

Fishery and electricity symbiosis – A win-win situation of combining farming and photoelectricity

The Fisheries Research Institute of Executive Yuan (FRI for abbreviation) is going to experiment how shadowing effect generated by photoelectric facility towards breed' s growth under the premise of 40% shadowing rate regulated by the laws. Particularly on main breed species like clam, milkfish, Tilapia and striped bass and so on. Initial experiment has more than 70% production. Fishery and electricity symbiosis has stepped out its first step firmly. FRI will keep testing other evaluations and find out the best way to operate and manage the use of fishery and electricity symbiosis combining to species. To respond to climate change, sustainable environment and green technology, government has developed polices for it with the core of using renewable energy. The police is to set 17GW of solar energy photoelectric facility which occupies about 25,000 hectare. But, we aren' t rich in land resources in Taiwan. The fishery used field must be considered. And is will definitely bring shock to the original working system when promoting the police. Thus, the solution behind how to balance energy polices and fishery development will lay behind the question: How to develop new Fishery and electricity symbiosis modules under the premise of agricultural production as main, green energy as supplement. The top 5 fish of fishery farming in Taiwan are: milkfish, clam, Tilapia and striped bass. And the farms are mainly located at Changhua, Nantou, Yunlin, Chiayi, Tainan, Kaohsiung and Pingtung . These are the areas rich in solar power the most in Taiwan. If we can apply the module to these areas without affecting current farming production. It would develop photoelectric green energy industries, increase fisherman' s revenue in selling energy; become a great incentive for young generation engaging in agriculture and for green energy company' s cooperation. Also, it would improve the construction of agricultural labor force, and the application of smart technology in farming would generate even more profit from “win-win for fishery and electricity” .

FRI has simulated effect of 40% shadowing rate of photoelectric panel this year (2018), towards species like clam, milkfish, Tilapia and striped bass and so on. For clam, experiment suggest that during the summer time, the panel could block sun beams directly which lower the temperature of the water and the mud in the bottom effectively. The test group with 40% shadowing rate had better growth than the control group that is without. During winter time that is with shorter day time and lower water temperature, the test group' s growth slowed down a bit due to the lack of the feed, but still, it has 70% effectiveness of the control group. Low temperature period and the supplement of the feed will be adjusted in the future experiment. In addition to that, FRI has worked with National Chiayi University on the test of effect of simulating floating solar photoelectric facility towards the growth of milkfish, Tilapia and striped bass. The initial result also suggests that 40% shadowing rate wouldn' t affect the growth of the species. These

summer time experiments with different photoelectric facility all suggest that the drop of the temperature caused by the shadow is making the farm system more productive. To evaluate the benefit of using Fishery and electricity symbiosis in clam farming precisely, and to reinforce the management, FRI is working with Sunny Rich Power Co. to set pillar solar photoelectric facilities with different shadowing rate on experimental pool of 4 Taixi experimental field occupying 0.5 hectare each. The pillar facility has capacity of 1,436kWp. They' ve connected to Taiwan Power Company' s wires in parallel in the early Oct. And FRI has farm clams in Nov to test fishery and electricity symbiosis in practice combining with the technology of cultivating outdoor microalgae, the monitoring of the water and the development of the devices related to it. It' s a new era of intellectual fishery and electricity symbiosis farming industry.

To accelerate the pace of l fishery and electricity symbiosis, FRI is planning to set a 10 hectare green energy farming laboratory in the sea breeding research center in Qigu Tainan and experimental field in Taixi each. Business companies are provided to set a spot in it, allowing them to test the efficiency of the whole photoelectric farming system and develop the system for management. FRI will offer suggestion aside. We hope the laboratory could become a spot where we cultivate people with the ability to integrate the skills of farming and photoelectric system. And we can increase our competitiveness and profit in fishery in Taiwan.





FRI' s sea breeding research center in Taixi with clam pool and solar photoelectric farming facility. Clam has been released into the pool to test.



Working with National Chiayi University at sea breeding center testing pool. To simulating floating solar photoelectric facility towards the growth of fish.