OUTDOOR SOLAR POWERED FRIDGE FOR FOOD PRESERVATION IN NIGERIA

Cold-Hubs is an innovation implemented in Nigeria addressing the cold storage needs of farmers who do not have access to reliable refrigeration.

By combining well-established technologies of photovoltaic energy supply and compressive cold generation with a novel concept of pay-as-you-need storage, the outdoor solar powered fridg developed by Nnaemeka Ikegwuonu, is a sustainable solution available for farmers to extend the shelf-life of perishable foods.

Cold room refrigeration is almost lacking in many rural areas of the world, causing the loss of 45% of food products. Nnaemeka Ikegwuonu invented the cold-hubs for storage fresh food to diminish the losses of small shareholder farmers and created in 2003 the Smallholders Foundation Ltd./Gte to produce and distribute it in Nigeria and abroad. This innovation has been recognized with prestigious international awards. In 2017 ColdHubs was among the 14 innovators selected through an open, global application process by the United Nations, to help address the 17 Sustainable Development Goals by 2030.

The solar powered walk-in cold room is made of 120mm insulating cold room panels to retain cold. It contains approximately 2 tons of perishable food arranged in 30kg plastic crates, stacked on the floor. Energy from solar panels mounted on the roof-top of the cold room generating approximately 5.5kw, is stored in high capacity long lasting batteries feeding the refrigerating unit. The temperature is kept around 5° Celsius. Farmers place their produce in clean reusable plastic crates that extend the freshness of fruits, vegetables and other perishable food from 2 days to about 21 days. The Cold-hub is oversized to generate power in all weather conditions.

The Cold-hubs minimize the post harvest losses faced by farmers and also reduce the mismanagement and waste of inputs, including labour, water, seeds or fertilizers. With more of their harvest to sell, smallholder farmers are able to increase their annual income by 25%.

Cold-Hubs are modular and can be installed in two weeks of civil, structural, electrical, refrigeration and electronics engineering in market areas and farms. They function according a flexible pay-as-you-store model: farmers pay a daily flat fee for each crate of food they

store. The flexible subscription is equal to US$0.50 a day per crate used.

The Hubs are designed for use in even the most remote corners of the country. They are simple to operate, and affordable to most people. Taking into account that the equipment is too costly for the average farmer to purchase, in order to promote the maximum spread of Cold-Hub stations in the country, the company adopts two solutions. The Coldhubs installed in a farm can remain the property of the company and the personnel are compensated based on the rate of crate usage at sites for which they are responsible. Farmers also have the option of forming co-operatives to buy their own Cold-Hub, with subsidized repayment plans.

Cold-Hub stations can be a source of revenue mainly by managing the operations of collection and storage of perishable food. They act as a warehouse, providing farmers an incredible opportunity to store their products when there is product glut in the market and sell later when prices increase. The overhead costs for marketing and office supplies are modest. They employ station attendants to operate and collect revenue that are local personnel, generally women, hired to provide the crates rental services. Market managers who are also farmers, coordinate the activity in the market or farms including encouraging farmers to use the cold room. The business model will enable the Cold-Hub to become self-sustainable within the first year of operation.

After many prototypes presented to investors and energy experts, the first Cold-Hub units were installed in Nigeria in 2014, giving farmers an opportunity to test them for 100 Naira ($0.50) per day. 50 Cold-Hubs were installed in 2016 and many are now in operation and constant use.

This innovation has been a great interest both in Nigeria and in many other countries where the possibility of preserve the freshness of fruits, vegetables and other perishable food it would allow not only food self-sufficiency but also the development of the many resources of agriculture managed by small farmers. Cold-Hubs, moreover, can represent a solution also for the refrigeration of medicines and vaccines, improving the health of populations living in rural areas.

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