

# PHOTOVOLTAIC MILK COOLING CENTER

Strengthening of rural growth and enhancement of food safety with renewables energies in Sub-Saharan Africa

## THE MISSION

Almost two thirds of the African population earns their living with agriculture and fishery. However this sectors contribute only 17 percent to the social product.

Productivity is often low because of the missing infrastructure and limited processing facilities.

In this context renewable energies linked with cooling technology can play a major role to strengthen decentralized rural growth. Technology helps to improve food safety.



## THE SOLUTION

The system of milk collection in sparsely populated regions of developing countries is based on milk collection centers.

The farmers which often only own a few cows bring their milk to the center where it is measured, quality tested and cooled. Milk trucks pick up the milk every second or third day.

Out of the resulting requirements the German „Institut für Luft und Kältetechnik Dresden“ has developed an innovative cooling solution which uses the sun as a free and endless energy source. As a result there are no costs for the use of a generator set.

## THE BENEFIT

Farmers and cooperatives in remote regions can service a wider market with their product and raise the profit.

Milk processing companies can increase the number of their suppliers and their production. At the same time the quality of the supplied raw milk can be improved. Hence food safety can be increased with the system.

With training of operators and service teams the competence in cooling and photovoltaic technology is strengthened.



## COOLING WITH SOLAR ENERGY

It is not basically new to operate cooling systems with photovoltaic in regions without power grid.

Unlike the conventional solutions this system uses an ice storage to store surplus energy instead of battery systems which are very expensive in maintenance.

Due to this all components are highly energy efficient.

With this concept the recurring expensive and ecologically harmful exchange of the battery system is not necessary.

(There is only a small battery for secondary systems.)

The solution for cooling raw milk is designed to store 500, 1.000, 3.000 and 5.000 liters of raw milk until collection. (Other quantities are also available.)

With this concept farmers in remote rural regions without or with poor power grid are able to sell their milk to processing companies.

The milk can be stored up to 3 days according to the collection cycle.

During this time the milk is cooled even with low sun.

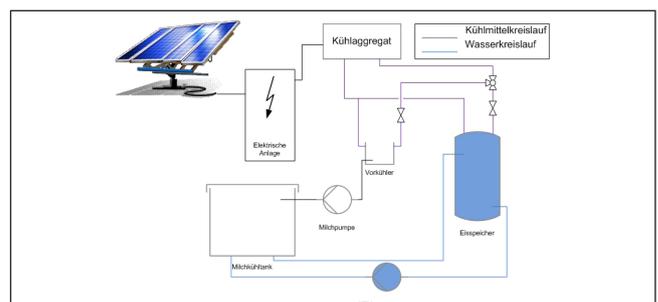


## TECHNICAL DATA

for a 1.000 liter System

PV-Power:	4.5 kWp
Daily cooling power:	20.4 kWh <sub>th</sub>
Capacity ice storage:	30 kWh <sub>th</sub>
Power cooling aggregate:	2 kW <sub>el</sub>

The system can be integrated into an ISO container as well as into a building.



## CONTACT

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# PHOTOVOLTAIC ICE MAKER

Strengthening of rural growth and enhancement of food safety with renewables energies in Sub-Saharan Africa

## THE MISSION

Almost two thirds of the African population earns their living with agriculture and fishery. However this sectors contribute only 17 percent to the social product.

Productivity is often low because of the missing infrastructure and limited processing facilities.

In this context renewable energies linked with cooling technology can play a major role to strengthen decentralized rural growth. Technology helps to improve food safety.



## THE SOLUTION

In rural areas at the coast or at a lake the local population often practices fishery.

Unfortunately these areas are often not electrified. Therefore it is difficult to produce ice to cool the fish. Ice has to be transported over long distances or there is no ice at all.

The solution is to produce ice locally. Therefore the German „Institut für Luft und Kältetechnik Dresden“ has developed an innovative ice maker which uses the sun as a free and endless energy source.

As a result there are no costs for the use of a generator set.

## THE BENEFIT

Fishermen and cooperatives in remote regions can service a wider market with fresh fish and raise the profit.

Fishmonger can increase the number of their suppliers for fresh fish and don't have to bring ice to remote regions. At the same time the quality of the supplied fish can be improved. Hence food safety can be increased with the system.

With training of operators and service teams the competence in cooling and photovoltaic technology is strengthened.



## COOLING WITH SOLAR ENERGY

It is not basically new to operate cooling systems with photovoltaic in regions without stable power grid.

Unlike the conventional solutions this system uses adjustable cooling technology to make the most of the available radiation of the sun instead of battery systems which are very expensive in maintenance. Due to this all components are highly energy efficient.

With this concept the recurring expensive and ecologically harmful exchange of the battery system is not necessary. (There is only a small battery for secondary systems.)

The ice maker is designed to produce 250 to 300kg of crushed ice per day (Other amounts are possible).

Fresh water from any source will be treated with an integrated UV water disinfection unit before it will be converted to crushed ice. The disinfection ensures food safety.

The produced ice can be hold in an integrated storage for 2 days.



## TECHNICAL DATA

PV-Power:	5.1 kWp
nom. cooling power:	5.9 kWh <sub>th</sub>
Daily ice output	300 kg
Capacity ice storage:	500 kg
Water tank	
UV-water disinfection unit	

The system can be integrated into an 20ft ISO container as well as into a building.

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