

# Research Title: Perceptions, barriers and opportunities for deploying solar-powered cooling technologies: Evidence from Tanzania

## BACKGROUND

TANZANIA is one of the largest tomato producers in Africa, however, the tomato sector particularly small-scale tomato farmers experience high levels of postharvest losses and spoilage of their tomatoes due to poor storage conditions and lack of cold storage facilities.

Solar-Powered Cold Storage Facility, NIGERIA



- Sustainable and eco-friendly solution to reduce postharvest food losses and spoilage on perishable crops such as tomatoes
- Low-cost compared to diesel or grid powered
- Suitable for small-scale farmers in off-grid locations

## RESEARCH PROBLEM

In Tanzania, only a few have been deployed and largely remain in the hands of large-scale farmers and well-established agro-processors and food exporters.

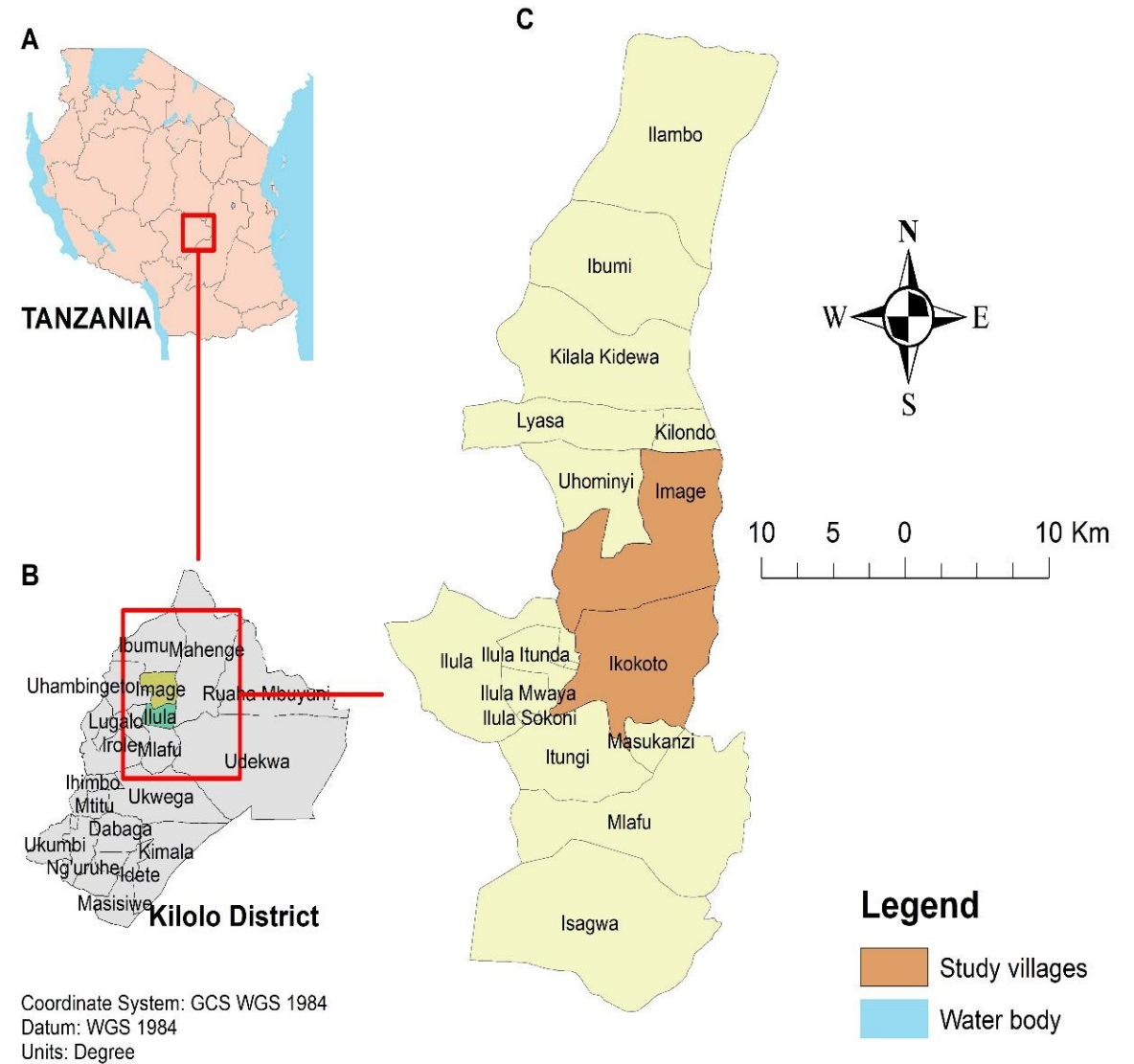
## Research Focus

- Explore farmers' perceptions regarding solar-powered cold storage technologies?
- Examine barriers impeding the deployment of solar-powered cold storage technologies in Tanzania?
- Establish how state and non-state actors can intervene.

## Research Methods

- In-depth interviews with tomato farmers, traders and Experts from Solar Companies, Govt and NGOs (n=67)
- 2 Focus Group Discussions with Farmers (n=12)
- Thematic Analysis Approach

# Study Area



**KILOLO District** is the largest producer of fresh tomatoes in Tanzania; and the biggest supplier of fresh tomatoes consumed in Dar es Salaam city and those exported to neighboring countries eg. Kenya, Rwanda, etc.

# Farmers Perceptions- Climate Variability a major Threat

## Weather Challenges and Pests pose a serious problem

- Pre-Harvest Losses caused by PESTS and CROP DISEASES is a major concern for FARMERS
- The vast majority of farmers experience substantial losses during the rainy season
- Concerns on STORAGE EFFICIENCY due to weather challenges eg. heavy rains during peak harvest season

## Other Major CONCERNS

- Consumer preference on FRESH TOMATOES vs Chilled tomatoes from the Cold Storage facility
- Fear of Cost due to inconsistent and lack of regular incomes

“I need better Pesticides to control pest attacks and alternative tomato preservation methods. **Most of the spoilage I experience is caused by pests, so good pesticides will control that.** I have tried a lot of pesticides from the local Agro-dealer shops in Ilula; I find nothing works; you spray today, then the next two days, pests have more than doubled. Don't KNOW if they are fake or of low quality” **(Tomato Farmer, Image Village, Tanzania)**

“If they can keep tomatoes fresh during the rainy season, that will be the kind of TECHNOLOGY we need, but anything that can't preserve tomatoes during the rainy seasons may not be appropriate in this village because we have rains almost throughout the year” **(FGD participants, Ikokoto Village, Tanzania)**

# Barriers to Deployment and Market Challenges

## High- Investment Costs

- Installation of a single medium-size cold storage facility could cost between \$50,000-\$100,000
- Small-Market Share, Low Return on Investment

## Limited Awareness to Potential Markets

- Tomato Traders, Fishery Communities and Dairy Farmers
- Inadequate Market Research

## Affordability and Lack of Financing

- High upfront costs for farmers and traders
- Consumer Preference on Fresh Tomatoes vs. Chilled tomatoes

**Untapped Markets:** Fishery Communities in Lake Victoria, Dairy Farmers, Small-Scale Food Exporters/ Processors

“A few years ago, we did a math to enter into cold room market, for a medium size solar cold rooms. We found out it would cost us about \$60,000- \$85,000 to invest for just one facility. And the batteries only last for 4 years, this means you need to change batteries after every four years. In short, the return of investment is still very LOW.”- (Chief Operations Officer, AG Energies- Solar World, Dar es Salaam, Tanzania, June 2021)

“If solar companies managed to come up with workable business models for radio, TV, and household appliances powered by solar for low-income markets. I think the same can be done on solar-powered cooling technologies. Currently, the solar market in Tanzania is well-developed; most rural households have one or two solar devices. This was only possible after solar entrepreneurs and companies **studied the market, understood market dynamics, did aggressive marketing, and came up with business models that work well for the low-income market.** (Senior Official, UN-FAO, Tanzania Office, June 2021)

# Conclusions & Policy Recommendations

## Breaking the Financial Barrier

- Develop flexible payment systems eg, *Facility Cost Sharing*, *Pay as you USE* targeting low-income markets (users)
- Lower deployment costs through *Special Tax Breaks* and *Import Exemptions* to local and foreign COLD STORAGE facility providers

## Comprehensive Market Assessment

- Establish Market Conditions and Viability
- Build investor confidence on Market Share and Opportunities
- Explore Untapped Markets eg. Fishery communities in Lake Victoria and Coastal Towns, Safari Hotels in remote locations etc

## Marketing, Awareness & Demonstration

- Fresh Produce Exporters, Fishery Communities, Dairy Farmers etc
- Large scale food markets in cities and urban centres
- The Economic benefits of solar-powered cold storage vs grid-powered cold storage

## Invest in Postharvest Extension Services

- Replace *Disposable Wooden Boxes* with *Re-usable Plastic Crates*
- Year-round Postharvest Management Training to Farmers & Traders
- Promote value addition postharvest practices focusing on food loss reduction through small-scale tomato processing near production areas
- Establish market standards, food safety protocols and certifications to reach premium markets



THANK YOU!!!