savE®

PHASE CHANGE MATERIALS

PLUSS® | TECHNOLOGY FOR A BETTER WORLD

PLUSS®

TECHNOLOGY FOR A BETTER WORLD

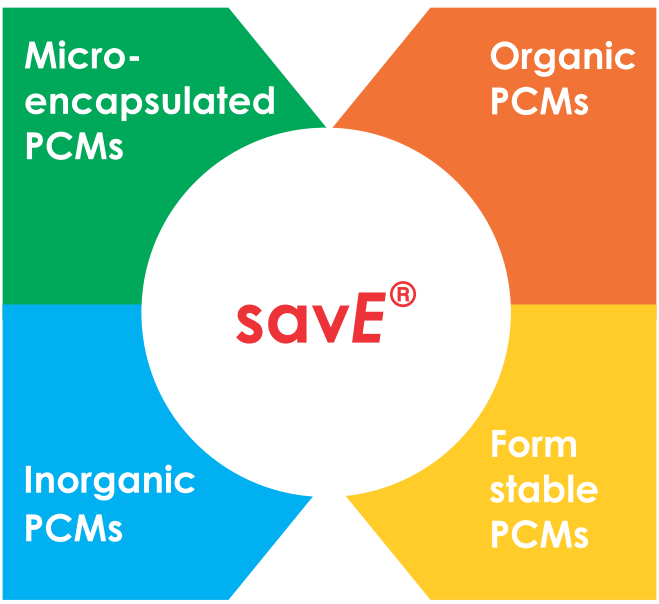
Established in 1994, Pluss Advanced Technologies Pvt. Ltd. (formerly Pluss Polymers Pvt. Ltd.) is a materials research and manufacturing company involved in the field of speciality polymeric additives and Phase Change Materials. Research and innovation has been the focus of the company since inception. The company bears the distinction of pioneering and creating cost effective and innovative products and applications that provide impacting solutions. Experience, interdisciplinary thinking and practical skills form the growth guidelines for PLUSS®. The company has an equity infusion from Tata Capital Innovations Fund.

Phase Change Materials

The term 'Phase Change Material' (PCM) is used to describe materials that use phase change (e.g. solidify, liquify, evaporate or condense) to absorb or release large amounts of energy at constant temperatures. Phase Change Materials leverage the natural property of latent heat to help maintain product and environment temperature for extended periods of time.

Why choose savE® range of Phase Change Materials

- Temperatures for wide applications: -33°C to +89°C
- Different PCMs to suit the temperature and the end application requirement
- Warranty for long shelf life: 3000 cycles
- Custom packaging and integrating solutions
- Proven test and validation methods
- T-History test to determine phase transition and stored heat, thermal stability test, cycling stability test and ageing process test



Applications

savE® PCMs find application in HVAC&R, pharmaceutical, solar, medical devices, automobiles, buildings, cold-chain, home-appliances, retail and agro businesses - wherever there is a requirement to maintain constant temperature for extended periods of time.

Freezers & Coolers —

Power outages, which are very common in developing countries, impose serious threats to refrigerated products like ice creams, milk etc. savE® PCMs are a perfect solution to maintain temperatures during power outages.

Currently used in:

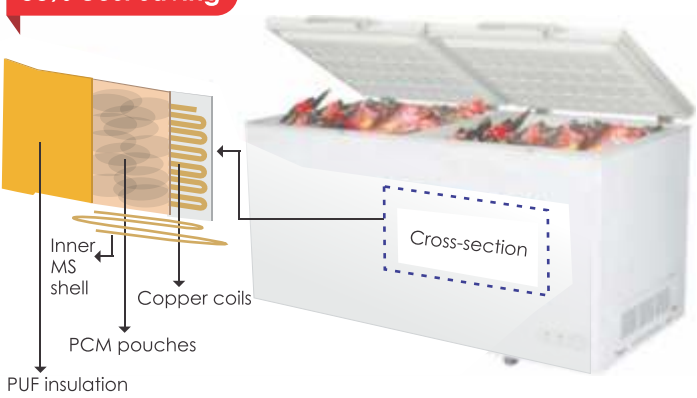
- Frozen application -30°C to -7°C
- Chilled application +2°C to +8°C

Also suitable for:

- Other temperatures +22°C to +89°C

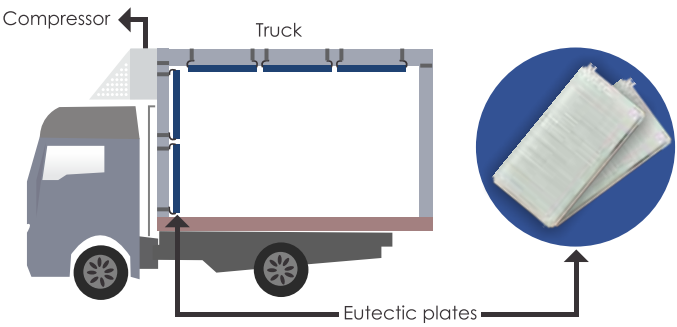
Commercial Refrigeration

30% cost saving



Cold Chain Logistics —

When compared with reefer trucks PCM based passive cooling technology offers up to 80% savings in operating cost due to the reduction in diesel consumption.
In addition, PCMs enable multi-temperature transport, improving the payload factor, thereby making part load transportation feasible.



PCM based reefer truck

Passive Cooling Shippers —

PCMs ensure that desired temperatures are maintained irrespective of ambient fluctuations. No external source of cooling is required during transport.

Temperature controlled solutions for pharmaceuticals, food and beverages

- Perfect solution for precise temperature control for specific temperature requirement
- Temperature back-up for up to 96 hours, or depending upon the requirement
- Re-usable and easy to install
- Safe and non-hazardous material

PCM based thermal shipper boxes

Building HVAC —

Use of PCMs allow 50% of the HVAC load to be shifted to the off-peak hours/night time. This translates to an overall reduction of more than 25% in the total electrical load of a building.

Benefits of PCM based building air-conditioning systems

- Capital & operating cost savings
- Augmentation of existing plant capacity
- Peak load shaving
- Reduction in electrical demand

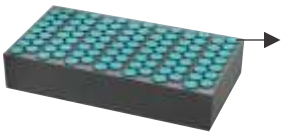
Energy Storage & Utilization

Aagun® 24x7 dryer

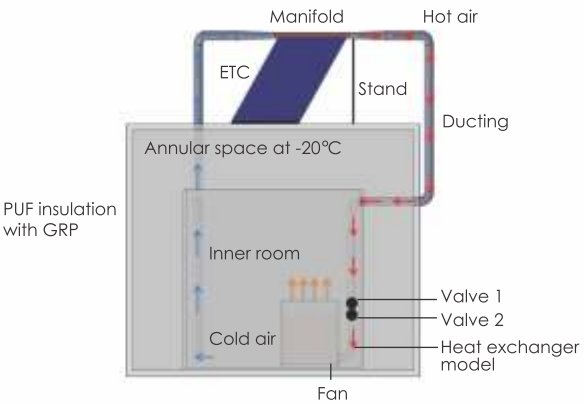
Cold storage

10 hours solar + 14 hours PCM

Electrical vehicle



Space heater



savE® Operating Range

PCM	Phase Change Temperature (°C)	Latent Heat (kJ/Kg)
HS01	1	350
HS3N	-3	346
HS7N	-7	296
HS10N	-10	290
HS15N	-15	308
HS18N	-18	242
HS22	22	167.6
HS23N	-23	262
HS24	24	199
HS26N	-26	272
HS29	29	190
HS33N	-33	224
HS34	34	150
HS89	89	125
OM03	3	229
OM05P	5	242
OM18	18	212
OM21	21	174
OM29	29	194
OM30	30	230
OM32	32	156
OM35	35	202
OM37	37	231
OM42	42	221
OM46	46	196
OM48	48	172
OM50	50	223
OM55	55	208
OM65	65	183
FS03	3	161
FS29	29	158
FS30	30	172
FS42	42	187
FS65	65	218

Note:

HS- Hydrated Salts, OM- Organic Mixture,
FS- Form Stable Mixture

Members

National Centre of Cold Chain Development. NCCD is an autonomous body established by the Government of India with an agenda to positively impact and promote the development of the cold-chain sector in the country.

India Energy Storage Alliance. IESA was launched in 2012 to help technology and system integration companies involved in energy storage and microgrids to understand and capture the opportunities in the growing markets.

Clean Energy Access Network is an all India representative organization launched in 2014 with a clear mandate to support, unify and grow the decentralized clean energy sector in India.

Reichs-Ausschuss für Lieferbedingungen (RAL). Several active PCM enterprises formed the Quality Association PCM in 2004 to develop proper quality assurance procedures.

Awards

Supply Chain Innovation Award for Celsure® - shipping solution for pharmaceuticals

Cold Chain Innovation Of The Year - 2016 for Celsure® - shipping solution for pharmaceuticals

CII Industrial Innovation Award - 2014 & 2017

Innovative Technology Award - 2015 Healthcare category

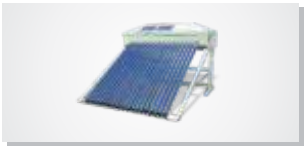
FICCI- DST Lockheed Martin Award - 2015

MIT Innovators under 35 India Award - 2016 & 2017

Most Innovative MSME Company Award - 2017

Innovations

MiraCradle®
Neonate Cooler



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"Have you **savE®d** your products?"

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