

Focus

Cold Chain
Logistics

How the **Indian cold chain logistics** is embracing sustainability

With continued focus and investment in sustainable practices, the sector is poised to play a crucial role in India's sustainable development goals while meeting the growing demands of its population.


 Nehal Gautam



Photo: Goldman Logistics

India's cold chain logistics sector is undergoing a significant transformation, grappling with the dual challenges of meeting growing demand and embracing sustainability. With a growing population and increasing urbanisation, the need for efficient and environmentally friendly cold chain solutions has never been more critical. According to a report by Mordor Intelligence, India's cold chain logistics market is expected to reach \$11.64 billion in 2024 and grow to \$18.19 billion by 2029, growing at a CAGR of 9.72% during the forecast period. This growth is driven by increasing demand for perishable products, government initiatives, and rising organised retail and quick-service restaurants.

However, the sector faces significant challenges. Cold storage facilities are energy-intensive, contributing to high operational costs and substantial



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Sanjay Sharma
Coldman Logistics

carbon footprints. Despite growth in the cold chain sector, India still experiences significant food waste, with the Food and Agriculture Organisation (FAO) estimating that about 40% of India's fresh produce is wasted annually due to inadequate cold chain infrastructure. The market is also highly fragmented, with numerous small-scale players, making it challenging to implement standardised sustainable practices.

Kartik Jalan, founder & CEO, Indicold Logistics, emphasised the complexities of operating within a rapidly evolving regulatory landscape and the need for specialised skills in the workforce. He stated, "Navigating various regulations and training staff with specialised expertise can be time-consuming, while justifying immediate costs to stakeholders is difficult."

Another significant challenge in the cold chain sector is the impact of poorly designed packaging.

Even within temperature-controlled environments, inadequate packaging can result in damaged goods, leading to waste and financial losses. Effective packaging design must consider various factors, including heat transmission from products through the package, carton, and pallet stack. Optimising these elements is crucial for maintaining product integrity throughout the supply chain. Addressing the issue, Jalan of Indicold Logistics stated, "Waste reduction is crucial too. We're recycling packaging materials and managing our inventory better to minimise food waste. This not only helps the environment but also improves our efficiency."

Addressing the financial challenges in adopting sustainable technologies in cold chain logistics, Manju Korah, Vice President - Operations, Snowman Logistics mentioned, "The initial investment costs associated with implementing sustainable technologies such as hybrid vehicles, Phase Change Material (PCM) technology, and renewable energy sources are substantial. Overcoming these upfront costs while demonstrating long-term benefits in operational efficiency and reduced environmental footprint remains a critical challenge for us."

To address some of these challenges, many cold chain companies are turning to renewable energy sources like solar power to reduce their carbon footprint and operational costs. Snowman Logistics, one of India's largest cold chain companies, has implemented solar panels at several of its facilities, reducing energy costs by up to 30%. Bootes, a net-zero construction company, and CargoPeople, an Indian multimodal logistics company, have collaborated to launch net-zero cold storage to address critical food waste challenges. Coldman Logistics has integrated solar power into 40% of its facilities, with plans to transition all its operations to solar power by the end of 2026. "This proactive approach has resulted in a substantial reduction of over 5000



Indicold Facility at Rai Sonipat

metric tonnes of CO₂ emissions over the years," asserted Sanjay Sharma, COO, Coldman Logistics.

Discussing the company's innovative approach to temperature-sensitive logistics and its impact on reducing product waste, Swarup Bose, Founder & CEO, Celcius Logistics, highlighted their advanced monitoring and alert system. He elaborated, "Our advanced contingency management system ensures that any temperature variance of ± 2 degrees is immediately flagged. Alerts are sent directly to our operations team and drivers via a mobile app, email, and messages, allowing for prompt corrective actions. This monitoring system has not only helped us maintain product quality but has also significantly reduced spoilage and wastage. For instance, we decreased the wastage ratio from 4% to 0.3% for one of our customers."

The adoption of energy-efficient refrigeration systems and LED lighting is also on the rise. A particularly promising development is the use of PCM in cold chain logistics. These

substances possess the ability to absorb, store, and release substantial amounts of thermal energy as they transition between solid and liquid states. Emphasising the same, Sharma of Coldman Logistics mentioned, "Over the past few years, the adoption of LED lighting, PCM for insulation, and electrically charged refrigerators for transportation has significantly reduced the carbon footprint. However, the industry is poised for a more substantial transformation in the coming years with the introduction of battery-operated Medium Commercial Vehicles (MCVs) and Heavy Commercial Vehicles (HCVs)."

Jalan of Indicold further mentioned, "When it comes to refrigerants, we're using ones with a low global warming potential (GWP) wherever possible to minimise our carbon footprint. Regular maintenance and leak detection systems ensure everything runs smoothly and prevents unnecessary emissions.

Addressing the company's eco-friendly and cost-effective cold chain solutions, Korah of Snowman Logistics, outlined their technological advancements and sustainable practices. He stated, "Our initiatives include hybrid and electric refrigeration vehicles, which reduce carbon emissions and enhance transportation efficiency across our logistics network. We leverage Phase Change Materials (PCM) technology in our refrigerated trucks to ensure precise temperature control, which not only decreases energy consumption but also lowers operational costs in cold chain logistics." He further emphasised the significance of electric vehicles (EVs) in cold chain logistics, highlighting their role as a cleaner alternative to traditional diesel-powered trucks. He explained that the adoption of EVs contributes to reduced emissions and offers the potential for integration with renewable energy sources such as solar power, further enhancing the sustainability of cold chain operations.

Despite these initiatives, implementing sustainability measures



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Indicold Logistics

faces several challenges. The upfront costs of sustainable technologies can be prohibitive for many small and medium-sized players. There's also a lack of awareness among many stakeholders about the benefits of sustainable practices or how to implement them effectively. India's infrastructure challenges, particularly in rural areas, can make it difficult to implement certain sustainable practices, such as solar power adoption or efficient transportation networks. Additionally, while the government has introduced initiatives to promote sustainability, regulatory frameworks sometimes lag behind technological advancements, creating obstacles for companies wanting to adopt new sustainable technologies.

However, there are significant opportunities for sustainable growth in the sector. The Indian government has launched several initiatives to promote sustainable cold-chain logistics, one of which is the National Centre for Cold Chain Development (NCCD), which has the agenda to positively impact and promote the development of the cold-chain sector in the country. "The Indian government is increasingly focusing on regulatory guidelines to align with global standards in pharmaceutical distribution, emphasising the reduction of losses in fruits, vegetables, and other perishables. Government support through infrastructure development and incentives will further lead to growth, particularly in tier-II and tier-III cities," noted Bose of Celcius Logistics.

Emerging technologies like the Internet of Things (IoT) and blockchain are creating opportunities for more efficient and sustainable cold chain management. Companies like New Delhi-based Tessol are developing phase-change material (PCM) based mobile cold storage units that can maintain temperatures for up to 72 hours without external power. Highlighting the use of technology in Indicold Logistics operations, Jalan stated, "IoT and AI-based solutions help us monitor and control



Photo: Coldman Logistics

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Increasing consumer awareness about sustainability is creating market pressure for more environmentally friendly cold chain solutions. Partnerships with international organisations and companies are bringing global best practices in sustainable cold chain logistics to India, with the Global Cold Chain Alliance (GCCA) working with Indian companies to promote sustainable practices and technologies.

As the industry continues to evolve, it will be crucial for all stakeholders – from government bodies to private companies and consumers – to work collaboratively towards building a sustainable cold chain ecosystem. This not only promises environmental benefits but also offers the potential for increased efficiency and reduced waste for India's growing population.

Bose of Celcius Logistics offers an optimistic outlook for the industry: "The future of cold chain logistics in India is

highly promising. The country's current cold chain market size is \$35 billion and is expected to reach \$50 billion by 2027. Technological advancements will continue to enhance efficiency, transparency, and reliability across the supply chain, reducing waste and ensuring product quality. Sustainability will be at the forefront, with significant investments in renewable energy sources and eco-friendly refrigeration systems aimed at reducing the industry's carbon footprint."

In conclusion, the Indian cold chain logistics sector is at a critical juncture. While facing significant challenges, it is also embracing innovative solutions and sustainable practices. From solar-powered facilities to advanced monitoring systems and electric vehicles, companies are finding ways to reduce their environmental impact while improving efficiency. As the sector continues to grow and evolve, sustainability will undoubtedly play a central role in shaping its future, contributing to both environmental conservation and economic growth in India. ●