Bundesanstalt für Landwirtschaft und Ernährung

Projektträger Bundesanstalt für Landwirtschaft und Ernährung

Project update

Project title (Acronym):	**Development of Milkfish (Chanos chanos) and Kimarawali (Stolephorus delecatulus) Solar Drying-Cooling Technology, Value Addition and Quality Assurance**
Geographical focus:	Kenya/Coast/tbd
Call reference:	"Innovative approaches to process local food in Sub-Saharan Africa and Southeast Asia" (Bekanntmachung des BMEL: Innovative Ansätze zur Verarbeitung lokaler Lebensmittel in Subsahara-Afrika und Südostasien)
Cooperating partners:	Fraunhofer Institut für Solare Energiesysteme ISE Innotech Ingenieursgesellschaft mbH Kenya Industrial Research and Development Institute KIRDI Kenya Marine and Fisheries Research Institute KMFRI Technical University of Mombasa TUM
Duration:	09/2018 – 12/2023
Budget:	1.522.614,31€

Map of the target region

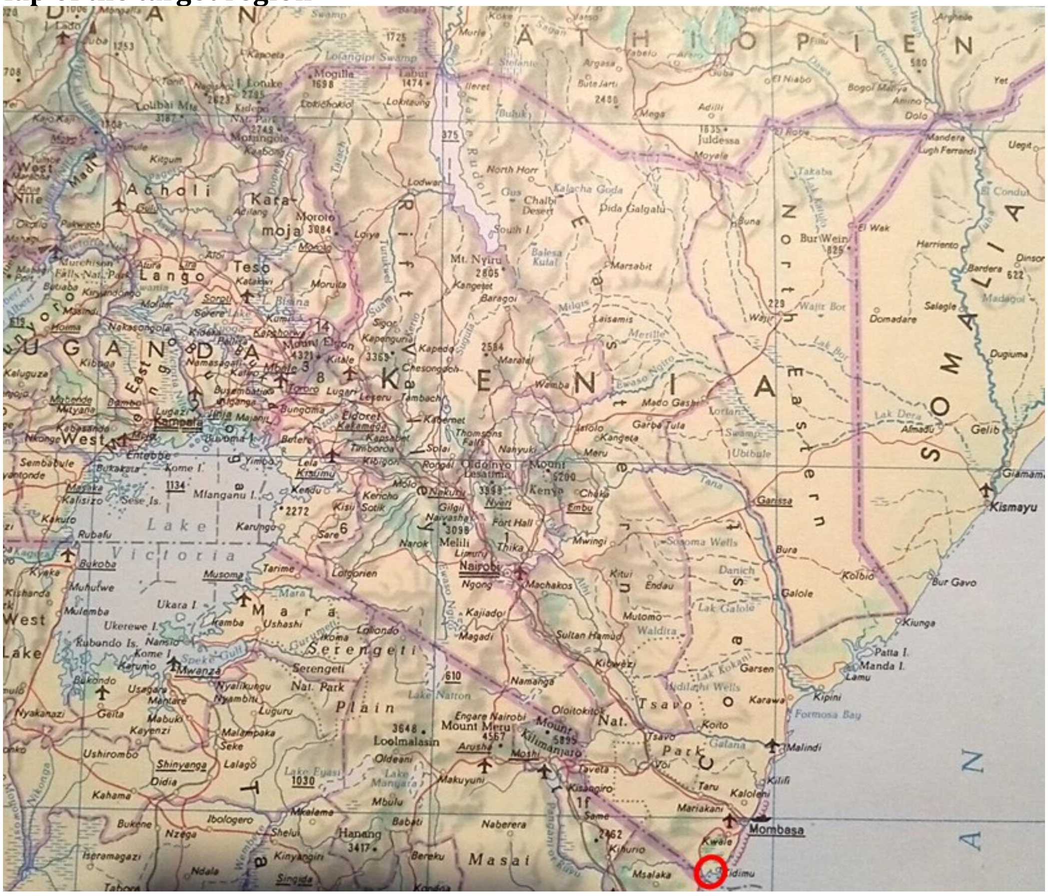

Fig. 1: Map of the target region in Kenya (Source: Haack Weltatlas, VEB Hermann Haack, Geographisch-Kartographische Anstalt, Gotha/Leipzig, 1972, 1. Auflage)

Aim of the project:

The aim of the project is to support local fishermen and farmers through the solar, and thus off-grid, production of ice for cooling fish between catch and consumer, as well as the provision of drying capacity, thus contributing to the reduction of so-called post-harvest losses through the preservation of fish and also other agricultural products.

Results:

Within the SolCoolDry project (FKZ: 2816PROC15), a system for solar ice production and drying was developed and set up in Mwazaro, in southern Kenya. The system is in operation since late summer 2022. In addition to Fraunhofer ISE, Innotech Ingenieursgesellschaft mbH is involved in the project in Germany, while the partners in Kenya are the Kenya Industrial Research and Development Institute KIRDI, the Kenya Marine and Fisheries Research Institute KMFRI and the Technical University Mombasa.

The system concept was developed by the partners in Germany. The final implementation of the system could only be realized in close cooperation with the partners in Kenya as well as through the active collaboration of the members of the local Beach Management Unit BMU in Mwazaro. A video tutorial was created in advance for the on-site system installation and handed over to the Kenyan partners. At the same time, all components were transported to their destination in a sea container. Thanks to the tutorial, the local partners were able to carry out most of the installation work, so that the time and effort required for commissioning was significantly reduced.
The system consists of a photovoltaic system with 15 kilowatts of power that feeds into a three-phase, battery-supported stand-alone grid, which is used to power the ice machine and the cold storage room. The ice machine produces a maximum of 550 kilograms of ice during the day. Excess solar power is fed into batteries with a total storage capacity of 19.2 kilowatt hours which is used to start the ice machine in the morning hours the following day. On the other hand, SolCoolDry consists of two solar tunnel dryers from Innotech Ingenieursgesellschaft mbH, which heat the air during the day and guide it over the products to be dried using a fan. In order not to have to interrupt the drying process at night, one of the dryers is equipped with heating pipes which are supplied with heat from a 2000 liter hot water tank during the night hours. This is heated during the day by a 12 square meter flat plate collector array.
Control and data acquisition are performed locally via a programmable logic controller, thus ensuring independent operation. To monitor the system and support the operators on site, the monitoring data is transmitted to Fraunhofer ISE via a mobile radio network and made available to all partners on a website.

The system was officially inaugurated in February 2023 as the SolCoolDry - Research, Innovation and Business Hub and thus handed over to the local partners of the Beach Management Unit Self Help Group in Mwazaro in southern Kenya.

Key statements and policy advice:
The reduction of losses occurring between catch and sale of the fish to the end consumer must be achieved on the one hand by suitable technologies (cold storage on ice or also drying) and on the other hand accompanied by intensive training and further education measures. This is the only way to ensure that the efforts made so far are sustainable and fit for the future.

Pictures

SolCoolDry

Research, Innovation & Business Hub

Abb. 2: Logo of the project

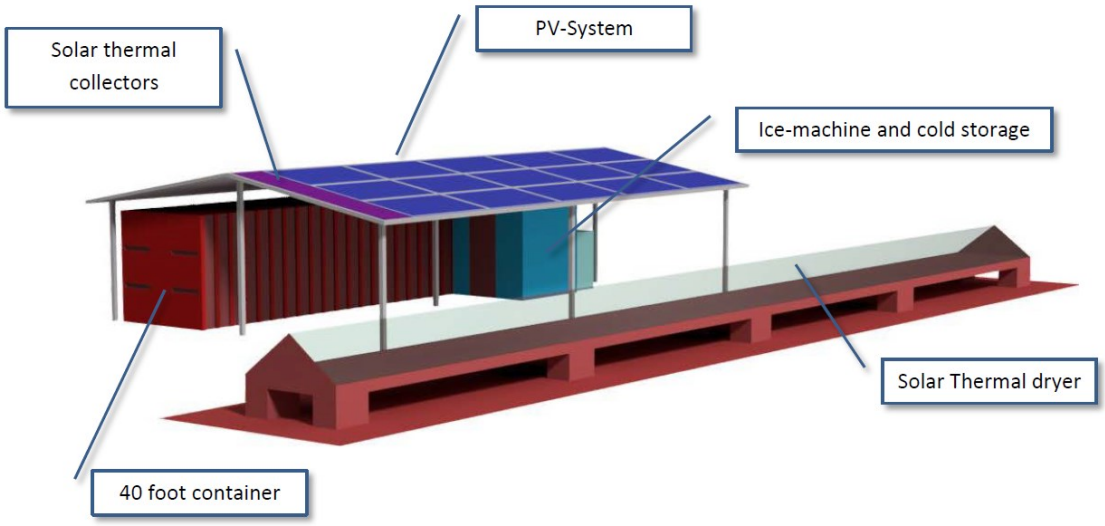

Fig. 3: Simplified system concept with photovoltaic system, solar collectors, 40-foot container, ice machine and small cold room for the flake ice, and solar thermal dryer.

Fig. 4: Completed SolCoolDry system: in the foreground the two solar tunnel dryers and in the background the container with the battery and solar technology, which is shaded by the solar roof. In the shadow on the right side is the ice storage room.

Fig. 5: Ice storage room and ice mashine behind it (left), ice dealer collecting ice (right)

Fig. 6: Preparation (left) and drying (right) of Kimarawali