

# Driving Innovation Across the Cold Chain Fulfillment Ecosystem™



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The need  
for innovation

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The Cold Chain  
Fulfillment Ecosystem™

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The Intelligent  
Actively-Cooled Tote

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Benefits  
and features

## Customers are demanding convenience & sustainability

Grocery supply chains are some of the most complex in the industry. Product shelf life, fragility and temperature requirements present unavoidable challenges, yet groceries serve one of the most ubiquitous demands of any supply chain. Not to mention, recent events are driving the exponential growth in fulfillment across numerous sectors, including grocery. And it's not slowing down — it's accelerating. By 2025, online grocery sales will account for 21.5% of total grocery sales; at an estimated 250 billion dollars, this is a 60% increase from 2020 estimates. [Supermarket News, 2020]. With over 50% of U.S. households projected to do all of their grocery shopping online within 10 years [Progressive Grocer, 2018], grocers are ramping up cold chain operations as quickly as possible to meet the demand.

Given the demand, how can cold chain integrity be maintained across the entire fulfillment ecosystem?

## INTRODUCING THE INTELLIGENT ACTIVELY-COOLED TOTE

It's the first truly comprehensive solution for active, portable freezing and cooling, driving cold chain integrity across the entire fulfillment ecosystem.



OVER

50%

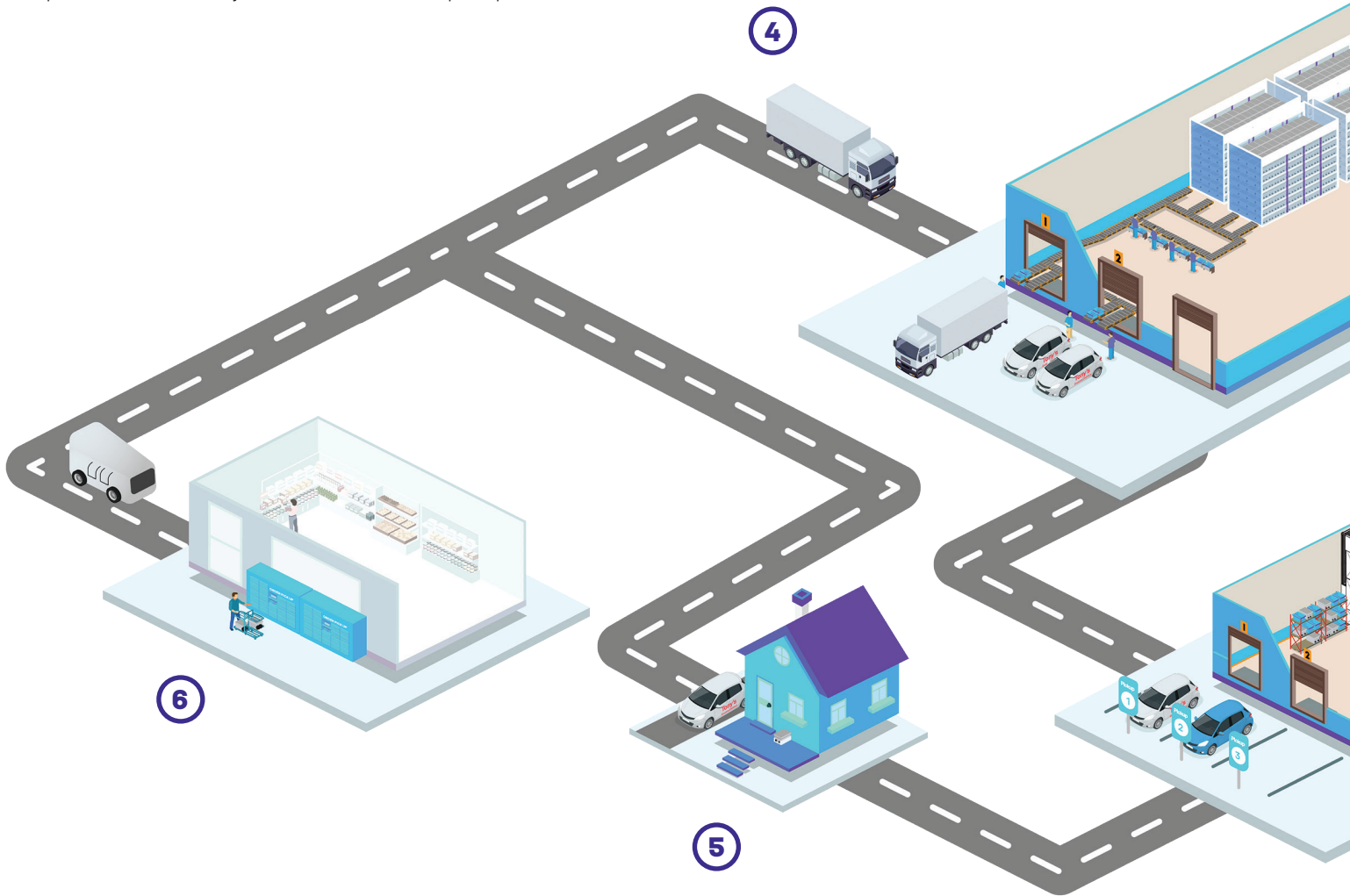
of U.S. households will do all of their grocery shopping online within 10 years.

## TO PUT IT SIMPLY

The Phononic tote delivers unmatched cold chain integrity across the entire fulfillment ecosystem with the most sustainable cooling technology available. Phononic's system does not use harmful Global Warming Potential [GWP] refrigerants and instead uses just CO<sub>2</sub> and water, making it non-toxic and non-flammable, unlike other "natural" or low-GWP refrigerants currently in use. Developed through rigorous thermal, mechanical and electrical engineering, the tote's semiconductor-based cooling technology reaches new levels of reliability and efficiency.

# The Cold Chain Fulfillment Ecosystem™

Phononic defines this ecosystem as the point of decanting products from inbound trucks and placing them into the fulfillment system until they reach the consumer. The fulfillment system includes micro-fulfillment centers (MFCs), the manual picking and packing process — as used for grocery retail and Hub & Spoke — and the dispensing of goods, such as with pickup locations, curbside or lockers, transportation, and delivery to home, office or other pickup locations.



1. Micro-fulfillment Center

2. Grocery Retail/ Hub & Spoke

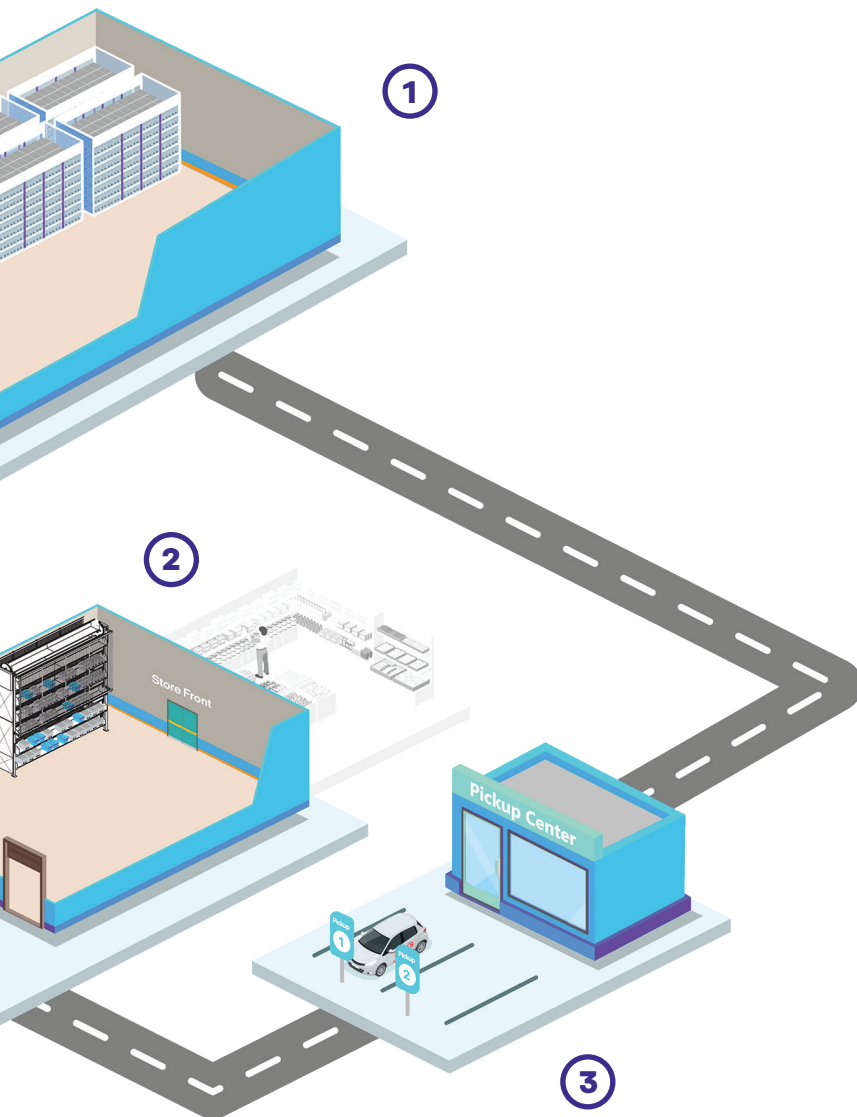
3. Pickup Center

4. Transport

5. Home/Office Delivery

6. Pickup Lockers

Phononic's patented solid-state cooling technology offers the highest possible performance for active, portable freezing and refrigeration. Developed through rigorous thermal, mechanical and electrical engineering, the tote's semiconductor-based cooling technology reaches new levels of reliability and efficiency. See how it drives innovation across the industry, in every application:



## AUTOMATED SYSTEMS

- Micro-fulfillment centers (MFCs)
- Automated supermarkets
- Hub & Spoke transport



## MANUAL FULFILLMENT

- Manual picking of items on the sales floor
- Storage of items on store racks
- Pick up of online grocery or RX orders via curbside delivery or secure lockers



## DELIVERY

- Direct delivery to customers or to pick-up points via a store-owned transport
- Logistic supplier companies, such as UPS
- Crowdsourced delivery services, such as Instacart or Uber
- Hub to spoke logistic suppliers
- Unassisted drop boxes, such as lockers, home porch containers or businesses

## What is the Intelligent Actively-Cooled Tote?

Totes are available in both a refrigerator and freezer version, using color to quickly distinguish between the two. The totes use wireless contact charging and are Wi-Fi and IoT capable, offering real-time insight into your cold chain automation process and leading to an increase in operation efficiencies. So whether you're running a fulfillment operation in a manual environment or need a cooled vessel within a micro-fulfillment center, the Intelligent Actively-Cooled Tote from Phononic is the perfect solution.



### Strong ROI

Reduces cost by eliminating the need for tri-temperature storage capital expense, in both fixed and mobile implementations and reduces fulfillment complexity and labor cost.



### Versatile

One common solution solves multiple use cases: Storage, Pick-and-Pack [Manual, Semi Automated, Automated], Curbside Pickup, Delivery and Unassisted Delivery and Hub & Spoke.



### Unsurpassed sustainability

Traditional cooling systems use CFCs, hydrocarbons and other toxic refrigerants. With just CO2 and water, our system is non-toxic and non-flammable and eliminates the need for dry ice, gel packs or ice blocks.



### Scalable

Increases the flexibility to scale with operational needs. Kick off with one container or grow to 3000+ in a site without cooling rooms, freezer warehouses or tri-temperature trucks.



### Flexible

Transforms your OPEX and CAPEX so it's based on real-time demand and allows for flexibility in scaling chilled and frozen storage as demand fluctuates.



### Real-time insights

The totes use wireless contact charging and are WiFi and IoT ready, offering real-time insight into your cold chain automation process, leading to an increase in operational efficiencies.



### Demand-based energy savings

Cools or freezes only the number of customer orders needed based on demand, rather than an entire cooler, warehouse or transport truck.



### Compressor-free

The elimination of the compressor combined with Phononic's patented refrigeration and freezing technology maximizes internal volume while keeping the container compact.



### Improved customer experience

Strengthens customer loyalty by ensuring order freshness and a positive experience with ever evolving e-commerce platforms.



## Who can benefit from the Intelligent Actively-Cooled Tote?

### Personal Shoppers

Due to strict cold chain compliance regulations, personal shopper associates must adhere to specific time limits while picking chilled or frozen products. By using an actively-cooled refrigerated tote, they can complete their entire route without having to return to the backroom due to a time constraint or concerns over product quality.

### Grocery Store Retailers

Our tote's universal dimensions work in conjunction with automated vertical storage and existing racking systems, as well as dollies and pick carts, so retailers can more easily optimize their existing space. Plus, as the ratio between the number of ambient, chilled and frozen products fluctuates, mobile totes allow for on-demand flexing, whereas conventional solutions — like reach-in cases — are more stagnant.

### Consumers

Now, more than ever, we're seeing an increase in the number of retailers adopting and expanding their Buy Online, Pickup In Store (BOPIS) solutions, like in-store, drive-up pick up and lockers. As the need for refrigerated versus frozen locker space fluctuates, these totes can accommodate needs by plugging into however many spaces are necessary. Most retailers that have stuck with ambient lockers, which only help with dry goods or GM products, require an associate to retrieve perishables from another area.

### Delivery Drivers

Grocers currently rely on passive-cooling solutions like gel or ice packs to maintain temperature control, which is not reliable or sustainable. With our totes, drivers can expand their overall delivery radius and acquire previously unattainable cost efficiencies by optimizing routes through batched orders.

## What does the future of cold chain fulfillment look like?

The Intelligent Actively-Cooled Tote allows for a more seamless operation within micro-fulfillment centers and automated supermarkets. So instead of needing tri-temperature trucks or having to build refrigerated and frozen warehouses, our totes can store perishable goods. Plus, solid-state cooling technology creates a more associate-friendly, ambient work environment and can even lead to easier maintenance and decreased energy costs.

**About:** Phononic is reimagining cooling and heating in ways never thought possible. Its breakthrough solid-state technology is transforming industries and creating new markets with innovative solutions that disrupt antiquated business models and incumbent technologies. Phononic is the critical element of innovation needed to radically change what it means to be efficient, effective and sustainable. The company has been named to the 2016, 2017 and 2019 CNBC Disruptor 50 lists, received the U.S. EPA's 2017 Emerging Tech Award, the R&D 100 Award and more.

Learn more at: [www.phononic.com](http://www.phononic.com)