

Guidelines for implementation for micro-solar Cold Storage Project in Jharkhand

1 Overview

Jharkhand is an agrarian state with more than 32 lakh hectares of land under cultivation producing more than 110 lakh tones¹ of grains and horticulture. About 75% of the population is dependent on agriculture sector for livelihood (National Sample Survey Organization (NSSO) July 2012- June 2013), making agriculture sector a key contributor in economic development of the State. Vegetables and fruits together account for nearly 46% of the total produce in the State comprising of lady's finger, brinjal, tomato, cabbage, cauliflower, peas, mango, lemon, and papaya etc.

While the State has a 30 - 35% horticulture surplus, due to its inadequate storage infrastructure, bulk of the produce deteriorates. It has been reported that Jharkhand loses about 37% of its perishable fruit and vegetable production. One of the key contributing factors for such high loss levels is lack of adequate infrastructure, such as, storage facilities, inappropriate logistic arrangement, and poor market linkages etc.

According to a study by Yes Bank, the State has **2,17,000 MT** of cold storage infrastructure and bulk of it was meant for multi-purpose use – including for storage of fruits and vegetables. The study highlights that the current gap for cold storage infrastructure in Jharkhand is around **579,000 Metric Tonne (MT)**².

Jharkhand has recognized horticulture as one of the focus areas for economic growth and has been striving to bring the sector into the mainstream of the State's economy. Jharkhand is one the largest producers of peas and tomatoes in the country; and cauliflower grows here round the year. The Jharkhand Food Processing Industry Policy, 2015 aims to establish the State as the leading state in food processing in India. To achieve this vision, one of the strategic areas of intervention proposed under the Policy is development of suitable infrastructure facilities including cold storages.

2 Significance of Solar Cold storage in Jharkhand

Cold storages require reliable power supply to maintain the desired temperature required for the storage of produce. However, the electricity supply situation in Jharkhand lacks reliability and sufficiency. The farmers get grid electricity for not more than 6 to 7 hours a day³ and there is no supply during the critical hours of the day – 6 pm to 10 pm. In the given scenario, cold storage with alternate power solution, such as solar, could prove to be very useful for the farmers. While diesel generator sets are one option, they are expensive and environmentally damaging. On the other hand, solar powered cold storages are a possible solution as it is economical compared to diesel as well as environmentally benign as Jharkhand is well endowed for solar energy. As per the National Renewable Energy Laboratory (NREL) satellite data, Jharkhand has solar

¹ Source: https://www.sameeti.org/default1_1sprof.htm, last accessed on 3rd December 2018

² Cold Chain Opportunities in India, Yes Bank - Dutch Embassy Collaborative Study, 2014

³ Source: Feedback from the field

insolation between 5.0 and 5.5 kwh/m²/day; and with 300 sunny days, it's a good location to harness solar energy.

The advantages of solar cold storages are discussed below:

- i. Reduction in Greenhouse Gas (GHG) emissions
- ii. Reduction in agricultural wastage
- iii. Economical in operational front
- iv. Ensures power reliability
- v. Addresses transportation woes of farmers to reach to the bigger storage facilities

3 Summary of Solar cold Storage Project across India

A summary of case studies of solar cold storage project in four different states has been presented below:

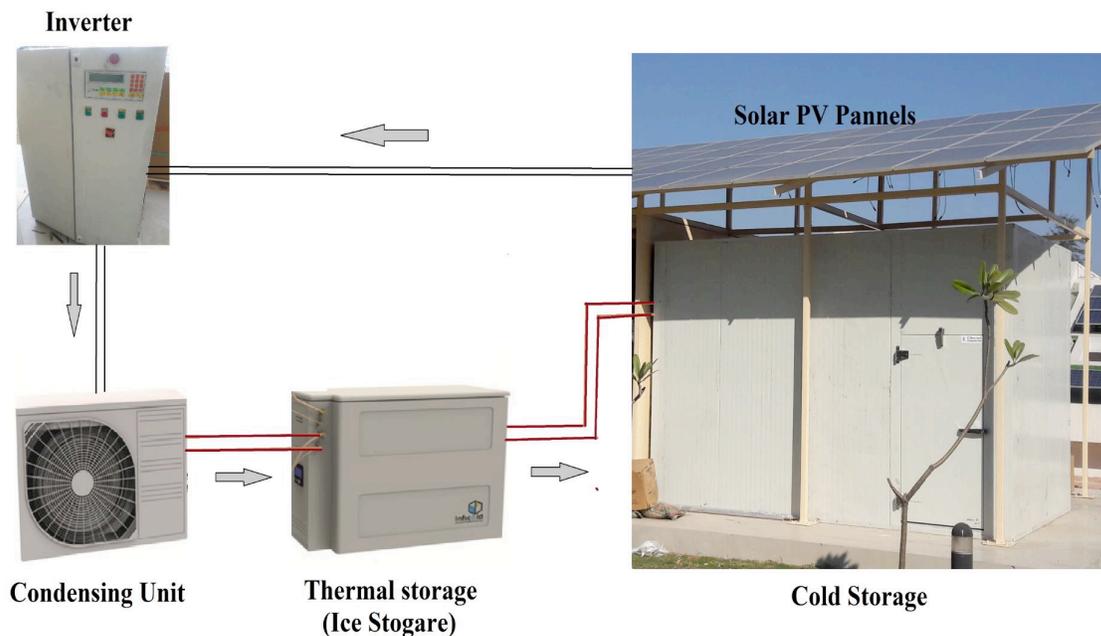
State	Gujarat	Maharashtra	Jharkhand	Jharkhand
Location	Dahegam	Yavat	Gumla	Koderma
Capacity Utilisation ⁴	40% utilization (average)	Almost 100% utilisation matching with the crop cycle	Not determined	50-60% utilization with the given crop cycle
Reduction in Wastage	Substantial reduction in crop wastage has been achieved	The members of the FPC have been able to achieve negligible wastage of their produce	Farmers have been able to avoid wastage by using solar cold rooms on rental basis	Working towards reducing wastage; especially tomato
Increased Market Access	Facilitated access to larger markets such as Delhi	Facilitated access to markets where premium on flowers is high, such as Ahmedabad	The fruit vendor in Pasanga has created backward linkages in wholesale market and forward linkage in the retail market at the village level.	The FPC has not been able to access larger markets as of now
Price realization	Realised almost 200% higher prices as compared to prices offered in local market	Revenue per stick of flower has increased almost by 75%-100%	Not determined as facility is being rented out	Realized almost 100% better prices by timing the market
Financial Viability	Financially viable and the farmer also has expansion plans	Financially viable; nearby farmers are also willing to invest in the technology	Not viable at present	Revenue stream is not defined yet
Payback Period	4-6 years, depending on the subsidy component	About 1 year	More than 10 years in case grant is not available	Not computed

⁴ figures from field interviews

4 **Solar cold Storage co-operative:**

- 4.1 A co-operative of group of farmers can be formed; the purpose of formation of co-operative is to increase the sense of responsibility amongst the group of farmers for smooth operation of solar cold storage unit.
- 4.2 Aggregating farmers to form co-operative shall give individual farmers more rights for utilization of solar cold storage unit rather than any other model.
- 4.3 Revenue shall be shared in the proportion of 30: 70 i.e. 30 percent of the revenues shall be shared amongst the group of farmers used the facility of solar cold storage unit and 70 percent to the Govt. of Jharkhand. 30% is the maximum stake of the farmers in the cold storage co-operative.

5 **Solar Cold Storage System Layout:**



Cold Storage Unit with Thermal Battery