute of Earth Sciences	Chao-Shing Lee	Bafang energy technology Co., Ltd.	低頻地震接收儀設備維護
Institute of Earth Sciences	Chao-Shing Lee	Taiwan Power Company	北海岸高解析度地熱參數層極分析及地熱資源目標區評估委託試驗
Department of Harbor and River engineering	Shiaw-Yih Tzang	Ministry of Science and Technology	Verification by Laboratory Model Tests on Capture Efficiency of a Bh-Owsc under Irregular Waves Offshore Northeastern Taiwan
Department of Mechanical and Mechatronic	Chun-I Wu	Ministry of Science and Technology	Study in Micro and Nano-Structured Thermoelectric Materials
General Education Center	Sheng-Wen Tseng	Ministry of Science and Technology	Renewable Energy, Poverty Alleviation and Local Governance: a Case Study of Guizhou Province in China