



Multipurpose & portable cold chain solutions

United Nations Economic and Social Commission for Asia & Pacific

Dec-2022



MachPhyTM

Cold Chain Specialists for economical solutions in Healthcare , Food Security & Retail

PROBLEMS ADDRESSED

1) Loss of vital perishables before it reaches consumer

- **Developing** **40%**
- **Global** **20%**



Source - Research And Markets : June, 2022;
McKinsey : 2022

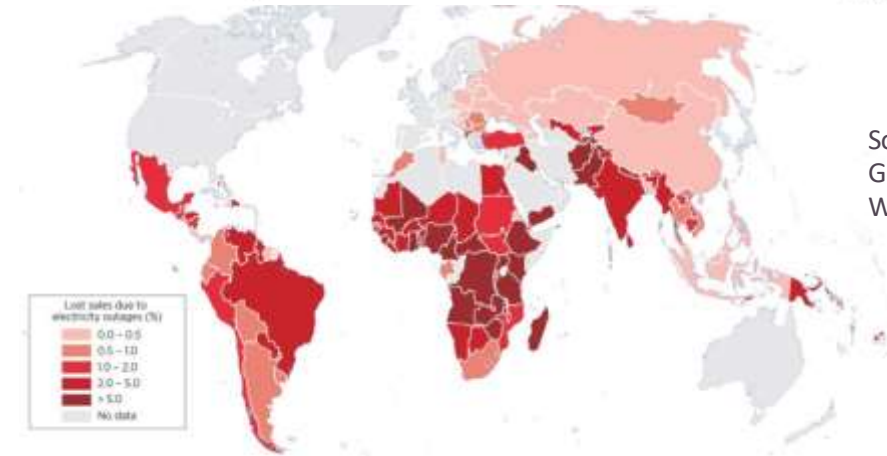
2)Expensive coping costs to maintain operations due to frequent power failures

- **Developing** **4x**



3) Average power outage duration in developing countries on an average month

- **South Asia** **105+ hrs**
- **Africa** **180+ hrs**



Source – World Bank Group : Policy Research Working Paper 8899

Climate Impact

Dependence on **Diesel-powered backups** along with **wastage in cold chain** adding 940 Million Tonnes of CO₂ to atmosphere annually

Source - UNEP



SOLUTION



Enabling usage during power outage



Low coping cost



Data transparency & predictive maintenance for short breakdown TAT

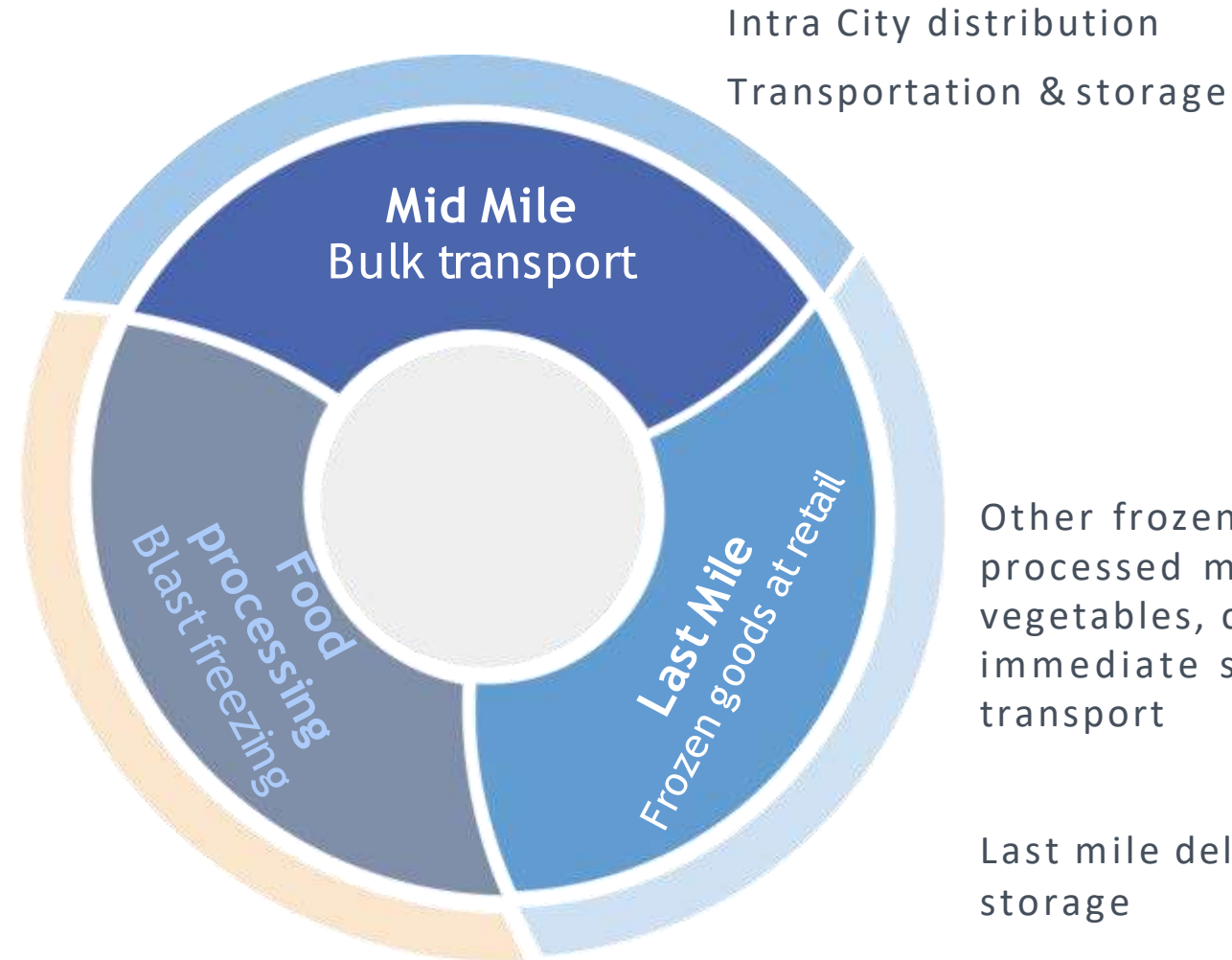


Low infrastructure cost:
Subscription Model

Focus Areas

For Fruits, Vegetables, Meat and Fish: -18°C to -25°C & $+1$ to $+15^{\circ}\text{C}$

Pre-cooling, blast cooling & local storage and transportation



PRODUCT PIPELINE

PASSIVE COOLING DEVICES

Fixed temperature devices with PCM based cooling. Low cost devices mostly preferred by diagnostic chains, agri-aggregators, food processing units, etc.



ACTIVE COOLING DEVICES

Variable temperature devices with PCM based cooling. Mostly preferred by R&D labs, agri-aggregators of multiple commodities, food processing units, multi-retailers, etc.



HYBRID COOLING DEVICES

Variable temperature devices with hybrid compressor-less cooling technology based on semiconductors & PCM. Very useful for R&D labs, high value life saving drugs transporters, shippers of blood/vaccines via drones



PRODUCT PIPELINE HIGHLIGHTS



Decentralised Products

Off grid location with physical parameters control, temperature & Humidity

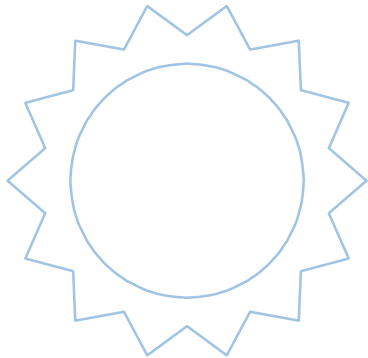


Hybrid Cooling Systems

With PCMs and nanomaterials

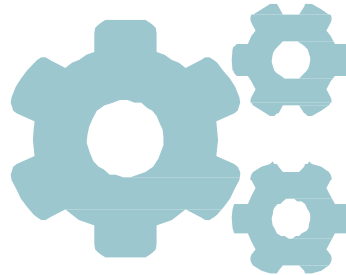


Patented Technology



Eco-friendly Solar Options

Net Negative carbon footprint



Versatility

Interchangeable cold storage product for multiple uses



ISO 9001:2015

ISO 14001:2015



RoHS

LAST MILE SUPPLY CHAIN

Product Local Storage & warehousing

Standalone units with branding for bulk storage.
Maintains required temperature for 24 hrs with
15% lower power consumption



Product Bulk portable storage & transportation

Hybrid units with branding for temporary storage.
Maintains required temperature during powercuts
without electricity & can be repositioned as per demand

Inter-city Product Delivery

Hybrid units with branding for mid mile delivery.
Maintains required temperature without diesel
consumption, saving 40% on distribution costs



MID MILE SUPPLY CHAIN

Product Display & Vending

Standalone units with branding for retail outlets. Maintains required temperature for 24 hrs



Product Retail Display & Storage

Hybrid units with branding for retail outlets and last mile display & storage. Maintains required temperature during power cuts without electricity

Product Delivery

Hybrid units with branding for last mile delivery. Maintains required temperature without diesel consumption, saving 40% on distribution costs



Product Local Storage & warehousing

Standalone units with branding for bulk storage. Maintains required temperature for 24 hrs with 15% lower power consumption. Leverages AI platform to predict shelf life of inventory



Product Bulk portable storage & transportation

Hybrid units with branding for temporary storage. Maintains required temperature during power cuts without electricity & can be repositioned as per demand



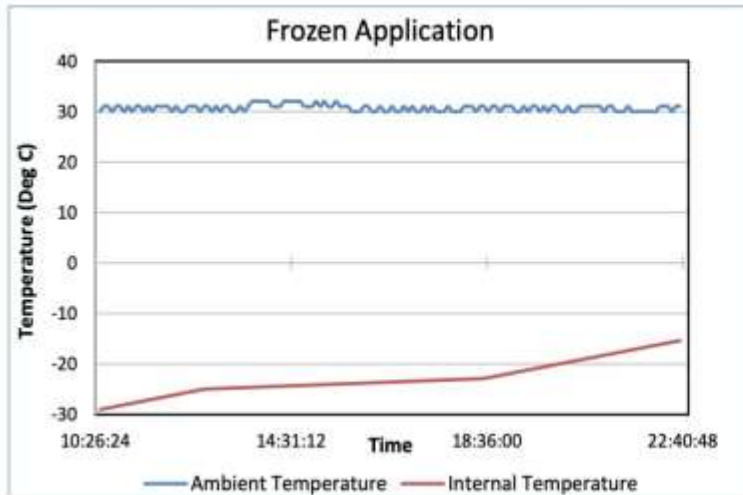
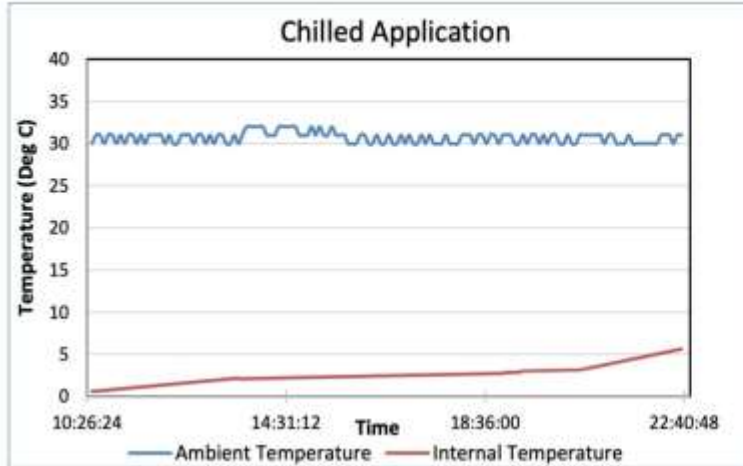
Blast Freezing & Cooling

Hybrid units with for blast freezing & cooling on site. Useful for onsite freezing and chilling on Opex model



PCM BASED MACHPHY REEFERS

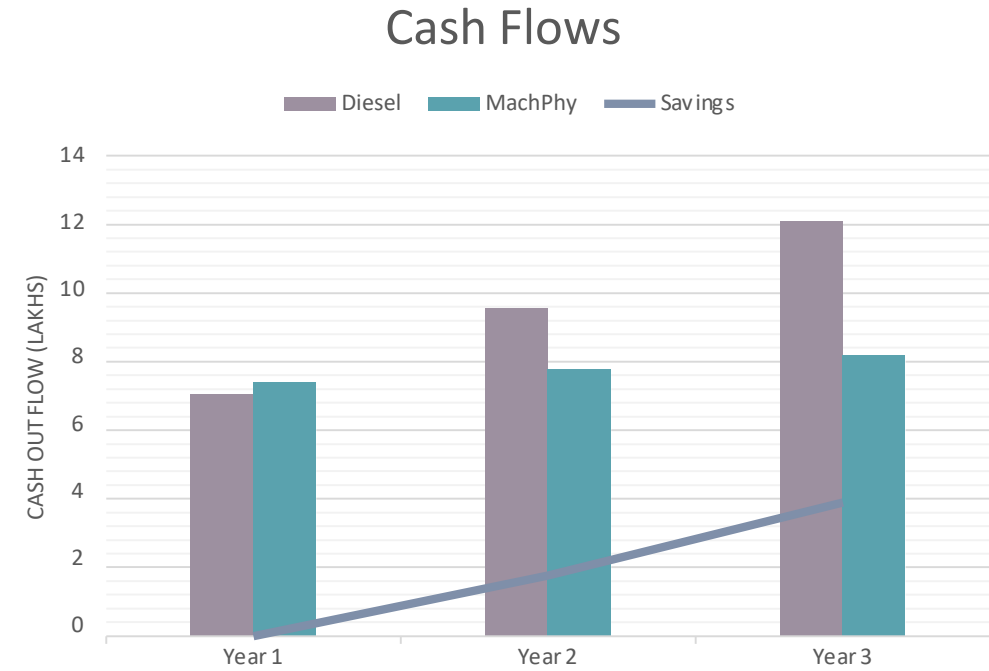
PERFORMANCE & TEMPERATURE VALIDATION



Financial Viability-Reefers



Reefer Type	Reefer-Diesel based	Reefer Machphy-PCM based
Upfront cost	\$6,000	\$9,333
Diesel consumption/hr (litre)	1	0
Daily diesel cost (10hrs)	\$10	0
Annual diesel cost 300 days	\$3,200	0
Electricity cost per day(overnight charging)	0	\$1.6
Annual electricity cost	--	\$480
Total running cost annual	\$3,200	\$480
Maintenance 5%	\$160	\$24
Annual Expenses (USD)	\$3360	\$504
Savings in OPEX	Loss	85%



Recovery & RoI in 1 year compared to Diesel Reefers

PRODUCT HIGHLIGHTS



CIGS flexible solar panels

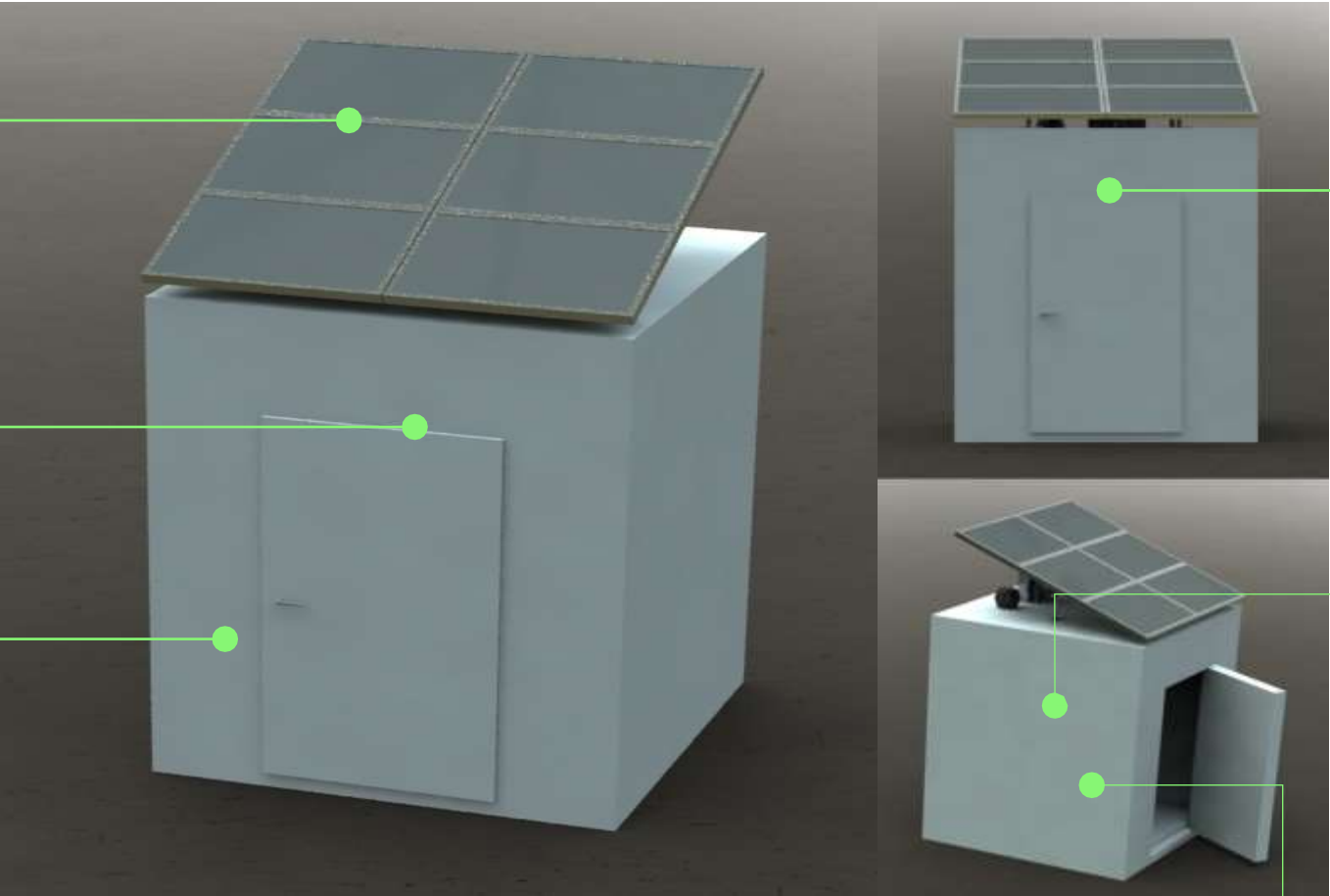
Proprietary technology & design

Easy to assemble outer body

Multi-chamber system for multiple commodities

Predictive maintenance with IoT & AI systems

Hybrid Thermal storage with variable climate control



Different variants from 25kg to 10 MT storage model

PRODUCT HIGHLIGHTS



Financial Viability- 10MT storage

	10 MT electrical cold storage	10 MT solar cold room on battery backup	Proposed 10 MT solar powered system
Upfront cost (INR)	\$13,333.00	\$17,333.00	\$20,000
Daily recurring cost (INR)	\$4.00 (20hrs running per day)	Nil	Nil
Monthly expenses (INR)	\$120.00	Nil	Nil
Annual Maintenance(INR)	\$80.00	\$200.00	\$106.00
Net Expenses in 8 years (actual value) in INR	\$25,493.00	\$26,400.00	\$20,853.00
Savings in 8 Years	Loss	\$ -906.00	\$5,546.00

Farmer/Trader affordability

User(s)	Capacity utilization	Trade cycles / year	Additional Profit from Proposed unit	Annual profit
Farmer	8 MT	10(monthly)	\$0.066/kg	\$5,333.00
Trader	8 MT	50 (weekly)	\$ 0.026/kg	\$10,666.00
Fish Retailers	8 MT	50 (weekly)	\$ 0.133/kg	\$53,333.00

CLIENTS & CUSTOMERS

PSUs



HEALTHCARE & MEDTECH



INTERNATIONAL



RECOGNITION



Awards



TATA TRUSTS

Winner, Tectonic Clean Energy Innovation
& Rise Institute, Sweden 2021



Winner of Health & Sanitation Challenge,
2020



Presented and Speaker at Rural Dialogues, IIT
Guwahati, 2018



Winner, Rural Innovators Start-up Conclave, National
Institute of Rural Development, 2018



Biotechnology Ignition Grant by
Biotechnology Industry Research Assistance Council, 2018



Ministry of Electronics and Information Technology
Government of India

Winner, TIDE 2.0 by DEITY, 2019



Entrepreneur-in-Residence, KIIT-TBI, 2017



Top 10 innovative start-ups in healthcare, Mediko-
Messe & Indian Medical Association, 2019

Featured



[Startup Bharat] This Bhubaneswar-based
startup is resolving cold-chain infrastructure
problems

<https://yourstory.com/2021/06/startup-bharat-bhubaneswar-cold-chain-startup-machphy-solutions/amp>



Social Alpha announces top 17 high-impact
CleanTech start-ups of Tectonic –
Innovations in Clean Energy Challenge

<https://www.socialalpha.org/announcement/social-alpha-announces-top-17-high-impact-cleantech-start-ups-of-techtonic-innovations-in-clean-energy-challenge/>



In conversation with Pradeep Rout, CEO and
Founder Director, MachPhy Solutions

<https://coldchainmanagement.org/2021/07/12/in-conversation-with-pradeep-rout-ceo-and-founder-director-machphy-solutions/>



MARL 5G Accelerator
supports Machphy
Solutions to scale
Services with 5G
platform



Awarded by Ministry of Animal
Husbandry and Dairying at Unnat
Pashudhan Sashakt Kisan Event
organised by [Confederation of Indian Industry](#) and [Department of Animal Husbandry and Dairying](#).



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