

# Demonstration of the Feasibility of Solar Energy in Sustainable Agriculture to Address High Costs in Conventionally Produced Electricity

**Pedro Ariola (Farmer/Rancher Grant Program)**

Project Number: FW09-006

Title: Demonstration of the Feasibility of Solar Energy in Sustainable Agriculture to Address High Costs in Conventionally Produced Electricity

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Pedro Ariola with the inverter for his solar system.

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## Situation:

The Commonwealth of the Northern Mariana Islands has one of the highest electrical rates in the nation.

Because of limited, expensive land and strict regulations on effluent discharge, most of the aquaculture producers in the CNMI produce shrimp and tilapia using Recirculating Aquaculture Systems (RAS).

RAS production requires the use of air and water pumps 24 hours a day to sustain the high density of fish required to make such systems economically feasible. However, at the rate charged by local utility companies, producers are challenged to sustain their operations.

This project was initiated to investigate the use of renewable energy sources, such as solar, as alternatives to conventional power generation to reduce production costs and increase profitability.



Tilapia at Ariola's aquaculture operation.

## Objectives:

- Demonstrate the feasibility of alternative energy systems to other aquaculture producers as a means of reducing the cost of energy, which is 40% of production costs
- Promote sustainable agriculture practices with planned field and media days and proposed workshops



Ariola demonstrates how he captures shrimp ready for harvest.

## Actions:

To test the feasibility of using a renewable alternative energy source, the project team purchased nine 60-watt solar panels and installed them on the grant recipient's roof. The panels were connected to a controller and four deep-cycle batteries that store energy from the sun.

A 600-watt power inverter was then connected to the batteries to power the three water pumps that circulate water through filters and back to the culture tanks.



The solar panels sit atop Ariola's house on Saipan.

## Results:

With the solar panels, the project coordinator has been able to run his water pumps for 12 hours from renewable solar energy and 12 hours using energy from the grid, reducing his energy costs by half. The savings are being used to reinvest in farm improvements and expansion.

A field and media day held Nov. 18, 2010, generated articles published in two newspapers, which, in turn, has generated significant interest. Several current and prospective farmers requested tours of the project coordinator's farm.

In addition, workshops, titled "Sustainable Aquaculture Practices in the Commonwealth of the Northern Mariana Islands," were held March 15, 2011, in Songsong, Rota (33 attended), and March 27, 2011, in Susupe, Saipan, (32 attended).

As a result of outreach from the project, one tilapia producer on the island of Tinian has installed a renewable solar system that powers his linear air compressor to provide aeration for his tilapia.



Michael Ogo, aquaculture specialist with Northern Marianas College, conducts a workshop on Rota.

## Potential Benefits:

This project, the first of its kind in the CNMI for aquaculture, has raised hopes for prospective aquaculture producers who had been hesitant to commit owing to high costs for conventional power.

## Recommendations:

The system for this project was designed and installed with the AC-powered water and air pumps already in place. The project coordinator recommends that anyone looking to install a solar-powered system might consider using DC-based systems now coming on the market. DC-based equipment can streamline the system and add savings.

Ogo points to baby tilapia swimming in Ariola's artificial fry incubator system.

