ICLEI Local Governments for Sustainability

TAP Transformative Actions Program

ZERO BUDGETING MODEL TO MITIGATE CLIMATE CHANGE

THE CASE OF PINGTUNG

Pingtung County, Chinese Taipei, has ambitious goals to tackle climate change and foster its energy transition. One of the strategies is to provide large access to green-powered electricity. The County, which applied to the Transformative Actions Program (TAP) in 2018, managed to set solar photovoltaic (PV) zones in subsidence areas employing a zero budgeting model. This was a key strategy to ensure sustainable land use while achieving a low energy emission target.

Facts and figures

Located in the Southern part, Pingtung County has the second longest coastline in the island of Taiwan. Adjacent to major bodies of water such as the Pacific Ocean, the Bashi Channel, and the Taiwan Strait, the county's territory has a total area of 2,776 square kilometers, with hillsides on the East and densely populated plains on the West.

Pingtung County is extremely exposed to the diverse effects of climate change. Climate catastrophes such as typhoons and floods, usually cause power outages and property damage in the county. Typhoons, occur on an average of 3 to 4 times a year, causing destruction and losses for farmers and fishermen.

During typhoon Morakot, in 2019, for example, the backflow of tides and seawater had a disastrous effect on livelihoods flooding nearly 602 hectares of aquaculture facilities, and leaving several villages without electricity for two months. The heavy rain caused severe disasters, such as landslides, road collapses, power outage, disruption of external transportations, and communication blackouts.

Pingtung has a tropical monsoon season and usually ample sunlight exposure, with sunshine hours reaching up to 4.7 hours/day, much higher than the global average annual sunshine amount of 1,209 kWh/m^2 (Global Solar Atlas, 2021), making it ideal for the development of solar power projects.

Figure 1 – Geographical map of the island of Taiwan

Figure 2 – Floods after Typhoon in Pingtung, 2009

A committed county

Since 2015, the county government has been committed to using natural resources as a strategy to tackle climate change, while promoting economic growth and green energy transition. The initiatives included the installation of photovoltaic systems on rooftops of public buildings, schools and green architecture.

In addition, Pingtung is part of ICLEI's 100% Renewables - Cities & Regions Roadmap and was able to assess the development potential of renewable energy in various townships. It also actively plans to promote the development of renewable energy in the county's 286,000 households (approximately 1.56 billion kWh).

Based on international trends of renewable energy development and in line with Sustainable Development Goals (SDGs), Pingtung is striving to develop renewable energy technologies, reduce greenhouse gas emissions and enhance its ability to cope with climate change. In this context, the county government applied for the ICLEI-led Transformative Actions Program (TAP) in 2018, and showing high transformative impact potential, was approved for its pipeline.

The current case study aims to showcase the successful implementation of this project, *Solar power generation in land subsidence areas*, the applied financial model, the main challenges it addressed and the lessons learned. It serves as an inspiring example for other cities and regions that face similar issues in tackling climate change.

Main activities and results

Designed in 2018, the *Solar power generation in land subsidence areas* (SSA) project aimed to help Pingtung in addressing the negative impacts of climate change. It started by a complete screening of severe land subsidence areas and the potential of the installed capacity of renewable energy, mainly solar power. To implement the SSA project, 3800 hectares of potential sites were selected, out of which 13,000 hectares were screened.

After the initial selection of potential sites (3800 hectares), only 800 hectares of the area had feeders, so the government planned to concentrate the PV sites on this amount. As the government evaluated other factors, such as the willingness of landowners, accessibility to feeders, and difficulty of setting up booster stations, the administration decided to start the project in an area of 170 hectares, as a first stage.

The main activities focused on (a) increasing the installed capacity of photovoltaic to 800 MW by 2020, (b) supplying 100% renewable energy for the demand of residential and commercial sectors and (c) reducing about 554,000 tonnes of CO_2e emissions per year. Sites' conditions were considered and measures such as elevation, corrosion prevention, salt damage prevention, and floating solar power systems were implemented.

As a result of the SSA project, photovoltaic investors constructed four booster stations and have installed nearly 170 MW PV power plants until October 2022. The sites of PV installation are close to the booster station within a 3 km radius and away from densely populated areas, to avoid major harm to local communities.

Therefore, the SSA project, along with other initiatives, contributed to increase the renewable energy capacity in Pingtung County, which has reached 1,053 MW. This generates about 17.1 kWh of electricity every year and can supply to 294,000 households. With this, Pingtung County has become the first city that reached the goal of RE100 (100% of renewable energy use) in Chinese Taipei.

Since the implementation of the project in 2019, more than 1,000 landholders have joined the project with zero budgeting model and photovoltaic investors keep participating in local businesses, which creates a virtuous cycle for the communities.

Figure 3 – Solar power generation in land subsidence area

Zero budgeting model

In terms of finance, the project was developed through a zero-budgeting model, which played a crucial role in enhancing local resilience against natural disasters and developing green energy simultaneously. The model counted with significant participation from the Green Energy Promotion Office, an institution created in 2016 by the Pingtung County Government, to provide one-stop service/ consultation, and to coordinate resources, strategize policies, streamline procedures and promote green energy.

The Office's main objective is to attract photovoltaic investors to engage in the project through incentives — reduction in fees, streamlined administrative processes — and ensure the rights of landholders through an administrative contract. Economic incentives for investors are done by waiving the handling fee of rezoning and the administrative process, speeding up the project.

On the other hand, the investors need to pay 2% of their profit to the Green Energy Fund, which is destined to develop more green energy. Besides the income provided by PV investors, the Green Energy Fund is also financed through the regular budget procedure, accrued interest incomes and donation.

The model enabled landholders and PV investors to pursue private interests, while also cooperating with the promotion of Pingtung's green energy policy and

pursuing comprehensive social benefits, such as climate adaptation measures, local revitalization and job creation.

The Green Energy Promotion Office also established a communication platform between investors and landholders, with administrative contracts to ensure the rights and obligations of both landholders and PV investors. The landholders can receive land rent from PV investors, while PV investors can have income by selling electricity.

This model adopts an open tendering procedure in order to strengthen the process and scale of solar PV capacity, and to prevent investors from attempts to sign an administrative contract and seriously damage the rights and interests of the landholders.

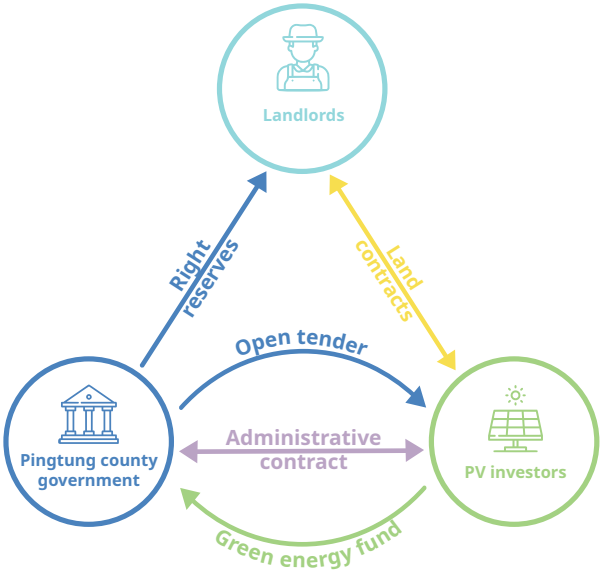

Figure 4 – Zero budgeting model

Multilevel cooperation to achieve climate goals

The Pingtung case is also a good example of how different levels of government collaborated towards a climate goal. Previously, the central government stipulated that when a farmland (designated in the land use plan) is to be rezoned or used for non-agricultural purpose, such as setting up PV system, the investors will be charged a handling fee/ administrative fee (similar as feedback fund).

When Pingtung decided to promote renewable energy locally, the county government negotiated with the central government, showing that the subsided farmland are not arable and could be used for solar system purposes. As a result, the handling fee of rezoning of non-arable farmland for solar system was waived.

Key success factors

Good governance

The experience of Pingtung has shown the importance of good governance in conducting climate projects. The creation of a Green Energy Promotion Office enabled the county government to manage the achievements and results obtained from the implementation of green energy projects. The Office, aligned with the central government's green energy policies, established a platform for communication and coordination, created a single-window system to accept inquiries, provided investment for green energy industries, offered services for the installation of green energy facilities, and assisted in overcoming administrative obstacles.

Minority protection

When designing the project, the county government considered local residents' needs, especially in regards to minorities and vulnerable groups. Whether through an open channel to receive inquiries or seminars to explain green energy projects, the government made sure to mainstream the citizens' needs and protect the rights of local residents and landowners.

The Green Energy Promotion Office helped not only to protect the landowner rights after leasing their properties, but also to avoid a free market mechanism, avoiding unfair practices.

Furthermore, the project also provided a solution for the aging population. As the aging farmers are not able to work, the county government integrated the solar power to the grid of the Taiwan Power Company (Taipower) through a feed-in tariff contract for 20 years, which gave the elderly farmers an alternative to earn their living and obtain stable incomes.

Co-benefits

Beyond tackling climate change and reducing CO_2, the project also had environmental and socioeconomic benefits. With the new installments, further land subsidence was prevented through reducing groundwater extraction by farmers and fishers and installing solar panels in the areas that were devastated by natural disasters. In total, 170 hectares were used as photovoltaic sites at the initial stage, including 140 hectares of the non-arable land and 30 hectares of the fish farm. The project is also expected to continue in the long term, amplifying its results and impacts to the local communities.

In economic terms, the project also created a new industry chain and job opportunities with the emergence of multiple factories producing solar panels and the increased demand for workers to install them. This promoted the green energy industry, enhancing the local economy and created new job opportunities.

Building on data and analysis

The implementation of climate projects has to include a mapping of the target areas, considering potential negative impacts on the main economic activities. Pingtung county selected areas that suffered with land subsidence to install the solar power infrastructure, avoiding the fragmentation of farm lands and the decrease of agricultural products.

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Led by ICLEI, the Transformative Actions Program (TAP) is a global initiative to support local and regional governments transform their net zero emission and resilient development infrastructure concepts into mature, robust and bankable projects ready for financing and implementation.

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