

HEALTHY, SAFE, SUSTAINABLE COLD CHAIN

MOVES THAT MATTER: SUSTAINABILITY

From preserving and extending the world's food supply and feeding a growing global population to helping ensure that vaccines and medications safely reach the people who need them, the cold chain plays a critical role in both everyday life and addressing global challenges. And as we look to strengthen the cold chain, we can't lose sight of another monumental challenge: protecting our planet for future generations. As a long-standing leader in refrigeration technologies and a pioneer in sustainability, Carrier is uniquely positioned to sustainably move the cold chain forward.

KEY CHALLENGES

While the need to strengthen and expand the cold chain continues to grow, the realities of food waste and its resulting effect on the environment present significant challenges. These challenges underscore the importance of sustainably feeding a growing planet by creating the cold chain of the future.



The global population will increase by 25% over the next 30 years¹



4.4 billion metric tons of carbon dioxide (CO₂) are produced per year from food waste⁴



By 2050, 66% of the world's population will live in cities, farther from where food is produced²



If food waste were a country, it would be the third-largest emitter of greenhouse gas (GHG) emissions⁵



Today one-third of all the food produced worldwide is wasted, while nearly 1 billion people go hungry every day³



An improved global cold chain could reduce current CO₂ emissions by almost 50%⁶



THE COLD CHAIN OF THE FUTURE

At Carrier, we're committed to bringing about transformation across the refrigeration industry – and across the cold chain – to enhance efficiency, effectiveness and sustainability. Our vision for the cold chain of the future is one that's connected, green and electrified, and we're bringing that vision to life today.



CONNECTIVITY

Intelligent & integrated



Reduced transport cost
and product loss



End-to-end visibility
for traceability and condition

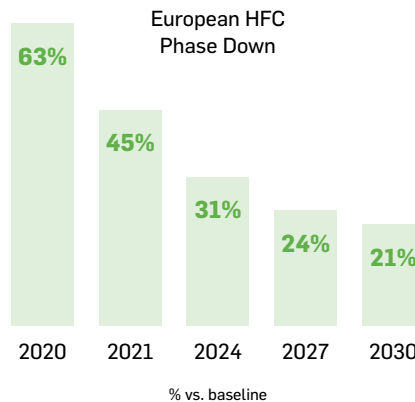


Increased asset uptime
and utilization



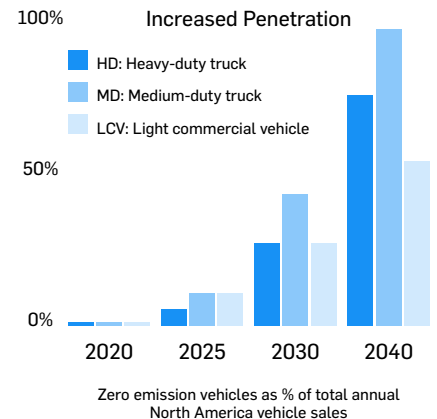
SUSTAINABLE REFRIGERANTS

Improving efficiency



ELECTRIC TECHNOLOGIES

Zero emissions



CONNECTIVITY

At Carrier, we're pursuing greater connectivity across the entire global cold chain. Today's customers want more real-time information, data analytics and prognostics, so they can make faster, intelligent decisions that help improve efficiency and sustainability. We're meeting that demand by improving connectivity and performance across our individual product lines in a number of ways.

FEATURED SOLUTION: LYNX FLEET

The Lynx™ Fleet application intelligently monitors connected refrigeration systems from anywhere in the world to provide vital information and improved visibility for asset owners, producers and fleet managers on the products being transported.

In addition to providing critical data, such as temperature, location and movement of refrigerated assets, Lynx Fleet can provide analytics and diagnostic information. The digital system provides access to near-live service and maintenance schedules for each connected refrigeration unit, helping to aid fleet management procedures and ensure minimal disruption through asset downtime.





SUSTAINABLE REFRIGERANTS

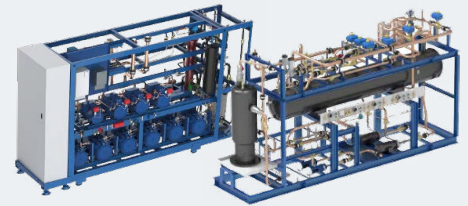
Carrier has long been an industry leader in the development and use of more sustainable refrigerant technologies. Our research on carbon dioxide refrigerants began during the mid-1990s, leading to the introduction of NaturaLINE®, the first natural-refrigerant based solution ever developed for marine container shipping.

We also pioneered the use of natural refrigerants in food retail. In 2004, Carrier installed our first transcritical CO₂ system in a Swiss hypermarket. Carrier transcritical CO₂ systems are one of the industry's most sustainable solutions for commercial refrigeration, enabling up to a 50% reduction in greenhouse gas emissions compared with traditional hydrofluorocarbon (HFC) refrigeration systems.

FEATURED SOLUTION: CO₂OLtec Evo

Our latest generation of CO₂ transcritical systems, CO₂OLtec® Evo provides energy-efficient and environmentally sustainable refrigeration through our patented modulating ejector technology. To further enhance energy savings, this revolutionary system can also be delivered with optional air conditioning and heating functionality.

The unit uses only repurposed CO₂ with no additional greenhouse gases from refrigerant use, so it was not affected by the EU F-Gas Regulation.



COOLtecEvo



ELECTRIC TECHNOLOGIES

Carrier recognizes the potential for electric technologies to reduce emissions, enhance reliability and uptime, and lower total cost of ownership for our customers. We're seizing these opportunities through flagship electric product platforms across truck, trailer and light commercial vehicle applications, and continuing to expand our portfolio with solutions that incorporate next-generation intelligence and data analytics.

FEATURED SOLUTION: Vector eCool

Built on years of research and development, including extensive real-world testing with prototypes operating in customer fleets, Carrier's Vector® eCool™ solution is the world's first fully autonomous, all-electric engineless refrigerated trailer system.

The solution combines Carrier's E-Drive™ all-electric technology with a new cutting-edge energy recovery and storage system. This converts kinetic energy generated by the trailer into electricity, which is then stored in a battery pack to power the refrigeration unit. The loop creates a fully autonomous system that produces no direct CO₂ or particulate emissions.

Cost: Lower Energy Usage
50 – 70% reduction in energy operating cost (diesel fuel vs. battery electric)*

Reliability and Uptime: Less Maintenance
30 – 60% reduction in estimated maintenance and repair costs**

Sustainability: Fewer Emissions
50 – 75% reduction in CO₂ emissions per trailer refrigeration unit***

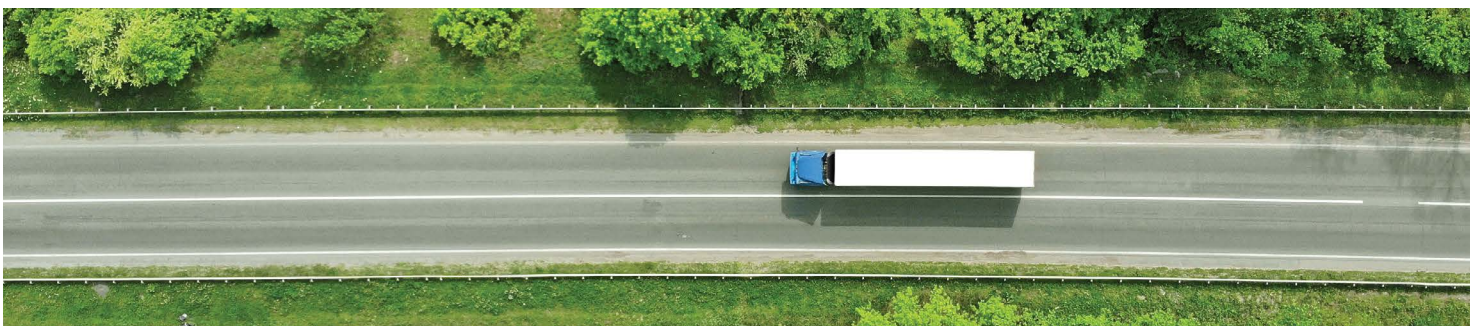
VECTOR eCool™



* Range a function of vehicle speeds, application, % time on grid charge, % time axle-generator charge, etc. Based on European fuel price of €1.50 / liter

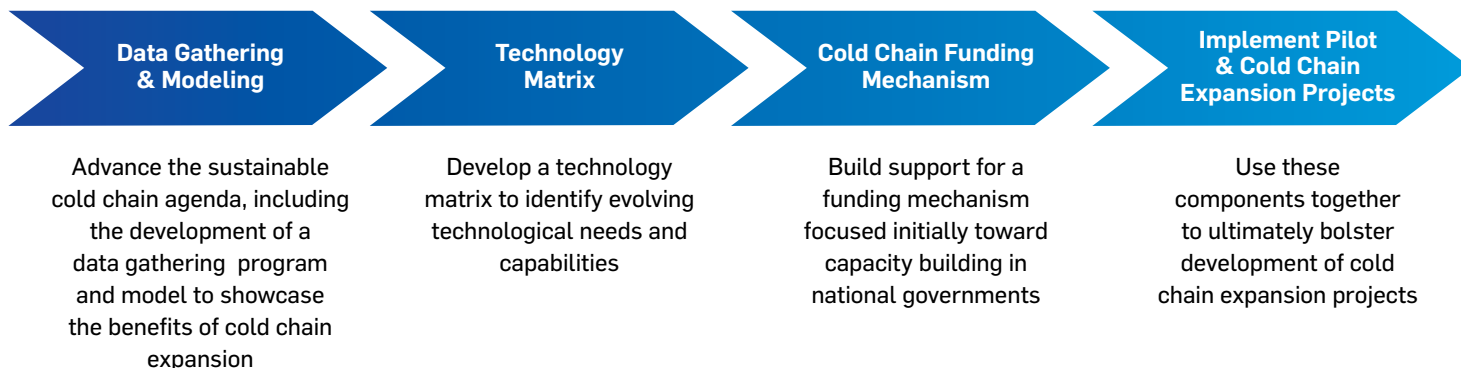
** Benchmarked using automotive studies and preliminary data from initial Vector eCool fielded units

*** Range based on emissions from battery production, vehicle speeds, application, % time on grid charge, % axle-generator charge, etc.



TURNING SUSTAINABILITY INTO POLICY

Carrier's commitment goes so much further than our own products. We're a founding member of the Global Food Cold Chain Council (GFCCC), an industry coalition dedicated to promoting expansion of a sustainable cold chain to reduce food loss, food waste and related greenhouse gas emissions. Together with other member organizations, we work to advance awareness – and most importantly, action – when it comes to securing a healthy, connected cold chain.



DELIVERING CONFIDENCE EVERY STEP OF THE WAY

By offering our expertise and innovation across so many products and initiatives, Carrier is able to make a genuine impact on the global cold chain every day – and, in turn, impact the global supply of food. From extending the shelf life of perishables, to better connecting operators to their fleets and cargoes, to collaborating with governments on their own sustainability projects, we're not only increasing confidence and food security – we're creating a better future for everyone.



GET STARTED WITH AN EXPERT

Visit us at corporate.carrier.com/healthycoldchain to learn more from Carrier leaders and industry experts about creating a safe, effective cold chain with trusted transport and storage refrigeration applications and the visibility of advanced cargo monitoring.

¹ <https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html>

² <https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html>

³ <http://www.fao.org/3/mb060e/mb060e.pdf>

⁴ "Food Wastage Footprint & Climate Change," Food and Agriculture Organization of the United Nations, 2015, Web June 4, 2020, http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/FWF_and_climate_change.pdf

⁵ <https://www.unep.org/regions/north-america/regional-initiatives/promoting-sustainable-lifestyles>

⁶ <https://iifir.org/en/tridoc/142029>



CONNECTED
COLDCHAIN