



Net-Zero Civic Experimentation and Sandbox Innovation Projects

Achieving net-zero transformation throughout Taiwan by linking the public with social groups while leveraging the power of civil society and technology.

Background

To achieve a sustainable society with net-zero emissions by 2050 and to align with the National Science and Technology Council's deployment of Taiwan's Net-Zero Science and Technology Program, it is essential to incorporate feedback from industry and civic groups during the development of key net-zero technologies. In addition, approaches such as inter-agency collaboration and public-private partnerships should also be employed to jointly facilitate net-zero transition.

In the process of driving this transition, it is also crucial to leverage the first-hand experience of third-sector organizations and civic participation in addressing the needs of society, the public, and vulnerable groups. This approach will provide “people-centered” solutions that can tackle real-world issues. Harnessing the social capacity of the third sector and enhancing their independent R&D capabilities will help foster the resilient and autonomous development of communities and civic groups. This will amplify the effect of initiatives that contribute to actualizing new net-zero lifestyles.

As such, the Taiwan Science and Technology Office for Net-zero Emission (hereinafter referred to as “T-STONE”) is promoting the Net-Zero Civic Experimentation and Sandbox Innovation Projects (hereinafter referred to as the “Sandbox Innovation Projects”). This program, which allows civic groups to provide and implement innovative net-zero solutions, encourages independent proposals from the private sector.

Through professional support mechanisms, events, and exchanges, the Sandbox Innovation Projects aim to foster connections between civic groups and legal entities while facilitating the application and promotion of net-zero R&D and field tests.

In addition, the Sandbox Innovation Projects aim to promote active participation from a diverse range of civic groups while establishing a bottom-up, citizen-driven pathway for net-zero transition. By capitalizing on various aspects of Taiwan’s social capacity, this program seeks to facilitate lifestyle transformation throughout society. The objectives of the Sandbox Innovation Projects are as follows:

- (1) Facilitate system-wide transformation by leveraging technological and social capacities that enable private sector innovative solutions to undergo preliminary testing in test beds and living labs.
- (2) Drive net-zero lifestyle transformation throughout society by accelerating net-zero policy advocacy and real-world implementation.
- (3) Strengthen the third sector’s ability to utilize innovative technologies, enhance R&D capacity, and reinforce mechanisms for inter-agency collaboration to jointly create an innovative net-zero ecosystem.

Project Implementation Process

Since the launch of the Sandbox Innovation Projects in 2023, there have been two rounds of proposal solicitation and selection. The following is a breakdown of the program's implementation process by year:

2023 Sandbox Innovation Projects Overview

To enhance the innovative capabilities of civic groups and communities while increasing public awareness and support for net-zero transition, the Sandbox Innovation Projects aimed to facilitate the promotion of policies related to addressing the developmental needs and goals of local communities.

Based on the aforementioned objectives, the Sandbox Innovation Projects conducted proposal solicitation and selection processes in 2023. During this process, civic groups independently submitted innovative net-zero project proposals. Subsequently, T-STONE held selection meetings to choose suitable teams.

In December 2023, the 14 selected teams participated in the exhibition and forum, Pathways to Net-Zero Lifestyle Transformation Throughout Society—From Civic Proposals to Innovative Practices. During the forum, these teams showcased their achievements and presented their innovative net-zero solutions. The teams included civic groups, communities, startups/social enterprises, and agricultural cooperatives. The research of these pilot projects primarily focused on themes such as carbon accounting, citizen power plants, and the circular economy (details provided in Table 1).

2024 Sandbox Innovation Projects Overview

Building on the foundation and achievements of 2023, the 2024 Sandbox Innovation Projects adopted a two-pronged approach, which combined existing projects with new initiatives. The program aimed to accelerate the implementation of net-zero lifestyle transformation throughout society by strengthening civic participation and social impact.

The selection criteria are as follows:

(1) Local Innovation: Projects must contain innovative approaches, break away from traditional practices, and have strong connections to local communities. Goals and targets must be specific rather than broad or promotional. Expected benefits should be clearly defined and must not solely involve capacity-building courses or educational training.

(2) Outreach Benefits: Outreach approaches should be diverse. Besides one-way exchange activities, these

projects must amplify impact by connecting to a broad range of social networks. In addition, projects should also demonstrate value and create impact.

(3) Data-Driven Approach: The experimental process must include data collection of related research and events. In other words, by providing quantitative data that validates outcomes, these projects can be systematically incorporated into the development cycle of technology programs.

This year, 21 pilot teams were selected from 49 proposals, a significant increase compared to the program's previous cycle. The visibility of the Sandbox Innovation Projects have gradually increased by garnering a growing amount of attention from people across various sectors. The proposal's core themes have also expanded beyond commonly discussed topics such as citizen power plants, carbon accounting, and the circular economy, to including areas such as carbon sequestration, low-carbon agriculture, and waste recycling and reuse (details in Table 2).

Strategic Implementation Framework

The Sandbox Innovation Projects have been jointly promoted by T-STONE, the Industrial Technology Research Institute (ITRI) Green Energy and Environment Research Laboratories, and the National Association for the Promotion of Community Universities. By having two organizations serve as management teams, they could jointly leverage their extensive experience in promoting foresight green energy technologies, meaningful local engagement, and civic and social capabilities to provide professional advice and technical support to pilot teams. Additionally, the program mobilized existing civic networks to guide communities and civic groups in actively participating in net-zero transition.

The implementation strategies are detailed below (see Figure 1):

Strategy 1: Create Strict Selection Mechanisms
Design a selection process that emphasizes transparency, rigor, professionalism, and reliability. Invite leading experts to serve as members of the evaluation committee.

Strategy 2: Introduce Mechanisms for Mentoring and Collaborative Learning

Invite organizations with experiences in policy development, professional technical expertise, and

long-term local engagement provide assistance in implementing support and guidance mechanisms. Through collaborative learning mechanisms, have leading civic groups enhance their technological capacities and amplify their social impact.

Strategy 3: Strengthen Connections Across Disciplines

Establish a funding and guidance mechanism for civic groups to facilitate cooperation across agencies, different levels of government, and civic organizations. This will assist in resource alignment and complementation among various stakeholders to maximize synergy while

eliminating resource misallocation and redundancy.

Strategy 4: Showcase Taiwan's Net-Zero Social Strengths

Leverage the Sandbox Innovation Projects as a platform for Taiwan's civil society to independently innovate and explore pathways for net-zero transition. Continue to contribute to the international community while demonstrating the international and foresight capabilities of Taiwan's civic groups.

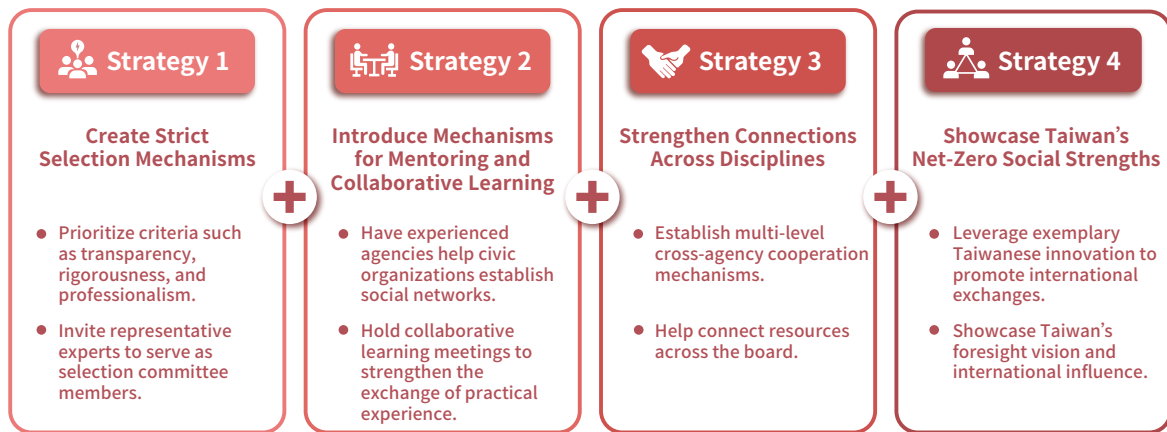


Figure 1 Operational Mechanisms of the Net-Zero Civic Experimentation and Sandbox Innovation Projects
Source: Taiwan Science and Technology Office for Net-zero Emission (T-STONE) (2024).

Expected Benefits and Follow-Up Projects

Expected Benefits

The Sandbox Innovation Projects are a direct approach in promoting social participation and facilitating the practical implementation of net-zero solutions. Its expected benefits include:

- (1) Establishing a model operational framework and demonstrating the effectiveness of cross-sectoral governance by viewing the pilot teams of the Sandbox Innovation Projects as representative indicators of the social ecosystem while progressively refining the program's implementation mechanisms in terms of regulations, technology, resources, and community engagement.
- (2) Promoting net-zero lifestyle transformation throughout society by introducing innovative technologies, connecting with young tech communities, and strengthening inter-agency collaboration to expand the influence of civic groups on social networks.

Follow-Up Projects

- (1) **Sustain the Momentum of Established Benchmark Groups while Enhancing the Collaborative Potential between Teams:** Transform the practical experiences of civic groups selected in 2023 and 2024 into systematic recommendations for implementation, which can serve as a reference for civic groups participating in future net-zero experiments. In addition, enhance inter-team communication, support, connection, and shared learning networks. This will help amplify the program's overall impact by showcasing the capacity of local net-zero education.
- (2) **Establish a More Inclusive Public Participation Mechanism to Increase Engagement and Drive Transformation:** Expand the range of proposal groups to provide diverse civic entities, especially unorganized citizen communities that have gradually begun engaging in net-zero transformation efforts, with further opportunities to initiate action regarding net-

zero lifestyle transition throughout society. Support these groups in scaling and organizing while facilitating connections with public sector entities. This approach is expected to create more possibilities and foster new opportunities for collaboration and innovation.

(3) Link Cross-Agency and Cross-Sector Resources by Establishing a Platform for Regular Dialogue Between Public and Private Entities: Propose collaborative public-private solutions for various issues by regularly organizing platforms for dialogue between the government, civic organizations, and focus groups. These platforms will explore the feasibility of adjusting regulations and related systems by reviewing the direction of governance strategies from a policy and social perspective. Enhance communication and trust with the public by providing concrete suggestions to optimize the integration of social and public sector resources. Furthermore, these efforts will gradually encourage relevant agencies to incorporate the social capacity of the third sector into the planning and implementation of future technology programs.

(4) Introduce Capital for Social Innovation to Enhance the Ecosystem for Net-Zero Innovation: Position pilot teams as key nodes and drivers in the ecosystem for social net-zero innovation. Through regulations, technology, resources, and community engagement, explore the overarching framework and strategic

pathways for social net-zero solutions. This approach will integrate the capacities of civil society, technology, and networks to expand Taiwan's ecosystem for net-zero innovation.

(5) Strengthen Data Collection and Analysis Capabilities to Validate the Effectiveness of Pilot Testing: Throughout ongoing projects, encourage pilot teams to collect relevant research data. This will assist in conducting carbon reduction benefit analysis and the subsequent validation of pilot projects. In addition to aligning with current trends in the governance of digital transformation, such efforts showcase the role of Taiwan's social and scientific outreach capacity in achieving net-zero transition.

(6) Expand the Scale and Impact of the Sandbox Innovation Projects by Publishing a Book on how the Program Inspired Civic Participation to Facilitate Net-Zero Transition: Utilize dynamic and engaging storytelling techniques and presentation styles to narrate the experience of outstanding projects. In addition to further increasing the visibility of sandbox pilot teams, the publication will serve as a reference for civic groups that may participate in future net-zero initiatives while reminding the public of Taiwan's capability to drive net-zero lifestyle transformation throughout society by developing localized solutions and pathways.

Table 1 Overview of 2023 Pilot Teams









































Network Number	Implementing Agency	Project Name	Keywords	Maturity Type	Net-Zero Area
Civic Group	Syin-Lu Social Welfare Foundation	Green Sheltered Workshop Project	#Renewable Energy #Sheltered Workshop #Sustainability	A-Allied	
Civic Group	People Power Energy Cooperative	Carbon Reduction Calculus – Net-Zero Life Super Attack	#Community #Energy Transition #Civic Participation	B-Well-Established	
Civic Group	Homemakers United Foundation	Citizens Power Plant Energy Education Roots Program	#Civic Power Plan #Energy Education	B-Well-Established	
Civic Group	Green Advocates Energy Cooperative	Green Consumers' Climate Action – “OUR RE100” Crowdfunding for Energy Harvesting to Carbon Reduction Communication	#Lesson Plan Design #Civic Power Plan #Briefing Session #Community Dialogue	C-Experimental	
Civic Group	Taiwan Green Energy for Charity Association	Carbon Cable Museum Satellite Project for Lanyang Museum's Net-Zero Transformation	#Net-zero Pathway #Museums #Energy Education #Workshops #Action Plans	B-Well-Established	
Civic Group	Taiwan Housewives Union Life Consumer Cooperative	Dual Circulation Fruit and Vegetable Bag Applications	#Inner Cycles #Produce Bags	C-Experimental	

Civic Group	Qigu Coastal Land Resources Protection Association	New Imagination of Net-Zero Cultivation in Qigu: Creating an Eco-Brand and Low-Carbon Tourism Network	#Net-Zero #Breeding #Ecosystems #Low-Carbon #Travel	B-Well-Established	
Civic Group	Changhua County Vocational Skills Education Association	Cost Assessment and Carbon Reduction Benefit Analysis of Residue and Liquid Watering Systems	#Dongluoxi Ecological Education Park #Biogas Residue and Slurry #Transportation and Demonstration of Irrigation Methods #Origin Testing and Information Digitization	B-Well-Established	
Civic Group	Huanan Community Development Association, Gukeng Township, Yunlin County	Eco-Village Society and Living Transformation Pilot Program	#Eco-Villages #Circular Economy #Civic Power Plan #Elderly Care #Organic Agriculture Communities	B-Well-Established	
Civic Group	Hualien County Chuyingshan Cultural Industry Exchange Association	Micro- Hydroelectricity Civic Engagement Program	#Micro-Hydroelectricity #Civic Participation	B-Well-Established	
Agricultural Cooperative	Yilan County Xingjian Organic Production Cooperative	Activating Agricultural Waste, Creating New Carbon Negative Ideas - Application of Carbonized Rice Husk in Agricultural Carbon Reduction	#Biochar #Waste #Circular Renewables #Carbonized Rice	C-Experimental	
Startup / Social Enterprise	wawaTEK Co., Ltd	Micro-Hydroelectricity with Existing Sand Dams to Create a "Disaster-proof Microgrid" - Community Electricity in Disasters, Green Power Wholesale in Safe Times	#Debris Control Dams #Disaster Prevention #Microgrids	B-Well-Established	
Startup / Social Enterprise	PackAge+	Sustainable Low-Carbon Community Circular Shopping Program	#Low-Carbon Communities #Circular #Shopping #Packaging	B-Well-Established	
Startup / Social Enterprise	Pink Panther Cultural Enterprise Co., Ltd.	Green Monopoly of Living Transformation - A Journey of Regeneration of People and Things	#Lifestyle Transformation #Green Living #Renewable #Net-Zero Microhub Connection	C-Experimental	

Table 2 Overview of 2024 Pilot Teams

Network Number	Implementing Agency	Project Name	Keywords	Net-zero Area
Civic Group	Hualien County Chuyingshan Cultural Industry Exchange Association	Chuyingshan Village Green Education Center Project	#Applied Green Energy #Green Energy Hardware Store #Social Work	
Civic Group	Dawushan Cultural and Educational Foundation	Community-Based Carbon Reduction and Sustainable Agriculture Advancement HUB Operation Demonstration Project	#Sustainable Agriculture #Microbacterial Cultivation #Civic Scientists	
Civic Group	Syin-Lu Social Welfare Foundation	Green Sheltered Workshop Project	#Energy Use #Green Procurement #Social Welfare Groups	
Civic Group	Qigu Coastal Land Resources Protection Association	New Imagination for Net-Zero Aquaculture in Qigu: Creating a Sustainable and Eco-Friendly Fish Farm	#Ecological Breeding #Carbon Footprint #Fish Education	
Civic Group	Taiwan Homemakers Union Consumer Cooperative	Upgrading the Cold Chain Transportation System for Logistics	#Cold Chain Logistics #Transportation Emissions	

Civic Group	Taiwan Green Energy for Charity Association	Innovative Green Consumption Plan for the Net-Zero Transformation of the Cultural Industry	#Carbon Inventory #Performance Groups #Green Finance	 
Civic Group	Taiwan Spiritual Ecovillage Promotion Association	Spiritual Ecovillage Social and Lifestyle Transformation Pilot Project	#Energy Education #Bamboo Recycling and Reuse	 
Civic Group	Homemakers United Foundation	Movement Towards Net-Zero Emissions and Complete Resource Recycling—A Resource Recovery and Lifestyle Transformation Plan	#Energy Recycling #Gonglaoping Community #Community Building	 
Civic Group	Spring Sprouts Innovations for Social Service	Carry Love - Reusing Coffee Sacks & Empowering Women: Reed Women Empowerment Cross-Domain Sustainable Environmental and Public Welfare Program	#Circular Economy #Women #Community Building	 
Civic Group	Taiwan Climate Action Association	Forest Carbon Sequestration Research and Demonstration Site Establishment and Promotion Project	#Forrest Carbon Credits #Demonstration Areas #Workshops	  
Civic Group	Changhua County Vocational Skills Education Association	Modular and Digital System for Guiding and Monitoring the Impact of Biogas Slurry and Residue Irrigation	#Biogas Residue and Slurry #Digital Transformation #Field Experiments	 
Civic Group	Taiwan Agricultural Algae and Fungi Education Promotion Association	Recreating a Low-Carbon Circular Fantasy Journey—Building High-Value Applications for Microalgae Resources	#Microalgae Cultures #Wastewater Treatment #Circularity	 
Agricultural Cooperative	Xingjian Agriculture Production Cooperative	Carbonized Rice Husk - The Path to Achieving Agricultural Net-Zero Carbon Sequestration (Extended Project)	#Carbonized Rice Husks #Field Experiments #Soil Carbon Credit Analysis	  
Agricultural Cooperative	Taichung City Great People Agricultural Marketing Cooperative	Central Taiwan Market-Oriented Negative Carbon Soybean Production Model Pilot Project	#Sustainable Agriculture #Soil Carbon Credits #Low-carbon Agriculture #Soy Beans	 
Startup / Social Enterprise	Rewood Group	Urban Forest: Carbonizing Tree Branches and Circular Educational Services	#Biochar #Carbon Sequestration #Circular Economy #REWOOD	 
Startup / Social Enterprise	Slashlc	NBS Solutions for Riparian Plant Restoration	#Riverside Plants #Reeds #Industrial Applications	    
Startup / Social Enterprise	Indigowaters	Fan-Shaped Salt Field Seagrass Civic Protection Project	#Blue Carbon #Civic Science #Workshops	 
Startup / Social Enterprise	ICSA SOCIAL ENTERPRISE LTD.	Taiwan's Fertile Soil Movement: Urban Soil Creation	#Pallet Composting #Kitchen Waste #Workshops	   
Startup / Social Enterprise	Agriforward Co., Ltd.	Creating a Net-Zero Transition Demonstration Project for Taiwan's Coffee Industry Using 'Natural Carbon Sequestration Methods, AIoT Smart Agricultural Technology, and Leopard Cat Brand Strategies'	#Biochar Carbon Sequestration #Hydrogen Energy #Product Design	  
Startup / Social Enterprise	wawaTEK Co., Ltd.	4,000 Micro Hydropower Plants—Using Renewable Energy to Drive Rural Regeneration	#Micro- hydroelectricity #Farming Villages #Community Participation Workshops	 
Startup / Social Enterprise	Pink Panther Cultural Enterprise Co., Ltd.	Net-Zero Cabin Play Area—A Journey of Human and Material Regeneration	#Net-zero Microhubs #Net-Zero Knowledge	