

How solar fish farms boost Taiwan's energy transition

By Richard Chang, Head of Taiwan, Aquila Clean Energy APAC

Since Taiwan published its "Pathway to Net-Zero Emissions in 2050" early last year, the region has made great strides towards a wider adoption of renewable energy. In March 2023, the state-owned [Taiwan Power Company announced](#) that wind and solar had reached about 15% of the energy mix over seven consecutive days and even outpaced coal at one point. Further exemplifying that our pathway to net-zero is well underway, throughout 2022, Taiwan connected 2.5 GW of solar (on rooftops and fishponds) as well as more than 1 GW of offshore wind power capacity, the utility provider shared.

When it comes to solar energy specifically, the government has set a short-term goal of achieving 20 GW generation capacity by 2025, which would double the installed capacity from the end of last year. A main constraint on this journey is the extensive space required for solar parks which must compete for land, often in the largely populated west of the island. While this area offers the best conditions in terms of irradiation and proximity to grid connections, it is also desirable for agriculture. That raises the question: How can we further advance Taiwan's decarbonisation without disrupting our fellow citizens' everyday lives too much?

Floating PV has become a popular alternative. [A report](#) released by research firm Wood Mackenzie expects Taiwan to reach 3.2 GW of floating PV by 2031, which would make the region one of the leading proponents of the technology globally. The installation of solar panels on top of underused bodies of water, such as detention ponds or reservoirs, can be less invasive for both humans and the environment. But another solution that I'd like to discuss here could become even more beneficial are solar fisheries.

The case for solar fisheries

One argument that conventional solar parks commonly face is that they lead to the loss of farmland and natural areas. However, as the authorities and the public increasingly recognise the many advantages of dual land use, opportunities for co-locating solar farms with other agricultural uses arise and provide a solid counter argument to the land use concerns.

Solar-fishery plants are one such example and make it possible to produce clean energy on-site by installing photovoltaic systems on top of the fish farm. Furthermore, they leverage the extensive number of fish farms that are already dotting the west coast of the island - without taking up valuable and limited agricultural land or reducing productivity of the existing farms.

As a matter of fact, the administration has earmarked 15,000 hectares of land for this use specifically, which it has screened for potential environmental and social impacts and is currently providing generous incentives to expedite the rollout. The industry anticipates adding between 500 MW and 800 MW per

year of solar fishery plants to the grid, reaching a total of 3–4 GW by 2025. Many projects are already underway or slated to begin shortly and if brought to fruition successfully, these projects could greatly contribute to Taiwan’s 2025 clean energy generation goals.

There are productivity improvements too. In a solar fishery farm, the panels are located above the ponds, and thus do not affect the breeding or broader fish farming activities, while floating PV could potentially disturb fishing activities on lakes or coastal areas.

Farmers, meanwhile, can count on additional income from leasing their land to the solar plant operator. In addition, through upgrading their facilities, for example by having the solar array installed, they can also increase the resale value of the land. Farms that run on older equipment, like pumps and aerators, feed dispensers and water-heating systems, also have an opportunity to be modernised during the redevelopment process.

Finally, a solar fishery installation may help optimise the breeding conditions. The PV modules, which are attached to pillars and cover the pond, provide shade, reduce water evaporation and protect against predatory birds. A 100-kW research facility in Vietnam run by [Fraunhofer ISE proved](#) found that the panels ensured a stable and lower water temperature which supported shrimp growth.

Taiwan’s vital food resource

Taiwan treasures its fisheries industry, which employs about 350,000 people and produces around NT\$78 billion (US\$2.49 billion) a year, according to [data from Taiwan’s Ministry of Agriculture](#). Nearly 30% of the country’s fish production comes from its more than 43,500 hectares of aquaculture and fish and seafood make up a significant portion of the Taiwanese diet.

Even with the significance of this industry, the sector is traditional, and innovation is often slow. Therefore, the government hopes that developments like the solar fisheries will improve the farmers’ quality of life and help revitalise the industry while also protecting this essential source of food.

Nevertheless, developing the solar fish farms can come with challenges. Gaining the buy-in from farmers can be difficult and building an entire solar plant might require consent from several parties with different interests. Consequently, the fish farmers’ specific requirements must be carefully considered when designing the solar plants to secure their livelihood and gain social licence for the projects. As a result, projects are often a patchwork of installations across multiple fish farms – an implementation challenge that other developers installing a solar farm on one continuous plot of land do not face.

Even with these challenges to consider, though, I still firmly believe that solar fish farms can and will play a prominent role in our energy transition journey thanks to their benefits of dual land use, increased productivity and improved breeding conditions, as well as through higher income and land values for our fish farmers. With Taiwan’s decarbonisation blueprint underway, solar fisheries can indeed be the

key to the future of one of Taiwan's most traditional and important sectors while also supporting the region's ambitious clean energy goals.