



永續特刊

# 再生能源相關計畫

## 1. 能源科技中心相關計畫

### 農業廢棄資材轉化綠色經濟

國立東華大學能源科技中心與企業合作，在花蓮縣瑞穗鄉舞鶴地區辦理「林下循環經濟示範實務觀摩會」，宣導農業廢棄物轉化與循環再利用經濟，在經濟部科技研究發展專案（協助傳統產業技術開發計畫）支持下，希望能在瑞穗成功建立東臺灣第一個「區域型生質資源綠色增值循環經濟示範棧」。

### 後山 SEE 農城將綠能知識寓教於樂

東華大學長年支持與推動綠能轉型，並在美崙校區創新研究園區內，設立「後山 SEE 農城」，利用純電動 301 綠能巴士連結花蓮特色綠能示範場域，結合在地觀光經濟農業，規畫東部唯一綠色廊道輕旅行路線，園區亦設立多項互動展示元件，例如微水力發電技術、水上光電埤塘、光電走廊、潔能密室逃脫遊戲等，並發展模組化生質氣化發電技術，進行生質能源技能培訓，讓農友及偏鄉青年了解專業知識與潛力。

## 2. 光電工程學系計畫成果

### 輔導失業者取太陽光電設置乙級技術士證照

為了因應力推太陽能光電而造成的人才缺口，也為了提升建置太陽能電廠發電的品質，勞動部自 2016 年開辦太陽光電設置乙級技術士證照，這是勞動部有關太陽能光電唯一的證照，光電工程學系也自 2016 年就開始訓練相關人員，已培訓多人考取證照，2021 年 9 月光電工程學系持續開設太陽光電設置、太陽光電設置實驗課程，訓練學生考取本證照。2021 年度修課同學人數 13 人，7 人報名於 2022 年中舉辦之本年度勞動部證照考試。此外本系在 110 學年開設太陽能轉換光電化學、半導體及能源材料與元件特性分析、綠能科技導論、太陽能電池創意實作、有機半導體及能源材料與元件等能源相關課程，培養同學不同面向的能源理論與創新實作能力，可望於畢業後投身相關產業，為再生能源發展達到實質貢獻。

除校內課程，為解決「加速國內再生能源的推動」及「解決太陽能光電系統設置人才不足」等問題，國立東華大學美崙校區「創新研究園區」得標勞動部勞動力發展署北基宜花金馬分署「109 年度第 3 次委託辦理失業者職業訓練 - 電腦網路及工業綠能職類」，多名光電系老師協助開課，培訓失業者太陽光電設置技能與電腦程式技能，並輔導考取太陽光電設置乙級技術士證照，將所學貢獻在地。



◀ 東華大學培養光電人才，輔導失業者取得太陽光電設置專業技術證照





### 3. 校內太陽能建置現況

#### 持續建置規劃太陽能光電發電

截至 2021 年 6 月，壽豐校區及美崙校區太陽能光電裝置容量總共為 3,443.88 kWp（峰瓦），占學校發電量 14%，2021 年整年度太陽能光電總發電量為 3,565,115 度，為臺灣整體帶來的減碳量為 1,789.7 tCO<sub>2</sub>e（以 2020 年電力排碳係數 0.502 kgCO<sub>2</sub>e / 度來計算）。獲教育部評為特優，堪稱是全臺最會發電的大學。預估未來在 2023 年發電量可提升到 42%，再搭配執行中的各項節能減碳措施，綠電占比還可再提高。

雖然目前太陽能光電發電量每年可達 464 萬度，但東華依然持續新增光電板設置地點，已相中行政大樓、大學門、理工二、三館等建物、宿舍的停車場，用以設置太陽能光電停車場車棚，以及在綜合球場、網球場、集賢館籃球場和游泳池建置光電球場，預計此兩方案皆可在 2023 年完成併聯發電，屆時發電設備總容量將達 6,000 kWp，與原有光電設備加總，全校的太陽能光電裝設量合計將近 10,000 kWp，且光電棚架之發電量，每年將提供 1,200 度電，做為本校綠電憑證，減碳量為 0.6 tCO<sub>2</sub>e，另行申請相關碳權，另廠商每年回饋金 33 萬元，做為企業社會責任 (CSR) 使用。

建物名稱	裝置容量 (kWp)	設置面積 (m <sup>2</sup> )
原住民族學院	400.14	
環境解說中心	99.84	
體育館	595.36	3,259.8
學生活動中心	228.14	1,249.2
六期宿舍	495.4	3,674
美崙校區	1,625	
總計	3,443.88	





Special Edition: Sustainability

# Renewable Energy Projects

## 1. Projects Promoted by the Energy Technology Center

Agricultural wastes can be turned into green economy

Working with private sectors, the NDHU Energy Technology Center organized an Observation Tour of the Undergrowth Circular Economy Demonstration and Practice in Wuhe, Ruisui Township. The demonstration propagates the recycling and reuse of agricultural wastes. Supported by the MOE as a Technology Research and Development project (assisting traditional industry in technology development), we expect to build eastern Taiwan's first Regional Value-Added Biomass Circular Economy Demonstration Point in Ruisui.

Demo site of sustainable economic and energy to turn green energy into fun and knowledge

NDHU is a long-time supporter and promoter of green energy advancement. The Demo Site of Sustainable Economic and Energy in the Innovation & Research Park at Meilun Campus uses electric bus 301 to connect the Hualien Green Energy Demonstration Site and regional farming tour, the only light travel route of the green corridor in east Taiwan. The site has multiple interactive units, such as Micro Hydropower generation, a photoelectric farm pond, a photoelectric corridor, and a clean energy room escape. We also developed modular biomass gasification technology and gave biomass



energy skill training to empower farmers and younger generations with professional knowledge and capabilities.

## 2. Project Progress of the Department of Opto-Electronic Engineering

Assisting unemployed individuals to pass the exam for Level B technician for installing solar photovoltaic systems

The MOL's exam for Level B technician for the installation of solar photovoltaic systems has been the only exam to obtain a solar photovoltaic system certificate issued by the MOL since 2016, which helps satisfy the unmet needs for solar photovoltaic system manpower and elevate solar power generation quality. In 2016, the Department of Opto-Electronic Engineering began relevant training to assist more people with the exam. In September 2021, the Department continued to organize Photovoltaic Installation and Photovoltaic Installation Experiment courses to help learners pass the certification. Of the 13 students in 2021, seven sat the MOL exam in 2022. In the academic year 2021, the Department added Photoelectrochemistry in Solar Energy Conversion, Semiconductor & Energy Material and Device Characterization, Green Energy Technology, Creative Implementation of Solar Cell, and organic semiconductor and Organic Electroluminescent Materials and Devices to enable students with different energy theories and the creation and execution capabilities in order to benefit renewable energy with more and better manpower.



NDHU fosters photovoltaic workforce by training the unemployed to obtain installation of solar photovoltaic system certificate



In addition to in-school courses, in order to accelerate renewable energy in Taiwan and prepare more talents for the installation of solar photovoltaic systems, our Innovation & Research Park at Meilun Campus was awarded a contract to help unemployed individuals to obtain the certificate of Level B technician for the installation of solar photovoltaic systems. The "2020 3<sup>rd</sup> skill training for unemployed: Computer, Internet, Industrial Green Energy categories" contract was issued by the Taipei-Keelung-Yilan-Hualien-Kinmen-Matsu Regional Branch of the Workforce Development Agency, MOL to engage Department teachers to train targets with the skills to install solar photovoltaic systems and related programming, as well as to assist them in obtaining the Level B technician certificate, fostering a workforce for the applied field.

### 3. Solar Energy Output on Campus

#### Solar power generator construction continues

By June 2021, the solar power generators in Shoufeng and Meilun Campuses totaled a capacity of 3,443.88 kWp, accounting for 14% of university generated electricity. The electricity produced in 2021 reached 3,565,115 kWh and reduced 1,789.7 tCO<sub>2</sub>e for Taiwan (based on 2020 emission coefficient of 0.502 kgCO<sub>2</sub>e /kWh). NDHU is recognized as excellent by the MOE in green power generation and is arguably the most "powerful" university in Taiwan. Together with other ongoing energy saving plans, we are boosting Taiwan's amount of green energy. We expect a 2023 goal of 42% power generation by solar energy.

While solar power produces up to 4.63 M kWh/year, we are continuing to expand solar panels within feasibility: Parking spaces of the Administration Building, University Gate, 2<sup>nd</sup> and 3<sup>rd</sup> Building of Science and Engineering and dormitories have been nominated as solar-powered parking sheds with photovoltaic sports fields at the general ball sports field, tennis court, basketball court in Ji-Xian and swimming pool. The two constructions are expected to be completed by 2023 for parallel power generation, at which point the total capacity will reach 6,000 kWp. When added to the existing photovoltaic equipment, the campus based solar power will generate close to 10,000 kWp. Each year, 1,200 kWh generated by the PV system will be used for NDHU green energy certificate, equaling 0.6 tCO<sub>2</sub>e carbon reduction. We also will apply carbon credits to vendors for CSR purposes with NT\$330,000 yearly rebate.

Building	Capacity(kWp)	System area (m <sup>2</sup> )
Indigenous Studies	400.14	
Environmental Exposition Center	99.84	
Indoor Sports Center	595.36	3,259.8
Student Activities Center	228.14	1,249.2
6 <sup>th</sup> Dorms	495.4	3,674
Meilun Campus	1,625	
Total	3,443.88	

