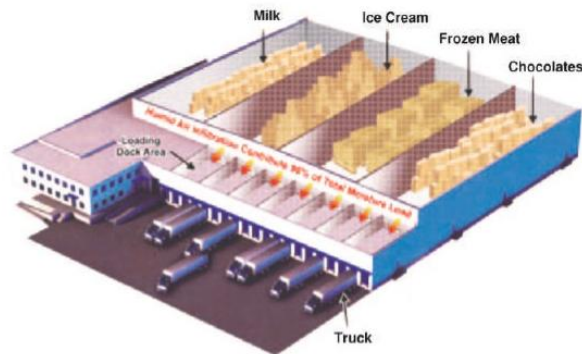


## GUEST COLUMN

## How cold chain is rendering a resilient food processing industry

*In the quest to protect food, industry players are looking for solutions to keep food quality intact until it reaches the end consumer. Consequently, the cold chain industry is diversifying into inhibiting the over-ripening of fruits and vegetables.*



Cold Storage



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The Indian food processing industry is one of the nation's largest sectors in production, growth, potential consumption and export. As per the IMARC report, the country is the largest producer of milk in the world and the second largest in producing fruits and vegetables. Along with this, India also leads in the production of meat and seafood. Despite the production of food on such a large scale, it still needs to be made available to a substantial population. Food wastage across the supply chain can be considered a major reason behind the unavailability of food. Some estimates suggest up to 25 percent of our Food products get wasted at various stages for multiple reasons.

An immense quantity of food is wasted due to spoilage without a standard cold chain infrastructure. Hence, employing an efficient cold chain facility across the supply chain can play an instrumental role in preventing food from decaying. It is well-equipped with integrated refrigerated transport, pack houses, collection centres, and cold storage that can sustain large-scale food production

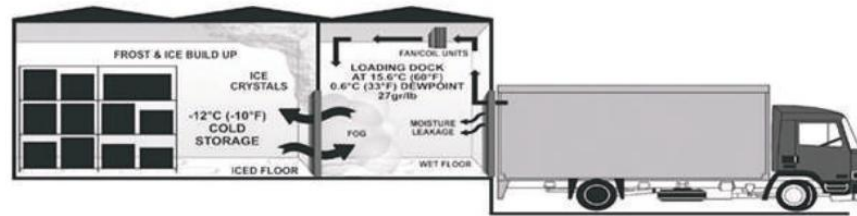
and processing while simultaneously checking food waste. This is driving the demand for robust cold chain facilities in the country owing to the surging preference for fresh, locally produced, and preserved food. In addition, even the pharmaceutical segment has entered the league that requires efficient storage systems. All the factors together give the desired impetus to the growth of the cold chain at a phenomenal rate. The pandemic further propelled the need for facilities to efficiently store food products and ensure a seamless supply chain within the country and even overseas.

As the Indian food processing industry is poised to grow at a CAGR of 14.72 percent, according to the IMARC report for the forecasted period of 2022-2027, the country invariably seeks a resilient cold chain infrastructure. Here, it is essential to note that moisture is a significant deterrent in inhibiting the facility's efficiency. Moisture has the potential to initiate a series of unwanted reactions that can lead to the spoilage of food. It gives rise to many problems entailing product frosting, slippery

floors, building-up of ice on the conveyor belt, and cooling coils. It is also responsible for the formation of fog inside the loading dock.

Furthermore, there is a high probability of cardboard cartons becoming soft and undergoing sagging in the presence of moisture that can damage the products inside the box. Therefore, it is evident that humidity has the potential to incur a heavy loss to the cold chain sector in the form of reduced storage space, increased possibility of mould and mildew thriving in moisture, and added pressure to incorporate defrosting costs. It also accounts for reduced cooling efficiency due to water vapour loads and clogging in evaporator coils. Invariably all these factors can lead to frequent shutdowns, hampering the company's profitability.

Hence, it is crucial to curtailing the moisture menace, and advanced dehumidification solutions are employed to elevate the productivity of cold chain facilities. It can curb frost formation on the evaporators and inhibit ice building up on the cooling




*A Schematic Representation*

coils. Considering that cold chains are developed sporadically with limited resources and infrastructure as and when the need arises, with the rising demand for quality food, it is more important to strengthen the cold chain infrastructure with robust dehumidification technology. Dehumidifiers can help achieve global safety and quality standards that increase the prospects of India becoming an international player as a quality food supplier.

In this quest to protect food, industry players are looking for solutions to keep

food quality intact until it reaches the end consumer. To cater to this requirement, the cold chain industry is diversifying into inhibiting the over-ripening of fruits and vegetables. As ethylene is the major reason behind the over-ripening of fruits and vegetables, the Bry-Air Ethylene Scrubber (BES) extends the shelf life of fruits and vegetables with the help of continuous ethylene removal from the air being emitted by Fruits & Vegetables. It contributes to minimising the loss due to decay and enables the availability of food throughout the season. In the process, it also eliminates the use of harmful preservatives.

Considering the large scale at which the cold chain is required, industry players also seek energy-efficient technology to eliminate moisture. Here, desiccant dehumidification is the ideal solution for the most economical and energy-efficient solution for inhibiting food spoilage due to moisture in the cold chain. It is adept at providing dry air continuously, irrespective of the surrounding conditions. It is the way forward in getting better produce value and increasing the country's global trade. 

## High-efficient cooling through a district cooling system

*The chilled water could be directly delivered to the buildings in DCS and then used to lower the temperature of the air passing through the building's air conditioning system.*

Chillers are commonly used central-type air conditioning systems that remove the heat from the water to a refrigerant in a closed-loop system. The chilled water is then circulated throughout the building to cool its inside temperature. The refrigerant is pumped to where the waste heat is transferred to the atmosphere. This technological approach requires each building to have its own "cooling system", composed of the chiller, cooling tower, operational and maintenance teams, etc.

The conventional chiller system is subject to a continuous operation environment subject to extreme heat, saline humidity, and wind-borne sand. Over time, performance, energy/cooling

efficiency and reliability suffer, leading to significant maintenance costs and, ultimately, equipment replacement. But the chilled water could be directly delivered to these buildings and then used to lower the temperature of the air passing through the building's air conditioning system.

This is what a District Cooling System (DCS) does: chilled water is produced in a centralised manner and distributed to many buildings - in a district. In this manner, the output of one cooling plant is enough to meet the cooling demand of many buildings in a more energy-efficient way, with reduced charges of refrigerant fluids, and in some cases, phasing out the use of halogenated refrigerants. District cooling systems

can reach up to 90 percent of energy efficiency if compared to conventional chillers. Along with electricity and water, district cooling constitutes a new energy service.

UNDP has been actively supporting countries to phase out ozone-depleting substances under the Montreal Protocol on Substances that deplete the Ozone Layer and deliver energy-efficient smart solutions. In this regard, such solutions, combined with multiple funding sources, overlap the use of hydrofluorocarbons (HFCs) and increase the efficiency of cooling systems. This can help parties meet future commitments under the Kigali Amendment and deliver important contributions towards reducing indirect greenhouse gas (GHGs) emissions.