Community Sustainable Resilient Energy

Background

The National Development Council released the Taiwan Carbon Reduction Action Plan (臺灣總體減碳行動計畫) in 2025, proposing six major institutional innovation mechanisms. Through systematic integration and cross-ministerial collaboration, these mechanisms comprehensively promote energy transition, industrial transition, and lifestyle transition to achieve Taiwan's 2050 net-zero emissions target. Among them, the "community-driven" mechanism focuses on localities as the core, promoting community autonomous participation and energy resource governance. By introducing autonomous energy and smart technologies, it creates sustainable communities with both energy autonomy and system resilience. At the same time, through the cultivation of green-collar talents and accumulation of local energy, it promotes community self-governance and economic revitalization, achieving goals that balance decarbonization, resilience, and local sustainable development.

Furthermore, according to the Taiwan Carbon Reduction Action Plan (臺灣總體減碳行動計畫), public buildings, social housing, and communities prone to isolation during disasters are positioned as key sites for the net-zero building decarbonization flagship program. Remote areas, with their abundant natural resources and local characteristics, demonstrate high potential for developing autonomous energy and low-carbon settlements. However, remote areas often face challenges such as insufficient infrastructure and unstable energy supply under disaster impacts. Therefore, while planning net-zero transitions, it is necessary to simultaneously strengthen settlement resilience foundations to ensure energy autonomy and power dispatching capabilities in both peacetime and disaster times.

To enhance the sustainability of local initiatives, this program incorporates sustainable financial models and technology applications, such as building dual-use management platforms via IoT technologies, introducing drone delivery and hybrid oil-electric vehicles as low-carbon technologies, and combining renewable energy, storage, and microgrids to form resilient energy ecosystems. Additionally, to ensure long-term facility operation, it is essential to train local water and electricity maintenance personnel, cultivating "local green-collar talents" so that settlement transformations extend beyond hardware construction to establish community self-maintenance capabilities.

Promoting net-zero resilient countryside not only seeks to achieve carbon emission reductions and energy autonomy but also serves as a key strategy for technology-driven local development. By addressing local issues, improving quality of life, and stimulating related industry chains, it realizes triple benefits of "environmental sustainability, social resilience, and local economy."

Global Outlook and Domestic Progress

1. Global Outlook

Internationally, multiple countries have proposed high-level policies on regional energy resilience and initiated actual implementations.

In 2024, the Canadian government launched "Powering Canada's Future: A Clean Electricity Strategy," positioning Indigenous-led communities and remote regions as clean power leaders to strengthen energy resilience via grid investments and build low-carbon foundations for green hydrogen, data centers, and mining. The Indigenous Diesel Displacement Initiative training community experts in planning, operations, and management to lead solar PV, wind, and storage as owners/operators, converting transitions into long-term economic/governance assets.

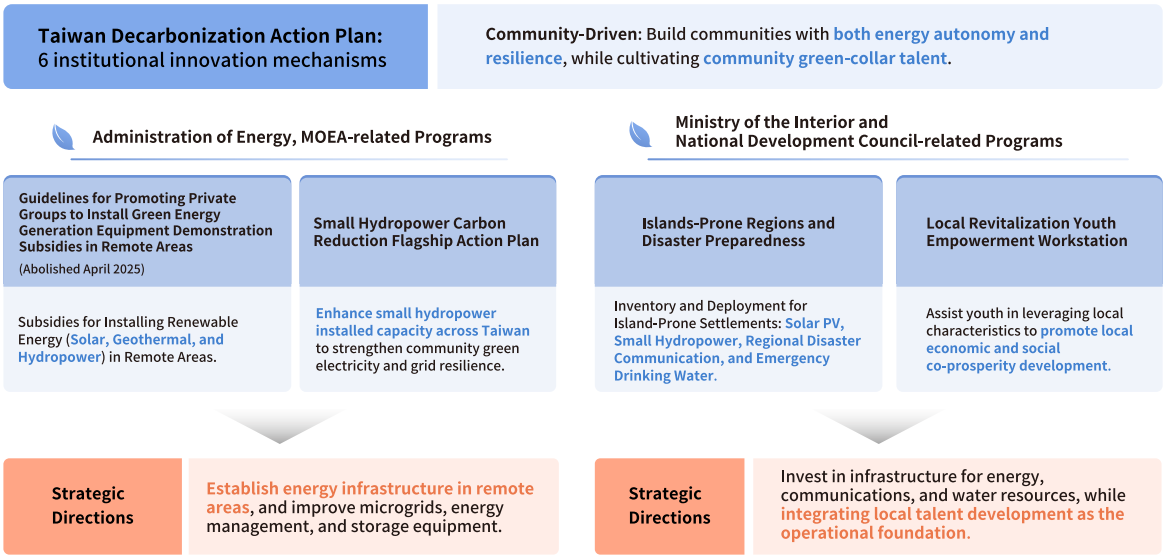
The Australian government has formulated multiple policies to enhance energy security and resilience, leveraging public-private partnerships (PPP) and various funds to upgrade advanced grids, solar panels, and battery storage in remote regions, addressing energy transition needs and power supply challenges during disasters. The Energy and Climate Change Ministers Council established the "National Energy Transition Partnership (NETP)" in 2022 and launched the "Disaster Ready Fund" in 2023 to advance state-level energy backup system initiatives.

2. Domestic Progress

Taiwan has established a multi-layered framework through central ministries for promoting policies and subsidies related to net-zero resilient settlements. The National Fire Agency under the Ministry of the Interior conducts policy inventories for disaster preparedness in "regions prone to isolation," addressing issues such as power outages, communication disruptions, and water shortages during disasters: on the energy front, it inventories potential and demand areas for photovoltaics and small hydropower and introduces facilities; on communications, it promotes regional disaster communication point equipment; on water supply, it establishes emergency drinking water reserve systems.

At the same time, the National Development Council promotes local economic development and resource activation through plans such as regional revitalization, community empowerment, and youth empowerment stations, enhancing community quality of life and overall well-being.

In the energy sector, the Energy Administration under the Ministry of Economic Affairs supports renewable energy facilities and storage systems such as solar, geothermal, biomass, and small hydropower through programs like the "Regulations for Rewards on Demonstration of Renewable Energy Installation Participation in Indigenous Areas" and "Subsidies for Demonstration of Green Energy Power Generation Equipment Installation by Private Groups in Remote Areas." In the future, microgrids and energy management systems should be further improved to enhance community energy resilience and efficiency, while cultivating local maintenance talents to enable autonomous operation of facilities during peacetime and disasters, utilizing drones for resource or medical supply delivery to strengthen local response and self-sufficiency.



Strategic Planning Framework

It is recommended to plan infrastructure introduction and integration targeting risks of power, communication, and water outages caused by natural disasters, while combining smart technologies to address equipment maintenance challenges in remote areas. By introducing intelligent energy and communication technologies, build foundational systems with both peacetime operations and disaster response functions, while empowering local green-collar talents to enhance community self-maintenance and recovery capabilities.

Strategy 1: Infrastructure Employment

For the energy infrastructure, assess the most suitable autonomous energy types based on regional resource conditions to ensure provision of at least 3-5% of local electricity demand, supporting basic operations such as communications, shelters, and emergency water supply during disasters. Storage facilities should prioritize safety and financial feasibility, with sites at substations or community public facilities, supplemented by simple water supply systems to enhance water resilience.

Strategy 2: Applications Introduction

Adhering to dual-use principles for peacetime and disasters, introduce facilities with livelihood, production, and ecological benefits. For example, use IoT for energy and environmental monitoring in peacetime, promote hybrid oil-electric vehicles and low-carbon transport, and switch to backup power and communication systems during disasters. Drones can handle routine logistics and medical supply delivery in crises, improving local self-sufficiency and rescue efficiency.

Strategy 3: Local Talent Cultivation

To ensure long-term stable operation and local self-maintenance, simultaneously implement local green-collar talent empowerment mechanisms, strengthening capabilities in energy, communications, and digital applications. Targeted at water and electricity technicians, community maintenance managers, and youth talents, introduce retraining and cross-domain learning to familiarize them with operations and maintenance of energy/communication infrastructure, microgrids, and drones in demonstration sites.

Potential Benefits

By planning Hakka village community energy resilience at the "township" level from a technology-driven revitalization perspective, and strengthening countryside energy, communications, and water resource resilience, remote areas' disaster life safety and basic services will be significantly improved, while promoting community participation and resident cohesion to enhance overall societal disaster resistance and recovery. The goal is to ensure that autonomous energy meets at least 3-5% of the countryside's electricity demand to secure essential power during disasters. Additionally, cultivating local water/electricity and maintenance talents will drive green-collar talent development and related industry chains, invigorating the local economy. Ultimately, it will establish implementation guidelines for net-zero resilient settlements and technology-driven revitalization, contributing to a nationally promotable model that advances decarbonization, resilience, and local revitalization in parallel for sustainable development.

References

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