

# Micropilot PROJECT GUIDE

2020

An initiative contributing



This material belongs to the project "Encourage young specialists to boost agri-food value chains and build sustainable business models"  
And it was designed by



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# System and equipment

The micropilot is a solar irrigation system, which ensures the supply of energy to irrigate crops.

The system is composed of solar panels that satisfy the electrical requirements of the new water pump, keeping the operation costs as low as possible.

The general scheme of this solution is presented in the following figure.



## WHAT ARE THE BENEFITS OF THE PROJECT?

The micro-pilot is connected to the electrical grid to take advantage of the maximum production of the solar system, covering a large part of the electrical consumption and reducing electricity costs.

In addition, it allows to return the surpluses to the network. Although these surpluses are paid at a lower rate than the

consumption rate, they still help to lower the bill additionally. This whole mechanism

works automatically, safely and without user intervention.

The user can easily verify how much energy has been delivered to the network, since the traditional meter is replaced by a two-way meter. This registers the electricity consumption and the surpluses separately.

## HOW DOES IT WORK?

The system is connected to the electric panel and works together with the electric network. In this way, the place has two sources of electricity: the distributor and the solar system. Both sources automatically complement each other to cover the consumption.

This feeds the water pump electrically. Its operation will allow the irrigation of the community's plantations in a sustainable and environmentally friendly way.

This improvement is the beginning to promote responsible production and consumption contributing substantially to poverty alleviation and the transition to green economies with low carbon emissions.





# Training and maintenance benefits

## TRAINING

It is important that the installer of the photovoltaic system gives the user a small training on how the system works and is used, teaching basic cleaning and care as:

- Energization and de-energization of the photovoltaic system
- Basic maintenance of a photovoltaic panel.
- Operation and maintenance.
- Safety for the user.

maximizing availability of the plant and the energy delivered.

- Increase the life of the photovoltaic plant.



## BENEFITS OF MAINTENANCE

In general, photovoltaic systems are very manageable and safe, their useful life can be up to 25 years. However, over time, the system is exposed to the weather with changes in temperature, rain, storms, ultra violet (UV) radiation, among others. Although all the components have to meet the regulatory requirements for outdoor, faults (e.g. a fuse defective) can occur. Sometimes these faults can be repaired at low cost, otherwise affect the expected performance and savings on the electric bill in a noticeable way. Therefore, every photovoltaic plant needs an eco-friendly maintenance, which can benefit your institution from three possible ways:

- Improve performance by increasing the amount of energy delivered during your operation.
- Avoid or, at least, reduce the system's inoperative time,
- 



# Cleaning

The performance of photovoltaic panels also depends, to a large extent, on their cleanliness and good state of maintenance. Dirt is deposited on the surface of the panel making it difficult to capture electromagnetic radiation with the consequent reduction in electricity production. The losses produced by the dirt deposited on the collectors vary between 10% and 15%.

For this reason, within the different preventive maintenance programs of the photovoltaic system, it will be necessary to plan the necessary cleaning tasks to keep the surfaces of the panels in perfect condition, maximizing the production of electricity and reducing the amortization period of the investment.

## PANEL CLEANING

Since the dirt that can accumulate on the panel can reduce its performance, the layers of dust that reduce the intensity of the sun are not dangerous and the power reduction is usually not significant. It is advisable to perform a cleaning once a month, as follows:

Cleaning should be done with water (without abrasive agents or metal instruments) and a non-abrasive sponge. Preferably it should be done outside the central hours of the day, to avoid sudden changes in temperature between the water and the panel (especially in summer).

## GENERATION SYSTEM CARE

Ensure that no avoidable shadows are generated on the panels. Example: avoid

any object to shade the solar panel, prune trees or move objects that could cover it.

Avoid damage to the solar panels. For example: do not let them hit or throw stones at the solar panel.

Visual inspection: periodically check connectors and cables. Any observation should be reported immediately to the persons designated to take the necessary measures. Only Qualified personnel can handle the cabinet internally.



# Monitoring

Monitoring is a periodic task that allows for the documentation and use of results, processes and experiences as a basis for directing decision-making and learning. It is a progress verification mechanism created to see if the project is on track and meets the established results within the time limits as mentioned in the project design.

Evaluation focuses on how well or how poorly the project has been implemented, the extent to which it has achieved the intended results, the challenges faced during implementation, and how these have been or could have been mitigated. It is also a basis for deciding whether replication or scaling up is possible.

The main recommendations for the formulation of a monitoring and evaluation framework are

## MEASUREMENT OF INFORMATION

The idea is to collect the information needed to determine the efficiency and results of the project. This allows to optimize resources in terms of cost, effort and time.

## DATA COLLECTION TOOLS

For this purpose, a series of tables are provided in the annexed section that allow to record the operation of the solar panels and the water pump. It is recommended to make the registration for at least 3 years.

## IDENTIFYING ROLES AND RESPONSIBILITIES

It is imperative to assign specific roles and responsibilities within the project team staff. It is important to define who is responsible for collecting the data for each indicator.

## COMMUNICATION WITH STAKEHOLDERS

Findings should be shared with stakeholders to help make necessary modifications, ensuring the success and progress of the project.





# Precautions

The PV board should remain closed and should only be opened and handled by qualified personnel.

Do not move the PV board.

Any source of heat such as stoves (kerosene) kerosene, wood, coal, etc.), stoves, ovens, chimneys, engines, generators or other similar source, should be kept away of the board, with a separation greater than 3m.

The assembly structure must not be intervened or modified.

The photovoltaic panels and their connections should not be intervened.

Don't forget, you can only check periodically: the control panel, the cleaning of the installations, the state of the cables and protections, the authorized personnel

## **FIRE, EARTHQUAKE AND ELECTROCUTION PROTOCOL**

Establish a protocol with your community and project administrators that sets out the roles and actions to be taken when the system is offline

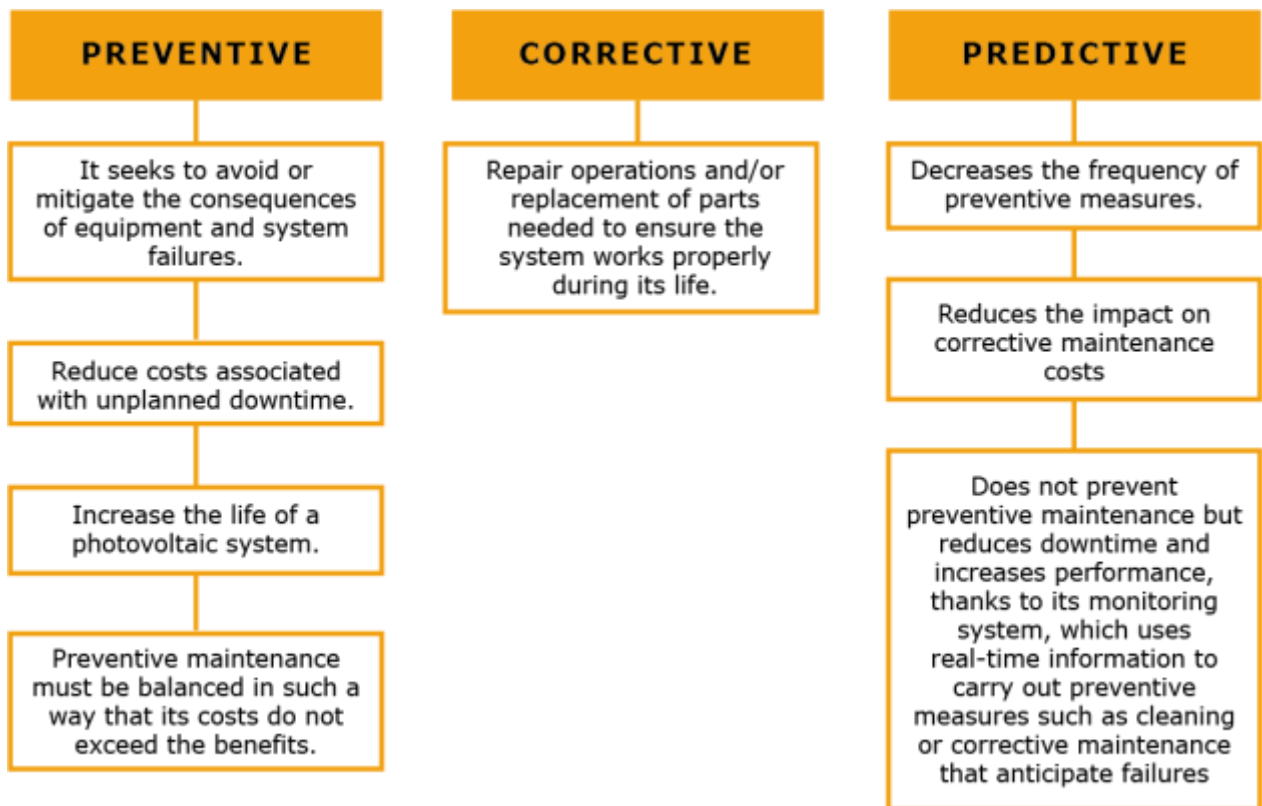
Physical structural review of the photovoltaic plant

Finally, if the regulations require it, a fire extinguisher must be available



# Maintenance plan

Photovoltaic systems have a lower maintenance requirement compared to other systems electricity generators. Even so, maintenance is a relevant component to guarantee the predicted performance. In general, maintenance is low cost and the failures corrected are usually worth the expenses and thus the return of the investment is guaranteed. However, it must always be kept in mind that a system that does not work properly does not generate savings, so possible losses due to non-operation must be weighed against the costs for maintenance.



## Environmental conditions affecting maintenance:

Humidity, temperature, snow, bird population, marine environments, high wind levels, emissions or dust caused by agriculture.

# Annex

## SOLAR PANEL CLEANING

DATE	STAR TIME	END TIME	PERSON EXECUTING	COMMENTS



# Annex

## WATER EXTRACTION FLOW RATE

DATE	STAR TIME	END TIME	MEASURING DIAMETER	NOMINAL FLOW (m3/h)



**CONTACT US**  
**+ (+374 10) 523604**

**[www.awhhe.am](http://www.awhhe.am)**  
**[office@awhhe.am](mailto:office@awhhe.am)**