

Fast-charging PCM based portable cold storage for transport of perishable

Facility for Low Carbon Technology Deployment (FLCTD) is a project financed by the Global Environment Facility (GEF), implemented jointly by the United Nations Industrial Development Organization (UNIDO) and the Bureau of Energy Efficiency (BEE). The main objective of the FLCTD is to facilitate the deployment and scaling-up of low-carbon technologies in India that can address technology gaps in mitigating climate change and promote the use of clean energy applications in selected sectors.

The FLCTD conducts “**Innovation Challenge**” competitions annually to identify innovative technologies and solutions and provides financial support for demonstration and testing in field conditions typically, industries/firms are willing for pilot demonstrations where the technology is periodically monitored, and performance validated. The technology verification process will help establish the efficacy of innovation and lend credibility to innovation to seek financing for scale-up.

FLCTD Technology Demonstration Locations: The technology demonstration was carried out at 20 different locations for a variety of perishable items.

About Tan90 Thermal Solutions Private Limited:

Tan90 started its journey in 2019 as a start-up, with an aim to reach out to farmers with cost-effective and energy-efficient cold-storage solutions. Tan90 developed thermal solutions that addressed the challenges faced by the suppliers and intermediaries in transporting perishable food items and reducing wastage and commercial loss. Tan90 developed a fast-charging Phase Change Material (PCM) and a storage container for multiple use in transportation. The innovation is to eliminate the dependency on reefer vehicles for the first & last mile movement of temperature sensitive perishables.

Tan90 Thermal Solutions Private Limited was awarded a contract from UNIDO, under the FLCTD project, qualifying the Space Conditioning Innovation Challenge in year 2019. The Technology demonstration of fast-charging PCM based portable cold storage for transport of perishable items, was carried out at total 20 different locations.



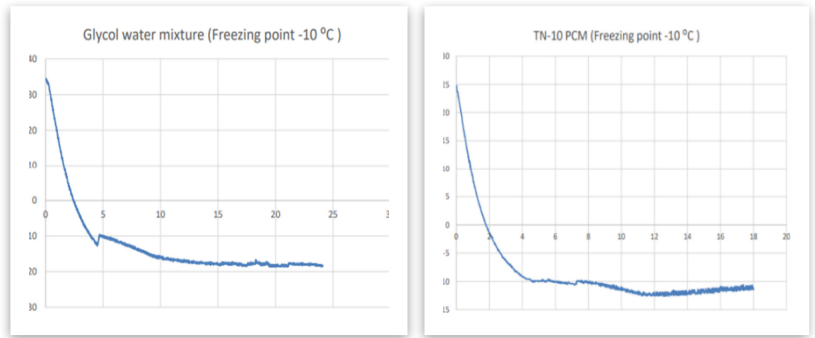
Fast-Charging PCM based Portable Cold Storage



Demonstration of Fast-Charging PCM based Technology-01.01.2021



Working principle: A PCM is a substance that releases or absorbs enough energy to generate useful heat or cooling at a phase transition. Generally, the transition will be from one of the first two fundamental states of matter - solid and liquid - to the other. Because phase change materials melt and solidify at precisely specified temperatures, they can be used to control the temperature in a wide range of applications. Tan90 is having boxes and bags of different capacities like 20 litre, 40 litre, 60 litre, 100 litre and so on. The PCMs developed by Tan90 operates in the temperature range of +4°C to -24°C.



Rate of Cooling is faster in Tan90 PCMs when compared with baseline Glycol- Water Mixture

In 2021, the Confederation of Indian Industry (CII) - Sohrabji Godrej Green Business Centre, Hyderabad verified the performance of the technology at pilot demonstration sites, by applying the International Performance Measurement and Verification (IPMVP) protocol.

Benefits of Fast-Charging PCM based portable cold storage for transportation of perishable:

- Cooling cartridges require only 4.5 hours to charge for cooling
- The solution has been validated under FLCTD for a different variety of perishables such as horticulture, vegetables, fruits, meat, ice cream, and medical supplies.
- Cooling cartridges will be available for service for the next 15hrs after charging.
- Meets the needs of the large corporates and small farmers
- Cooling boxes can be transported via any logistic medium
- Improvement in shelf life, and reduction in material return/wastage.
- Improvement in quality which can lead to more sales/revenue/ better brand image.



Energy Savings from the Technology Demonstration:

Technology Demonstration: Delivery boxes (insulated Container 20 Litres) with PCM based cartridges (22 nos.) for -16 °C final temperature



Replication Potential: Being early adopters of such innovative technologies, cold chain logistics can reduce their operational-specific energy consumption, reduce chilling cost, improve quality, and reduce wastage, which helps to de-carbonize the operations. The adoption of PCM based portable cold storage for transportation of perishable items by 10% (3,380 number of units) has annual emissions reduction potential of 7,132 tons of CO_{2e}.



Confederation of Indian Industry





CII-GBC (https://www.greenbusinesscentre.com/)	UNIDO (https://www.low-carbon-innovation.org/)	Tan90 Thermal Solutions Pvt.Ltd. (https://www.tan90thermal.com/)
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