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कृषि एवं किसान कल्याण मंत्रालय
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
सत्यमेव जयते

National Centre for Cold-chain Development

COLD CHRONICLE

Everything about COLD-CHAIN

COLD CHAIN FOR ALL

EDITORIAL

EDITOR
PRITAM SARKAR
ENGINEER- NCCD

NCCD is all set to publish its much-anticipated Engineering Guidelines and Minimum Standards for Cold Chain Infrastructure in January 2025, a comprehensive resource designed to provide the sector with clear, actionable standards for setting up cold storage facilities and ensuring optimal performance.

In addition to these guidelines, NCCD has also unveiled its Solar-Based Cold Room Demonstration Unit within the NCCD campus. This demonstration unit serves as a prime example of how renewable energy can be harnessed to power cold storage facilities, reducing dependency on conventional energy sources and lowering operational costs. It marks a crucial step toward making the cold chain sector more sustainable and energy-efficient, and it sets a precedent for future projects that prioritize green technologies.

We also express our deepest gratitude to both Ms. Malik and Ms. Garjola for providing insightful articles for this edition, further enriching the content and the discourse surrounding cold chain development.

As we move forward, the NCCD's Engineering Guidelines and Solar-Based Cold Room Demonstration Unit will serve as vital resources for industry stakeholders, offering a clear pathway for development while embracing sustainability at its core. The journey has just begun, and we look forward to the continued innovation and collaboration that will shape the future of the cold chain industry.

You can share your views and ideas.
Mail to: *nccd.india@gmail.com*

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MESSAGE FROM DIRECTOR

SH. PRIYA RANJAN
JS- HORTICULTURE
MD- NHB
DIRECTOR- NCCD

As we continue our journey toward enhancing the cold chain sector in India, it is with great pleasure that I reflect on a recent visit to Germany, where NCCD had the privilege of witnessing some of the most advanced technologies and best practices in cold chain management. This experience has reinforced our commitment to elevating the standards of cold chain infrastructure across the nation. Germany's approach to cold chain solutions showcases how technological advancements, innovative processes, and sustainability measures can harmoniously work together to create a seamless and efficient supply chain.

In this edition of Cold Chronicle, with the theme "Cold Chain for All," we delve into the idea that cold chain solutions must be accessible, efficient, and sustainable for all stakeholders, from farmers and producers to consumers. This theme resonates deeply with NCCD's vision of building an inclusive cold chain ecosystem that caters to every segment of the supply chain, ensuring that no one is left behind in accessing fresh, high-quality produce.

MESSAGE FROM COO-NCCD

SH. ASHEESH FOTEDAR
COO - NCCD

As we reflect on the accomplishments of 2024, it is with immense pride and satisfaction that I highlight one of NCCD's most significant milestones—the forthcoming revised publication of the Minimum System Standards and Guidelines for the Implementation of Cold Chain Components, set for release in January 2025. This marks a monumental step in establishing a clear, standardized framework for the development of cold chain infrastructure across India. These guidelines will ensure industry compliance while remaining adaptable to the diverse needs of stakeholders across the supply chain, fostering efficiency, sustainability, and growth in the sector.

I am also pleased to share a significant milestone in NCCD's journey – the setting up of a demonstration unit of a solar-based cold room at our campus. This cutting-edge initiative is not only a testament to NCCD's commitment to sustainability and innovation but also a practical step toward promoting energy-efficient solutions in the cold chain sector. The solar-powered cold room will serve as a model for stakeholders, showcasing how renewable energy can be harnessed to maintain the integrity of perishable goods while reducing dependency on conventional energy sources.

TRAINING AT LBSNAA

Sh. Asheesh Fotedar, Chief Operating Officer of the National Centre for Cold Chain Development (NCCD), recently visited the prestigious Lal Bahadur Shastri National Academy of Administration (LBSNAA) to conduct an insightful training session on the cold chain sector. The training was designed for senior officers, as well as various agriculture and horticulture officers from different states, to equip them with a comprehensive understanding of cold chain infrastructure, its role in economic growth, the latest industry trends, and its environmental implications.

Key Highlights of the Training

Sh. Fotedar emphasized the pivotal role of a robust cold chain system in ensuring food security, reducing post-harvest losses, and enhancing overall supply chain efficiency. He detailed the technological advancements that have revolutionized the industry, highlighting the integration of IoT, AI-driven monitoring systems, and energy-efficient refrigeration solutions.

The session also shed light on the importance of sustainable cold chain practices, including the adoption of green energy solutions, reducing carbon footprints, and implementing environmentally friendly refrigerants. Sh. Asheesh Fotedar underscored how these advancements align with India's commitment to sustainability and decarbonization.

Addressing Policy and Infrastructure Development

With the government's increasing focus on strengthening agricultural and pharmaceutical cold chain logistics, Sh. Fotedar provided insights into various policy initiatives and investment opportunities. He highlighted schemes and incentives available to boost cold chain infrastructure and stressed the need for efficient policy implementation at both the central and state levels.

He also discussed the role of cold chains in fostering rural-urban linkages, promoting agricultural exports, and enhancing farmers' incomes by enabling better market access. The training included case studies demonstrating successful cold chain implementations and their impact on supply chain resilience.

Encouraging Administrative Involvement

The interactive session engaged senior officers and state agriculture and horticulture officers in discussions about challenges and potential solutions in cold chain development at the grassroots level. Sh. Fotedar encouraged the officers to integrate cold chain solutions in their respective administrative frameworks to drive efficiency and sustainability.

His visit and training at LBSNAA marked a significant step towards empowering key policymakers and state officials with critical knowledge and insights to drive growth in the cold chain sector. By fostering awareness and proactive involvement, this initiative is expected to contribute to a more resilient and sustainable cold chain ecosystem in India.

Energy Transition

Energy Transition in Cold Chain

Because the Last Mile Matters

India stands at the threshold of growth- rising demand, increasing purchase parity and most importantly growing aspirations. But why does this growth matter? Because behind every aspiration is a person who deserves the best—whether it's the food they eat or the medicine they rely on.

What makes cold chain unique from other logistics is that it is not just about moving products; it's about delivering value, ensuring quality, and making sure every journey adds meaning to the perishables we carry. Yet, the final leg of the journey, known as intra-city perishable deliveries, remains the most challenging and expensive step in the chain.
Delivering perishables within the city comes with a set of unique hurdles-high upfront and running costs of refrigerated trucks, temperature fluctuations due to engine dependency, and most importantly- gaps for vehicles for sub one-ton loads.

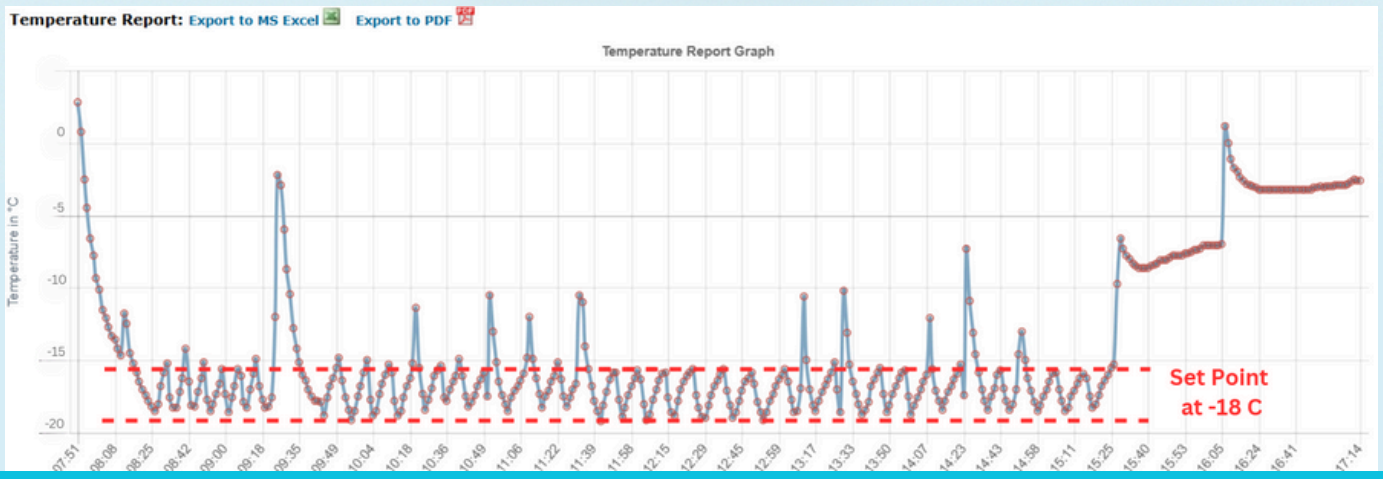
Traditional diesel-powered refrigeration units are a common solution, but they come with significant drawbacks. This unit is directly attached to the main vehicle engine which results in:

1) **Excessive Fuel Consumption:** Diesel-powered refrigeration units consume average 3-4L of fuel daily.

2) **Prolonged Engine Idling:** This unit requires the engine to run continuously, leading to extended idling times.

3) **Reduced Vehicle Efficiency and Lifespan:** The added load on the engine diminishes overall vehicle performance and shortens its operational life.

4) **Limited Compatibility:** These units cannot be installed on small commercial vehicles (SCVs) like the TATA Ace or electric commercial vehicles.



These refrigeration units, which keep our food fresh and our medicines safe, are one of the most polluting parts of the cold supply chain. But there's a better way of maintaining temperature while also cutting emissions with Yotuh Energy's 100% Electric Refrigeration Units. This makes it ideal and cost-effective for within city deliveries, where challenges like multiple stops, frequent halts, and traffic congestion make it difficult to maintain temperature.

Following features make it stand out-

- Vehicle Independent Refrigeration - Ensures idle-free cooling that maintains consistent temperature even in traffic or delivering to multiple drop points.
- Enhanced Reliability - Minimizes risks associated with vehicle breakdowns.
- Cost Efficiency - Perishable transport costs reduced upto 25% than conventional diesel-based reefers
- Increased Profits - With lesser operating costs, the vehicle owners will have maximum profit in-hand.

Designed to empower small business owners, distributors, and transporters in the cold chain as it can be seamlessly installed on IC vehicles like Tata Ace (SCV segment) as well as EV vehicles.

Lead the Charge with Zero-Emission Refrigerated Vehicles: With India's first 100% electric refrigeration system capable of actively cooling goods, we can unlock the cost-efficiency and low-maintenance advantages of EVs in the cold chain. Together- this innovation helps reduce emissions, protect the environment, and drive a sustainable future.

Author: Ms. Shaivee Malik

Shaivee Malik, Co-founder & COO of Yotuh Energy, launched the startup with two friends from IIT Delhi to tackle cold chain challenges. Backed by a strong R&D team, Yotuh Energy develops most efficient battery-powered refrigeration units, making sustainable cooling more accessible and reliable for urban logistics.

REFCOLD 2024

REFCOLD India 2024, India's premier exhibition for refrigeration and cold chain technologies, took place from October 3rd to 5th at the Biswa Bangla Mela Prangan in Kolkata. With the cold chain logistics market in India projected to grow from $11.64 billion in 2024 to $18.19 billion by 2029, the event emerged as a pivotal platform for the sector's growth and innovation.

THEME: "FRESH & HEALTHY PRESERVATION THROUGH INNOVATIVE TECHNOLOGIES"

03-05TH OCTOBER **KOLKATA, W.B.**

The grand inauguration featured distinguished dignitaries, including Mr. Asheesh Fotedar, COO of the National Centre for Cold Chain Development (NCCD); Dr. Subrata Gupta, IAS, Additional Chief Secretary of the Department of Science and Technology and Biotechnology, Government of West Bengal; Dr. Rajeev Singh, Director General of the Indian Chamber of Commerce; Mr. Anup Ballaney, National President of ISHRAE; Mr. Manoj Chakravorti, Chair of REFCOLD 2024; and Mr. Ritesh Modi, CFO of Informa Markets in India.

REFCOLD India 2024 garnered support from a range of esteemed domestic and international associations, further cementing its role as a cornerstone for industry collaboration and innovation. These included organizations such as the UNEP, International Institute of Refrigeration (IIF-IIR), National Centre for Cold-chain Development (NCCD), Federation of European Heating, Ventilation, and Air Conditioning (REHVA), Refrigeration and Air Conditioning Trade Association (RATA), Indian Chamber of Commerce (ICC), All India Air Conditioning & Refrigeration Association (ACRA), International Institute of Ammonia Refrigeration (IIAR), ASSOCHAM India, Department of Food Processing – Government of West Bengal, Odisha Cold Storage Association, NHB, and others. This broad support underscores the event's significance as a vital platform for driving industry progress.

Key Highlights:

1. Industry Insights: India's cold-chain sector is crucial for food security and economic growth. Despite vast agricultural output, only 60% is accessible due to inadequate infrastructure. The rise of e-commerce and the pandemic further emphasize the need for robust cold-chain solutions.
2. Strategic Location – Kolkata: Kolkata is a vital hub for perishable goods, servicing West Bengal and neighboring states, and plays a key role in India's cold-chain expansion.
3. Government Support: The Indian government is investing in cold-chain infrastructure, with six new food parks and five Agri Export Zones being developed in West Bengal to boost exports and agricultural growth.
4. REFCOLD Kolkata – A Platform for Innovation:
   - B2B Networking for industry connections and collaborations.
   - Knowledge Sessions from experts on industry trends and challenges.
   - REFCOLD Awards recognizing excellence in cold-chain solutions.
   - Innovation Zone showcasing cutting-edge technologies.
   - Product Showcases and Demo Zones for new product introductions.
   - Launch Pad for product launches and innovations.
   - Global Poster Competition highlighting global cold-chain solutions.

Food Safety

Food Safety and the Role of Cold Chain in Public Health Nutrition

Foodborne diseases impact millions of individuals worldwide each year, contributing to significant public health burdens, especially among vulnerable populations such as children, pregnant women, and immune-compromised individuals. The World Health Organization (WHO) reports that unsafe food causes approximately 420,000 deaths annually, with 125,000 of these fatalities occurring in children under five years of age. According to the Food and Agriculture Organization (FAO), nearly 14% of the world's food is lost between post-harvest and retail due to inadequate cold chain facilities. As the demand for perishable food products increases globally, particularly in urban areas, the need for a robust cold chain infrastructure becomes even more critical. This article examines the significance of cold chain logistics in food safety, its implications for public health, and innovations designed to enhance cold storage efficiency.

Foodborne illnesses arise from bacterial, viral, and parasitic infections, with the WHO estimating that contaminated food results in approximately 600 million cases globally each year. Ensuring food safety is particularly critical for perishable items such as dairy products, meat, seafood, and fresh produce, which require stringent temperature controls to inhibit microbial proliferation. Inadequate refrigeration accelerates the growth of pathogens such as Salmonella, Escherichia coli, and Listeria monocytogenes, leading to severe gastrointestinal infections and systemic complications. It is estimated that Listeria monocytogenes has a mortality rate of 20-30%, making it one of the most severe foodborne pathogens. Moreover, food spoilage due to ineffective cold storage contributes to malnutrition by diminishing the availability of essential nutrients. Inadequate refrigeration and temperature fluctuations can result in the rapid growth of harmful bacteria such as Clostridium botulinum, which causes botulism, a severe neuroparalytic illness. Similarly, improper handling of seafood under insufficiently cold conditions can lead to scombroid poisoning, characterized by symptoms such as flushing, headaches, and abdominal cramps due to histamine accumulation. Additionally, contamination of dairy and meat products due to cold chain failure often leads to outbreaks of Campylobacter infections, which account for an estimated 96 million cases of diarrheal diseases annually. Another major concern is Norovirus contamination, which thrives when perishable items are stored at improper temperatures, causing widespread gastrointestinal illnesses with high transmission rates. In regions where cold chain logistics are weak, cholera outbreaks have been linked to the consumption of contaminated seafood and fresh produce, further exacerbating the public health burden. These diseases not only result in increased morbidity and mortality but also impose economic strains on healthcare systems due to treatment costs and productivity losses.

Despite its critical role, the cold chain system faces substantial challenges, particularly in low- and middle-income countries. According to the International Institute of Refrigeration (IIR), only about 10% of perishable food in developing nations benefits from proper cold chain logistics, compared to 60% in developed nations. Energy constraints, particularly in regions with unreliable electricity supply, further impede the effectiveness of refrigeration systems, necessitating the adoption of alternative energy solutions such as solar-powered cold storage units. The high operational costs associated with maintaining temperature-controlled logistics present another challenge, as refrigeration equipment, transportation, and monitoring technologies require substantial investment. Additionally, logistical barriers, including poor road infrastructure and extended transportation distances, increase the likelihood of temperature deviations, thereby compromising food safety and quality.

Recent advancements in refrigeration technology have introduced sustainable and efficient solutions to enhance cold chain management. Solar-powered refrigeration has emerged as a viable alternative for preserving perishable food in rural areas with limited access to electricity. Studies indicate that solar-powered cold storage units can reduce post-harvest food losses by up to 40% in certain regions of Africa and South Asia. Block chain technology facilitates food traceability by ensuring transparency in storage conditions and transport processes. The integration of smart sensors and Internet of Things technology enables continuous monitoring of temperature and humidity, thereby reducing spoilage and ensuring compliance with safety standards. Cryogenic cooling technologies, including the use of liquid nitrogen and carbon dioxide-based refrigeration, have further improved temperature control in food logistics, thereby enhancing the overall safety of perishable food products. The adoption of these technologies not only improves food safety but also promotes sustainability by reducing energy consumption and waste.

Governments and public health organizations must implement comprehensive policies aimed at strengthening cold chain infrastructure and ensuring food safety. Increased investment in cold storage facilities and refrigerated transport networks is essential to improving food security and reducing waste. The FAO estimates that improving cold chain systems could reduce global food loss by 20-30%, translating into economic and nutritional benefits. Regulatory frameworks mandating strict temperature control measures for food distribution are necessary to enforce compliance with safety standards. Public-private partnerships can facilitate technological innovations and expand the accessibility of refrigeration solutions in resource-limited settings. Furthermore, consumer education initiatives promoting awareness of proper food storage practices play a critical role in minimizing foodborne illnesses and ensuring public health. Training programs for food handlers on cold chain management can further enhance compliance with food safety regulations. Strengthening food safety frameworks through improved infrastructure, continuous monitoring, and public awareness initiatives will be crucial in achieving global food security and reducing the public health burden associated with foodborne diseases.

Author: Ms. Kanishka Garjola

Ms. Garjola has completed her Graduation in Microbiology from Institute of Home Economics, Delhi University (IHE DU). She is presently pursuing Post Graduate Diploma in Hospital and Health Management and has keen interest Healthcare Sector.

WAREHOUSE LOGISTICS & COLD CHAIN EXPO (WLC EXPO) 2024

The Warehouse Logistics & Cold Chain Expo (WLC Expo) 2024, organized by PHDCCI & InterAds Exhibitions with the support of the Ministry of Agriculture and Farmers' Welfare and the National Centre for Cold Chain Development (NCCD) as the Knowledge Partner, took place from December 5-7, 2024, at the India International Convention & Expo Centre, Yashobhoomi. Co-located with the 6th edition of SIAL India 2024, the event provided an exceptional platform for networking, knowledge-sharing, and business expansion with a significant international presence.

Alongside the expo, two key conferences—FoodLogix & Warehouse Summit 2024 and India Cold Chain Conclave 2.0—were organized on December 5 and December 7, respectively. These conferences facilitated discussions on the latest advancements in food logistics, warehousing, and cold chain technologies, emphasizing innovations that improve efficiency and sustainability in the supply chain sector.

Presence of NCCD:

As the Knowledge Partner, NCCD played a crucial role in shaping discussions on cold chain infrastructure, sustainable practices, and advancements in temperature-sensitive logistics. NCCD experts and representatives participated in panel discussions and technical sessions, offering insights into policy frameworks, innovative cold storage solutions, and best practices for enhancing efficiency in cold chain logistics. Their presence underscored the growing importance of developing a resilient and sustainable cold chain network to support India's agricultural and perishable goods industry.

Key Takeaways:

1. Technological Innovations: The expo showcased cutting-edge solutions in temperature-controlled storage, automation, and tracking systems, demonstrating how modern technologies can optimize cold chain operations.
2. Sustainability Focus: Discussions emphasized eco-friendly logistics practices, energy-efficient warehousing solutions, and the integration of renewable energy sources into cold storage infrastructure.
3. Industry Collaboration: The event fostered valuable partnerships among stakeholders, including policymakers, logistics providers, technology developers, and agricultural producers, aiming to strengthen the cold chain ecosystem.
4. Market Insights: Experts highlighted trends such as the increasing demand for integrated logistics solutions, the role of AI and IoT in monitoring cold storage conditions, and the need for policy-driven support to enhance sector growth.
5. Global Engagement: With participation from international companies and stakeholders, the event facilitated knowledge exchange and potential cross-border collaborations in the cold chain sector.

The Warehouse Logistics & Cold Chain Expo (WLC Expo) 2024 successfully provided an essential platform for industry leaders, businesses, and policymakers to explore advancements in warehousing, logistics, and cold chain technologies. NCCD's contribution as the Knowledge Partner reinforced its commitment to promoting sustainable and efficient cold chain solutions in India. The event highlighted the sector's immense potential and set the stage for future innovations, ensuring continued growth and modernization of India's cold chain and logistics industry.

From The

The Ministry

Agriculture is the backbone of India's economy, contributing significantly to food security, employment, and rural development. The Ministry of Agriculture & Farmers Welfare (MoA&FW) has been at the forefront of implementing farmer-centric policies that drive productivity, enhance market access, and support sustainable agricultural practices. Our efforts under initiatives such as Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), Agriculture Infrastructure Fund (AIF), Mission for Integrated Development of Horticulture (MIDH), and the National Mission on Sustainable Agriculture (NMSA) aim to create a resilient and self-reliant agricultural ecosystem.

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SH. DEVESH CHATURVEDI

**SECRETARY,
MINISTRY OF AGRICULTURE &
FARMERS' WELFARE,
GOVT. OF INDIA**

One of the most critical components of agricultural sustainability is the cold chain infrastructure, which ensures minimal post-harvest losses, enhances food quality, and supports farmers in securing better prices for their produce. The role of the National Centre for Cold Chain Development (NCCD) in advancing India's cold chain ecosystem has been instrumental in achieving these goals.

Climate & Country

Climate change poses a major challenge to global agriculture, affecting productivity and increasing crop loss risks. India is committed to sustainability through global agreements like the Paris Agreement and SDGs, aiming for net-zero emissions by 2070. A sustainable cold chain is no longer a choice but a necessity, requiring energy-efficient, climate-resilient solutions. Eco-friendly refrigerants, solar-powered cold storage, and smart energy management are key to reducing emissions while enhancing efficiency.

Energy Efficiency & Renewable Energy

The cold chain sector is among the most energy-intensive industries, consuming a significant portion of power for refrigeration, storage, and transportation. It is imperative that we adopt innovative energy solutions that lower dependency on fossil fuels while maintaining efficiency and affordability. Some key areas of focus should include:

- **Solar-Powered Cold Storages** – Integrating solar panels and hybrid energy systems in cold storage units to reduce reliance on grid power.
- **Energy-Efficient Refrigeration Technologies** – Using thermal energy storage, advanced insulation materials, and automation in cooling systems to minimize energy wastage.
- **Green Cold Chain Transportation** – Encouraging the use of electric and hybrid refrigerated trucks to lower carbon emissions.
- **Eco-Friendly Refrigerants** – Transitioning towards natural refrigerants such as ammonia and CO_2-based cooling systems to replace traditional high-GWP refrigerants.

By incorporating these solutions, the cold chain sector can make significant contributions to India's overall energy efficiency and sustainability targets while ensuring food security and reducing post-harvest losses.

Minimum System Standards & Guidelines

The National Centre for Cold Chain Development (NCCD) has already taken commendable steps in this direction. By updating its guidelines and promoting energy-efficient infrastructure, NCCD has been instrumental in integrating sustainability into India's cold chain ecosystem. From paving way towards modernizing cold storage facilities and enhancing transportation efficiency, NCCD is leading the way in ensuring that farmers and businesses generate maximum benefit from the latest advancements in cold chain technology.

Way Forward

I encourage all stakeholders—industry leaders, policymakers, researchers, and farmers—to continue collaborating and leveraging NCCD's expertise to create a resilient, sustainable, and climate-smart cold chain ecosystem. By working together, we can ensure greater efficiency, reduced wastage, and better market opportunities for our farmers, ultimately leading to a more prosperous and sustainable agricultural future.

Together, let us build a future where innovation meets sustainability, and our farmers reap the true benefits of a world-class cold chain network.

Joint Inspection

NCCD's Joint Inspection Team Visits IGC Lassipora, Pulwama to Assess Cold Storage Projects Under MIDH

In a significant step towards bolstering the cold storage infrastructure in Jammu and Kashmir, a Joint Inspection Team from the National Centre for Cold Chain Development (NCCD) and Mission for Integrated Development of Horticulture (MIDH) conducted an inspection of the cold storage projects in the region. The visit was aimed at evaluating the feasibility of financial assistance under MIDH for these projects, ensuring their compliance with the required standards, and expediting their completion.

The team meticulously inspected nine different Controlled Atmosphere (CA) stores situated in the IGC Lassipora region of Pulwama. The evaluation process encompassed several critical parameters, including:

- Measurement of storage chambers and other facility areas.
- Inspection of machinery and refrigeration equipment to assess operational efficiency.
- Evaluation of fire-fighting readiness, including the availability and functionality of fire-fighting equipment.
- Verification of legal and operational documentation to ensure compliance with government norms.

The visit underscores the government's commitment to strengthening the cold chain infrastructure in Jammu & Kashmir. By ensuring financial assistance under MIDH, the initiative not only expedites the completion of pending projects but also encourages further investment in cold storage facilities by farmers, grower cooperatives, and Farmer Producer Organizations (FPOs) etc.

Key Benefits of Government Support

1. Fast-tracking Cold Storage Projects: Joint inspections and financial aid facilitate quicker implementation of projects, ensuring that perishable agricultural produce is stored efficiently.
2. Enhancing Post-Harvest Management: A robust cold storage network reduces post-harvest losses, ensuring better price realization for farmers.
3. Encouraging More Investments: The availability of government schemes and financial incentives motivates stakeholders to set up modern cold storage units.
4. Boosting Agricultural Economy: Strengthening the cold chain infrastructure enhances the horticulture sector, which is crucial to the economy of Jammu & Kashmir.

Demonstration Unit

The National Centre for Cold Chain Development (NCCD) is spearheading an innovative initiative to revolutionize cold storage infrastructure in India. As part of its ongoing commitment to enhancing sustainable cold chain logistics, NCCD is establishing a Decentralized Renewable Energy (DRE)-based Demonstration Unit at the National Horticulture Board (NHB) premises. This initiative aims to showcase the potential of renewable energy in mitigating post-harvest losses and strengthening farm gate infrastructure.

A Step Towards Sustainable Cold Storage

At the heart of this initiative is the establishment of a solar-based cold storage unit with a capacity of 10 metric tons (MT). This DRE-based system will serve as a demonstration unit for various stakeholders, enabling them to understand the advantages of integrating renewable energy into cold storage solutions. The primary goal is to reduce post-harvest losses and enhance the efficiency of the cold chain at the farm level.

Additionally, the solar-based cold storage unit will be deployed in standalone cold store, which can also be functioning on hybrid technology that incorporates both electrical energy and solar power. The data collected from this unit will be analyzed and shared to facilitate the commercial development of DRE-based cold storage technology. By documenting and disseminating valuable insights, NCCD aims to encourage wider adoption of sustainable cold storage solutions.

Encouraging Innovation Through Collaboration

To foster innovation and encourage technological advancements, NCCD is inviting other manufacturers to set up conventional cold storage units and alternative cooling technologies. This initiative will enable comparative assessments of different cooling technologies, allowing for in-depth research and evaluation. By establishing a platform for real-world application and analysis, NCCD seeks to support the development of cost-effective and energy-efficient cold storage solutions.

ADVANCING SUSTAINABLE COLD CHAIN INFRASTRUCTURE: NCCD'S DRE-BASED DEMONSTRATION UNIT

Building Awareness and Capacity

One of the key objectives of the Demonstration Unit is to serve as a training and capacity-building hub. The facility will be open for training programs, offering industry professionals, government officials, and students hands-on experience with cutting-edge cold storage technologies. Organizations such as NHB, Mission for Integrated Development of Horticulture (MIDH), Agricultural and Processed Food Products Export Development Authority (APEDA), and the Ministry of Food Processing Industries (MOFPI) will have the opportunity to train their personnel on the benefits and applications of DRE-based cold storage systems.

Research and Development for Future Advancements

Beyond training and demonstration, the facility will function as a center for research and development. Experts in the field will have access to a real-world testing environment to conduct studies on optimization, efficiency, and scalability of cold chain infrastructure. This will align with India's sustainability goals and contribute to the evolution of more eco-friendly cold storage solutions.

The Future of Cold Chain Sustainability in India

The establishment of this DRE-based Demonstration Centre at NCCD represents a significant step toward a greener, more resilient cold chain infrastructure. By combining innovation, research, and practical training, NCCD is laying the groundwork for the widespread adoption of renewable energy-powered cold storage solutions.

This initiative is expected to bring multiple benefits, including:

- Demonstration of Renewable Energy-Based Cold Storage Systems: A real-world model to showcase the effectiveness and viability of solar-powered cold storage.
- Enhanced Training Opportunities: A facility for government officials, industry experts, and students to gain hands-on knowledge of sustainable cold chain solutions.
- Facilitation of Research & Development: A center for conducting studies and assessments to improve cold storage technologies in alignment with sustainability and efficiency goals.

As climate change and energy consumption challenges continue to shape global agricultural and food supply chains, India's commitment to sustainable practices through initiatives like this will play a pivotal role in securing the future of agriculture and food security.
The NCCD's DRE-based Demonstration Unit is a beacon of progress, setting a new standard for energy-efficient, cost-effective, and environmentally responsible cold chain solutions in India.

Written by-
Sh. Rahul Garjola
Engineer, NCCD

Foreign Visit

Exposure Visit To Germany Conducted By GIC (Green Innovation Centres In Agriculture And Food Sector India) Of Federal Republic Of Germany

In a landmark initiative to strengthen India's horticulture and cold chain sector, a delegation of senior officials visited Germany from September 2-6, 2024. Organized by the Green Innovation Centres in Agriculture and Food Sector (GIC) of the Federal Republic of Germany, the visit provided valuable insights into cutting-edge agricultural technologies, high-density farming, postharvest management, and energy-efficient cold storage solutions.

The Indian delegation included key policymakers such as Shri Priya Ranjan (Joint Secretary, DA&FW), Shri Naveen Kumar Patle (Additional Commissioner, Horticulture), Shri Vijay Kumar Doharey (Deputy Managing Director, NHB), and Shri Asheesh Fotedar (COO, NCCD). Their exposure to Germany’s innovative practices is expected to contribute significantly to India's agricultural transformation.

Revolutionizing Orchard Management: The KOB Research Station

The visit to KOB Research Station, Ravensburg, a leading center for excellence in temperate crops, showcased advancements in plant health, variety testing, and postharvest physiology. The delegation witnessed the integration of Agri-Photovoltaic (Agri-PV) technology, where solar panels are used in high-density apple plantations. This dual-purpose approach enables fruit production while generating renewable energy to power cold storages, thus ensuring a sustainable supply chain.

Additionally, KOB's research on protected cultivation demonstrated the benefits of using hail-nets and insect nets for apples, pears, and apricots, leading to enhanced productivity and disease resistance. The visit also provided insights into innovative Controlled Atmosphere (CA) storage systems, which extend the shelf life of apples while utilizing environmentally friendly refrigerants such as Propane (N35) and CO2 cascade systems. These energy-efficient technologies reduce carbon footprints and ensure a sustainable cold chain infrastructure.

The Role of Farmer Producer Organizations (FPOs) in Modern Supply Chains

A significant part of the visit was dedicated to understanding the role of Farmer Producer Organizations (FPOs) in Germany. The delegation visited BayWA FPO, which operates a state-of-the-art 14,000 MT CA storage facility equipped with an automated GREEFA grading line and a QR-based traceability system for food safety. The mechanized packhouses at these facilities ensure efficient sorting, grading, and packaging, significantly enhancing the export potential of fresh produce.

The exposure also highlighted Germany's multi-vegetable packhouses, handling crops such as tomatoes, cucumbers, brinjals, carrots, onions, sweet potatoes, and chilies. These packhouses incorporate modern cold storage technology, advanced residue testing laboratories, and automated packaging lines to ensure high-quality standards in the global market.

Bridging Knowledge Gaps: Hohenheim University and Global GAP Collaboration

The delegation also visited Hohenheim University, a leading institution focusing on research-driven agricultural advancements. Discussions centered around Bharat GAP certification, an Indian adaptation of Global GAP, aimed at enhancing food safety and expanding market opportunities for Indian farmers. The university has initiated a student exchange program with Dr. YS Parmar University of Horticulture & Forestry, Solan, fostering international collaboration in agricultural research.

A crucial meeting with GIZ officials in Bonn reinforced the significance of capacity building in India. The German government's GIC program in India has been extended till mid-2025, emphasizing sustainable agriculture and knowledge exchange.

Key Takeaways for India

The visit provided actionable insights into adopting German best practices in India's agricultural sector:

- **High-Density Apple Plantations (HDP)**: Optimized spacing, pruning, and training techniques can boost productivity.
- **Protected Cultivation Techniques**: Use of hail-nets and insect nets can significantly reduce pest attacks and environmental risks.
- **Energy-Efficient Cold Chain Technologies:** Environmentally friendly refrigerants and energy-efficient cold storage solutions must be promoted.
- **Strengthening FPOs**: Mechanized grading, traceability, and marketing support can enhance India's horticultural supply chains.
- **Bharat GAP Implementation**: Aligning with international food safety standards will open new market opportunities for Indian produce.

Conclusion

The exposure visit to Germany has reinforced the importance of sustainable and technology-driven agricultural practices for India's horticulture and cold chain sectors. With increased focus on research collaboration, farmer empowerment, and energy-efficient solutions, India can significantly enhance its agricultural productivity and market competitiveness. The insights gained will be instrumental in shaping future policies and infrastructure development for a more resilient and profitable agricultural ecosystem.

Revolutionising Bihar's Mango Trade

Breaking Barriers with Innovative Business Models

Bihar, India's third-largest mango producer, contributes 7.5% to the nation's total production, with regions like Bhagalpur and Darbhanga playing crucial roles. Bhagalpur is particularly renowned for its GI-tagged Jardalu mangoes, while Darbhanga is the state's highest producer, yielding a diverse array of varieties such as Dudhiya Maldah and Bombai. Mangoes from Bihar are highly sought after, both for fresh consumption and in the processing industry, particularly during the peak season from May to July. The case study presented here discusses the importance of cold-chain access in rural parts of the country, which can improve the market reach for the good quality horticulture produce, providing better earnings to the producer and lowering post-harvest losses.

Challenges in the Mango Supply Chain

Despite its potential, Bihar's mango value chain faces significant challenges, particularly in post-harvest management. The lack of standardised harvesting and post-harvest practices severely limits the ability of Bihar's mangoes to penetrate broader domestic and international markets. Additionally, inadequate infrastructure, such as the scarcity of integrated packhouses and poor transportation facilities, exacerbates these issues.

Traditional trade systems that dominate the region further restrict market expansion and profitability, making it difficult for local farmers to achieve better market outreach and pricing.

Innovative Solutions: A Packhouse-Centric Approach

To address these challenges, a new packhouse-centric business model is emerging as a promising solution for developing a sustainable value chain in Bihar. This model focuses on strengthening market linkages and enhancing the post-harvest process, with integrated packhouses serving as the hub for various critical functions. These facilities provide the essential cold-chain infrastructure that preserves mango quality during transit with processes like Hot Water Treatment (HWT) and Vapor Heat Treatment (VHT), a global phytosanitary requirement, which is effective in eliminating major issues of Anthracnose (a fungal infection) in North India mangoes and educates farmers on key preconditioning processes such as sorting, grading, cleaning, and precooling. By adopting a participatory business model, this approach encourages collaboration, where risks and profits are shared between buyers and farmer groups, fostering trust and breaking away from the constraints of traditional trade practices.

Case Study: Jitban's Collaboration with Agro Point FPC

Supported by the Industry Department of Bihar, the pilot intervention led by Jitban in collaboration with Agro Point FPC, showcased the effectiveness of this pack-house centric model, demonstrating how integrated packhouses using a buyer-driven model can ensure better market access and higher profits for farmers. The initiative facilitated the shipment of GI-tagged Jardalu mangoes to premium domestic markets like Bangalore and Mumbai, as well as to Middle Eastern and Southeast Asian countries.

The success of this pilot suggests that such models could be replicated across other regions, providing a blueprint for transforming Bihar's mango value chain.

How this Model Benefits FPCs

The participatory model offers significant advantages to FPCs, making it an attractive alternative to traditional trading systems. Enhanced market connectivity and reduced losses during the supply chain are just the beginning. The model also provides FPC members with training in best operational practices and post-harvest management, equipping them with the skills necessary to maintain high standards. Additionally, the shift to a more transparent and ethical business environment offers greater flexibility in trading and secure payment modes, empowering FPCs and ensuring a more sustainable and profitable future.

Impact and Replicability

This model has the potential to significantly impact local communities by providing employment opportunities for both women and men in handling packhouse operations and equipment. By adopting an innovative participatory trade model, FPCs can not only improve the mango value chain but also explore the integration of other crops into the packhouse and cold supply chain, enhancing the overall agricultural output. This model emphasises the importance of training and capacity building in good post-harvest management practices, leading to improved product quality and market readiness. With its proven success in expanding market outreach and establishing strong linkages, this approach serves as a replicable model for other community-based farmer groups, enabling them to access broader markets and achieve greater economic benefits.

The Way Forward

By continuing to innovate and expand this model, players like Jitban will be crucial to revolutionise Bihar's horticulture value chain, providing sustainable solutions that benefit farmers, improve market access, and enhance overall profitability. Jitban plans to expand its participatory model across Bihar by partnering with more FPCs and focusing on integrated packhouses in regions like Bhagalpur to access premium markets. The model will gradually include high-value crops like pointed gourd, chilli, banana, litchi, and okra.

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Setting the Benchmark

NCCD revises its Engineering Guidelines & Minimum System Standards for Implementation in Cold Chain Components

The National Centre for Cold Chain Development (NCCD) is pleased to announce the revision of the 2025 edition of the “Engineering Guidelines and Minimum System Standards for Cold Chain Components”, to be published in January 2025. This updated document represents a significant milestone, revising the standards first introduced in 2015. The new guidelines comprehensively address various facets of cold chain development, reflecting a decade of technological advancements that have modernized infrastructure and enhanced the sector’s ability to reduce post-harvest losses.

As part of its mandate, NCCD regularly revises standards and protocols to incorporate industry developments, aligning with the Government of India’s commitment to reducing post-harvest losses and promoting food security. This proactive approach ensures that the cold chain infrastructure remains relevant and capable of meeting the nation’s evolving needs.

India’s recent emergence as the world’s most populous country presents unique challenges, particularly in providing nutritional food to a rapidly growing population. Cold chain infrastructure plays an essential role in ensuring food availability and security, preserving perishable goods, and minimizing waste. The revised guidelines focus on fostering sustainability, energy efficiency, and innovation to address these critical challenges effectively.

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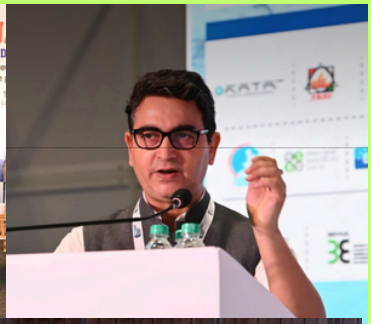
2024 AT A GLANCE

NCCD
National Centre for Cold-chain Development



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2024 AT A GLANCE

NCCD
National Centre for Cold-chain Development

7th Feb
Assocham
Conference on
Cold Chain

16th Feb
Selco
Round Table
Conference

29th may
FICCI
Cold Chain &
Logistics Summit

5th April
Kullu
ICCC: Himalayan
Chapter 2.0

15th-17th Feb
ISHRAE
Acrex India

15th-16th June
Agra
All India
Cold Chain Seminar

19th June
IACC
2nd Agro Summit

26th June
ISHRAE
World
Refrigeration Day

12th July
Rajasthan
Cold chain
Summit

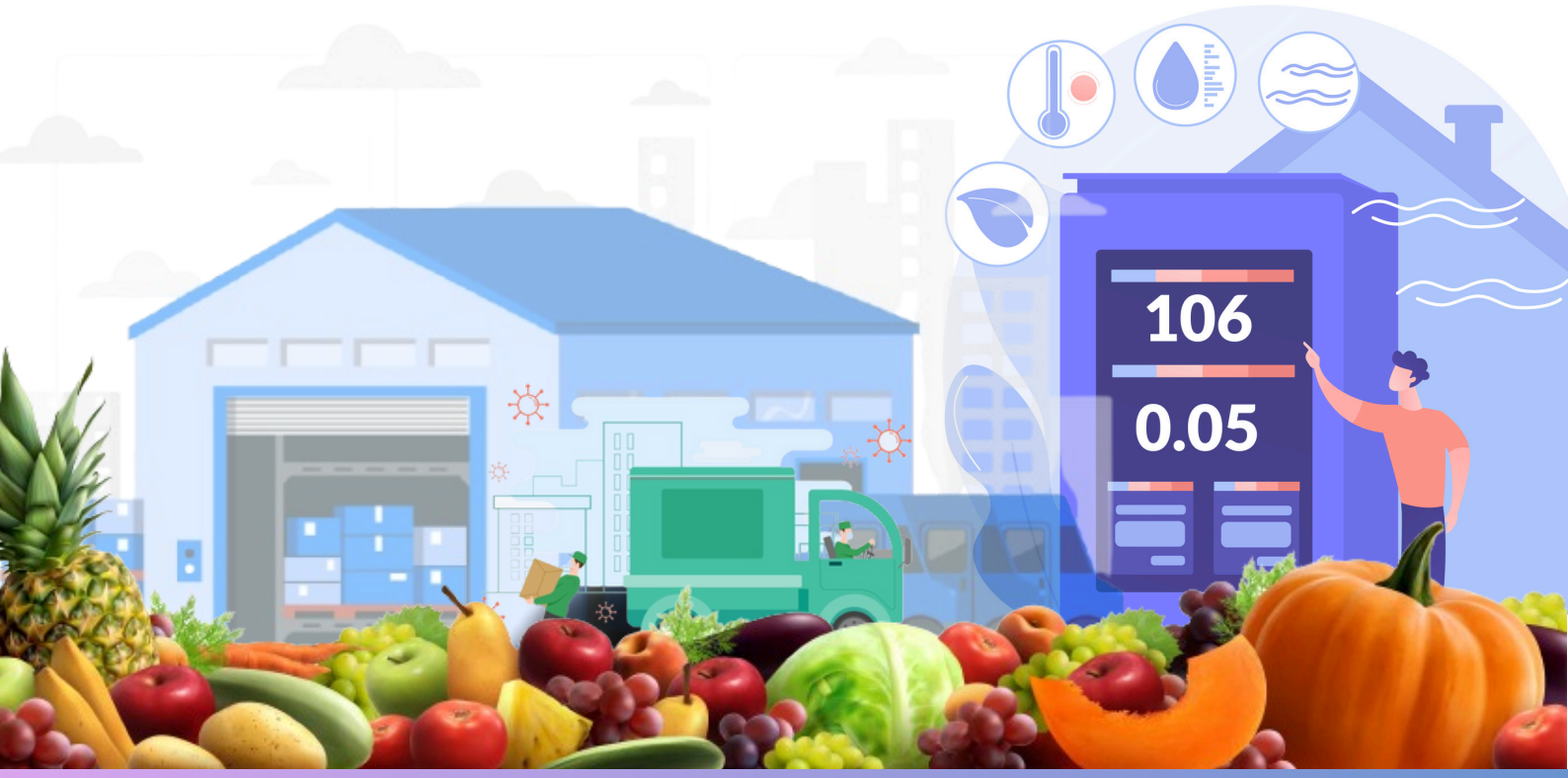
1st- 3rd Aug
Jaipur
Cool Conclave

20th Sep
MoFPI
Indo- Japan JWG

3rd -5th Oct
Kolkata
Refcold

5th Dec
Warehouse Logistics
& ColdChain Expo

2025
AHEAD



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