

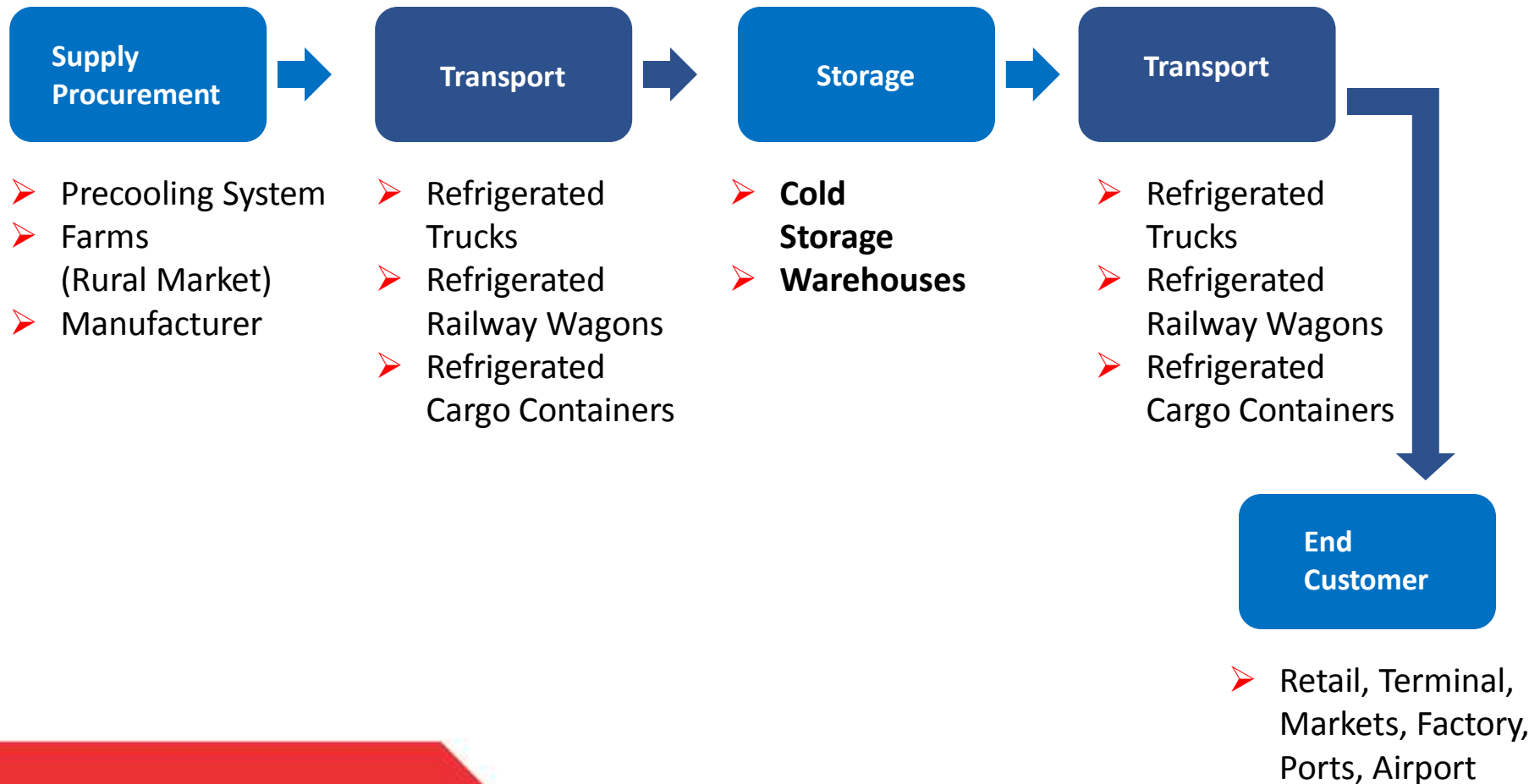


Advanced Phase Change Materials

Application of Phase Change Materials in Cold Chain Transport

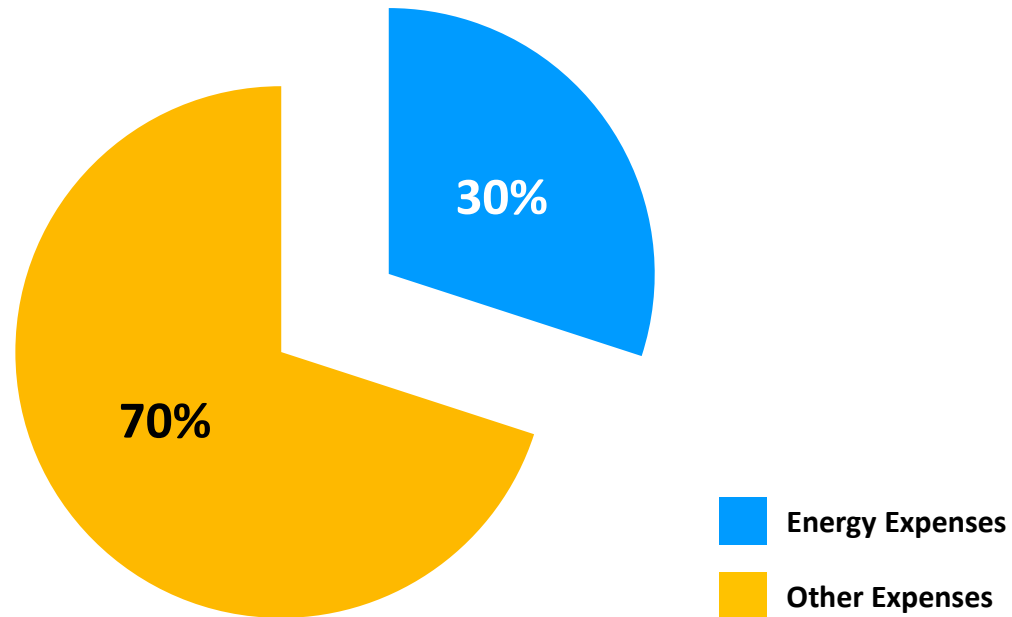
OVERVIEW

The cold chain logistics infrastructure



OVERVIEW

Temperature controlled transport sector



Source: Cold Chains: The Essential Infrastructure, News desk <http://logisticsweek.com> , 2012

BOTTLENECKS

Limitations in controlled temperature transport and storage -

➤ Poor Transport Infrastructure

➤ Fragmented cold storages

➤ Power outages

➤ High capital investment

➤ Awareness & Adaptation of new technology

INNOVATIONS TO CLOSE THE GAPS - PCMs

➤ Temperatures maintained without external source. -33°C to +89°C

➤ Back-up for temp. critical applications. Up to 96 hours.

➤ Reduces energy consumption, noise and emissions. Uses of peak electricity

➤ Increases Payload. No cooling equipment, doubles as insulation too.

APPLICATION IN TRUCKS

PCM Passive Plates

- Charged Offline
- Easily loaded before transport
- Truck can be used for different commodities by replacing the PCM.
- Ideal for 6 – 8 hours of transport



Vehicle : TATA ace trucks, Client: Nestle, in Delhi & Chennai

APPLICATION IN TRUCKS

PCM Passive Plates



Vehicle : TATA ace trucks, Product: Dominos Pizza

APPLICATION IN TRUCKS

PCM Passive Plates

- Charged Offline or Online
- PCM plates are fixed permanently
- Can be used for long distance transport - 16 hours to 40 hours



Source: PCM based refrigeration truck manufactured by TESSOL Pvt. Ltd.

APPLICATION IN TRUCKS

PCM Wrapped Pouches

- Charged Offline or Online
- PCM pouches are wrapped around insulated cabinet
- Back-up for Chilled range – 4 to 5 hours
- Back-up for Frozen range – 10 to 12 hours



PCMS FOR COLD CHAIN

Product	Operating Temperature (°C)	Latent Heat (KJ/Kg)
HS 33N	-33	250
HS 26N	-26	205
HS 23N	-23	200
HS 10N	-10	220
HS 7N	-7	230
Frost	0	290
HS 22	22	185
FS 65	65	180
FSM 65	65	170