The “cold chain” process involves food products that are shipped from the field or manufacturing plant to foodservice distributors, grocery stores, restaurants and/or directly to the consumer. This is often referred to as “farm to fork.”

There is increasing demand for cold storage logistics facilities that service the food industry.
This first installment of a three-part CBRE Research series exploring the cold storage industry’s impact on industrial & logistics (I&L) real estate outlines the drivers of cold storage demand, its major players, inventory estimates and geographical distribution.

ABOUT THIS REPORT

Fundamentally, the cold storage industry facilitates the movement of temperature-sensitive, perishable and frozen food products.

WHAT IS COLD STORAGE?

The Global Cold Chain Alliance estimates that owners and operators of U.S. temperature-controlled warehouses will register a compound annual growth rate of 4% (by value) from 2018 to 2022.

WHY IS COLD STORAGE WAREHOUSING A SUBSECTOR TO WATCH?

Although refrigerated warehouses make up a small portion of the overall U.S. industrial market (between 1% and 3%), major drivers such as population growth, evolving consumer behaviors and increased space demand from third-party logistics companies servicing grocers and food retailers have put cold storage front and center.
The two largest cold storage companies make up more than half of the total market by space occupied in North America.

Lineage Logistics is the leader, accounting for 31.8% of the cold-storage market with over 1.1 billion cubic feet of space in the U.S. and Canada. Americold takes up 29% with 1 billion cubic feet. Other key players include United States Cold Storage (8.9%) and VersaCold Logistics (3.8%), both having a combined 444 million cubic feet of refrigerated warehouse space in the U.S.

**WHO ARE THE MAIN PLAYERS?**

- **31.8% | Lineage**
- **29.0% | Americold**
- **8.9% | USCS**
- **3.8% | VersaCold**

The U.S. Department of Agriculture (USDA) estimates that there is 3.6 billion cubic feet* of industrial food commodity cold storage space in the U.S.

Cold storage warehouses are primarily measured by the cubic footage of storage area. Therefore, there is a premium on clear height—typically between 40 and 60 feet or more in modern facilities—and the number of pallet positions they can hold. There is limited new construction due to the relatively small number of operators and the specialized nature of the industry. Barriers to entry, such as high construction costs and restrictive government food-grade storage regulations, prevent overbuilding. The average age of cold storage warehouses in the U.S. is approximately 34 years.

**HOW MUCH COLD STORAGE SPACE IS THERE?**

*estimated at 214 million sq. ft.

Cold storage warehouses are primarily measured by the cubic footage of storage area. Therefore, there is a premium on clear height—typically between 40 and 60 feet or more in modern facilities—and the number of pallet positions they can hold. There is limited new construction due to the relatively small number of operators and the specialized nature of the industry. Barriers to entry, such as high construction costs and restrictive government food-grade storage regulations, prevent overbuilding. The average age of cold storage warehouses in the U.S. is approximately 34 years.

Online grocery shopping will play a significant role in the demand for cold storage space.

Nearly half of U.S. consumers already shop for packaged food products online. This is expected to rise to 70% by 2022, translating into an estimated $100 billion spent per year on online grocery, according to the Food Marketing Institute (FMI) and Nielsen. A large portion of this will likely be perishable food items, requiring more freezer/cooler space for storage and distribution. CBRE estimates cold storage space demand of between 70 million and 100 million sq. ft. over the next five years.
There are two distinct categories of refrigerated warehouses: production facilities and distribution centers.

1. **PRODUCTION FACILITIES**

Production facilities are usually located at the point of food origination, such as farms for produce, fishing ports for seafood and cattle ranches for meat plants. These facilities provide processing or freezing and handling services for commodity agricultural products. In the case of consumer packaged/processed foods, ingredients come from all over the country and are located at the middle of the supply chain.

2. **DISTRIBUTION WAREHOUSES**

Distribution warehouses, on the other hand, often are in large urban areas and typically serve retail (grocery) or institutional food customers in a major metro market or region. They focus on providing storage, product handling, distribution management and other services primarily for refrigerated or frozen packaged goods. Public refrigerated warehouses (a more narrow definition of “cold storage”) provide longer-term storage to meet seasonal demands and provide inventory management and value-add services primarily for frozen food storage.

**79% of the refrigerated storage capacity in the U.S. is outsourced by food producers, distributors, retailers, e-tailers and other participants.**

Due to rising costs and increased sophistication of technology used to move food through the supply chain, outsourcing has become common. According to the USDA’s National Agriculture Statistics Service, 79% of the refrigerated storage capacity in the U.S. is outsourced by food producers, distributors, retailers, e-tailers and other participants. The remaining 21% includes in-house cold chain participants who own and manage their own warehouses.
Typical grocery and foodservice distribution centers are comprised of freezer, cooler and dry warehouse sections within a single warehouse building.

Second-generation space is sometimes owner-occupied but is often investor-owned and offers a tremendous cost advantage for users versus new construction. As a result, there is substantial demand for quality, second-generation space, which is typically absorbed by grocery and foodservice tenants. Thanks to high standards required by food distributors, these facilities are generally well-maintained and have a longer useful life.

Public refrigerated warehouses are typically owner-occupied and 100% refrigerated.

They are predominantly comprised of freezer space and oftentimes have cooler space as well. The primary function of a public refrigerated warehouse is storing refrigerated product on a per-pallet, per-month basis for various food manufacturers and retail users. They also provide value-add services for their customers, such as blast freezing, cross docking, repacking and electronic data interchange.

Dedicated refrigerated warehouses (typically connected to processing facilities) are highly customized to the requirements dictated by the type and quantity of food production.

Because such facilities are tied to production, reuse is often challenging. In second-generation space, the refrigerated warehouse portion of the facility can sometimes be leased separately from production areas; however, feasibility depends largely on configuration, geographic location and loading.
Overall, it is difficult to fully quantify and categorize the cold storage market.

Given the many different uses of space within the refrigerated industrial sector and the uniqueness of each operation, not all space clearly falls into exact, quantifiable subsectors. The public-refrigerated-warehouse sector is by far the most uniform, quantifiable subsector. Nevertheless, the specialized nature of other refrigerated industrial operations can be very attractive for reuse by similar cold storage users. While each property requires evaluation on a more granular, asset-by-asset basis, these properties can attract small but highly interested groups of prospective tenants and investors.

**COLD STORAGE SPACE:**

**ONE SIZE DOES NOT FIT ALL**

Online grocery shopping is still in its infancy compared to other retail categories. Just 3% of U.S. grocery spending occurs online, while 20% and 40% of footwear and consumer electronics spending, respectively, occurs online.¹

The in-store grocery shopping experience is difficult to replicate in a digital platform, and therefore U.S. consumers largely prefer to shop for food in person. A survey conducted by Bain & Company and Google found that 25% of the respondents used an online grocery service in the past year, yet only 26% of those users, or 6% of all consumers, say they placed orders more than once a month.

Despite the marginal e-commerce grocery penetration, consumer behavior is evolving toward convenience and speed. Today, approximately 49% of U.S. consumers shop for packaged goods products online, according to FMI and Nielsen. By 2022, FMI/Nielsen forecasts this will rise to 70%, translating into $100 billion in online grocery sales and rising to 13% from 3% of the total grocery spend.

F&B online sales are forecast to grow by an annual average of 22% during the same timeframe, according to Euromonitor. This should have a significant impact on logistics space demand since more perishable F&B items will move through supply chains. CBRE estimates that between 70 million and 100 million sq. ft. of cold storage space for food distribution may be added to meet this demand.

DEMAND DRIVERS

According to a July 2018 study by consulting firm Brick Meets Click, use of online grocery services varies by age. Approximately 26% of those aged 30 to 44 actively shop for groceries online (down slightly from the prior year). The study also found that those aged 45 or more are less likely to shop for groceries online, and older shoppers’ household penetration (active online grocery shoppers) has declined somewhat since 2017. On the other hand, the number of 18- to 29-year-olds who actively shop for groceries online increased by 3 percentage points last year, indicating that online grocery shopping is gaining traction for younger consumers.

Source: Brick Meets Click, 2018.
DEMAND DRIVERS

Although the baby-boom generation isn't a big user of online grocery shopping today, this age cohort—with 10,000 retiring every day in the U.S.—likely will use online grocery shopping more and more as the technology and experience improves.

Many baby boomers migrate to retirement communities in warm-weather states such as Florida and Arizona, and more and more are choosing an urban environment given all the cultural amenities. Not only will they shop for groceries, but these urban retirees will patronize restaurants and food places. Consequently, there will be a greater need for cold storage distribution in and around these areas.

Some major food retailers are making aggressive moves into e-commerce by acquiring or partnering with delivery platforms. U.S. grocery chain Kroger has partnered with British online grocer Ocado, which only provides home deliveries from its warehouses. Together, Kroger and Ocado are building out a high-tech cold storage distribution system, initially identifying sites for at least 20 high-tech cold storage warehouses across the U.S., with three already underway near Cincinnati, Central Florida and the Mid-Atlantic. Kroger will employ Ocado’s advanced digital and robotics capabilities to expand its omnichannel reach.

Similarly, Albertsons has enlisted Takeoff Technologies to provide a robot-powered micro-fulfillment center for its grocery stores, thus combining the retail and logistics platforms. Takeoff’s software coordinates a series of “crate-bots” that use a rail system to sort food orders, which are then bagged by workers for customer pickup or delivery. These technological solutions are just the beginning, and it is expected that grocers will increasingly use robots and artificial intelligence to stock their warehouses.

Population growth and changing demographics are major underlying drivers of cold storage space demand. The U.S. Census Bureau estimates that the population has grown by 6.3% or 18.4 million people since 2010. This has led to increased food consumption with a rising demand for frozen foods and prepared refrigerated foods. Additionally, restaurants and limited-service eating places have experienced growth with more people dining out. And in response to consumer preferences for healthier options, many eating places—fast-food restaurants in particular—have eliminated artificial flavors and preservatives as ingredients. This means that more of their food items must be stored in and distributed from cold storage facilities.

Although economic conditions tend to dictate how frequently consumers eat out, they don’t dramatically impact the demand for cold storage space either way. Food products still need go through warehouses, whether their destination is to a restaurant, grocery store or directly to the consumer.

Demand for refrigerated warehouse space is also largely generated from the food industry’s increasing propensity for outsourcing. Food retailers and wholesalers continue to outsource the storage and distribution of their products to public refrigerated warehouse companies. Historically, the food industry handled these activities in-house, but increased costs, greater complexity of technological systems and a trend toward “core competencies” occurring in most industries have made outsourcing more attractive. Additionally, the consolidation of public refrigerated warehouse companies has enabled them to better serve their customers. For example, Nestlé is transitioning from direct-store delivery (DSD) to an outsourced warehouse model beginning in Q3 2019.

FIGURE 2: FOOD SALES BY PLACE

- GROCERY STORES
- FULL-SERVICE RESTAURANTS
- LIMITED-SERVICE EATING PLACES

Demand for refrigerated warehouse space is also largely generated from the food industry’s increasing propensity for outsourcing. Food retailers and wholesalers continue to outsource the storage and distribution of their products to public refrigerated warehouse companies. Historically, the food industry handled these activities in-house, but increased costs, greater complexity of technological systems and a trend toward “core competencies” occurring in most industries have made outsourcing more attractive. Additionally, the consolidation of public refrigerated warehouse companies has enabled them to better serve their customers. For example, Nestlé is transitioning from direct-store delivery (DSD) to an outsourced warehouse model beginning in Q3 2019.
COLD STORAGE
INVENTORY & MAJOR PLAYERS

States with the most industrial food commodity cold storage space are usually near major food producers and population centers.

The U.S. currently has approximately 3.6 billion cubic feet (estimated 214 million sq. ft.) of industrial food commodity cold storage space and 2.0 billion cubic feet (300 million sq. ft.) of retail food cold storage space.

FIGURE 3: AGRICULTURAL PRODUCTS COLD STORAGE

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>BILLION CUBIC FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public General Warehouse</td>
<td>601</td>
</tr>
<tr>
<td>Private &amp; Semiprivate General Warehouse</td>
<td>349</td>
</tr>
<tr>
<td>TOTAL GROSS SPACE*</td>
<td>950</td>
</tr>
</tbody>
</table>

* 85% freezer, 15% cooler.


Note: Survey represents about 78% of the total capacity tabulated. The numbers published should be considered minimum figures as there are cold storage firms that are not known to NASS.

The cold storage industry is highly fragmented with just a few companies controlling a significant portion of the market. The two largest cold storage companies make up more than half of the total market by space occupied in North America. Lineage Logistics is the leader, representing 31.8% with over 1.1 billion cubic feet of space in the U.S. and Canada. It recently acquired Preferred Freezer Services to move into the No. 1 spot by total cold storage space. Americold also has expanded its footprint by acquiring Cloverleaf’s 132 million-cubic-foot portfolio in nine states across the central and southeastern U.S., growing to 1.0 billion cubic feet or 29% of the market. Other key players include United States Cold Storage (8.9%) and VersaCold Logistics (3.8%), both having a combined 444 million cubic feet of warehouse space in the U.S.

Consolidation of the cold storage industry will continue. All the large companies have evolved through mergers and acquisitions. As technological systems become more sophisticated, the benefits of cold storage economies of scale far outweigh the operational challenges brought on by increased size.

FIGURE 4: LARGEST REFRIGERATED WAREHOUSE COMPANIES IN NORTH AMERICA

<table>
<thead>
<tr>
<th>Name</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINEAGE LOGISTICS</td>
<td>31.8%</td>
</tr>
<tr>
<td>CONTINENTAL LOGISTICS</td>
<td>12.1%</td>
</tr>
<tr>
<td>HENNINGSEN COLD STORAGE</td>
<td>1.6%</td>
</tr>
<tr>
<td>BURRIS LOGISTICS</td>
<td>2.0%</td>
</tr>
<tr>
<td>FRIALSA FRIGORIFICOS S.A. DE C.V.</td>
<td>2.8%</td>
</tr>
<tr>
<td>INTERSTATE WAREHOUSING, INC.</td>
<td>2.8%</td>
</tr>
<tr>
<td>AGRO MERCHANTS GROUP</td>
<td>3.3%</td>
</tr>
<tr>
<td>VERSACOLD LOGISTICS SERVICES</td>
<td>3.8%</td>
</tr>
<tr>
<td>UNITED STATES COLD STORAGE, INC.</td>
<td>8.9%</td>
</tr>
</tbody>
</table>


Note: Updated to account for recent M&A activity in Q1 2019.
Cold storage facilities tracked by USDA are primarily in states where food production is substantial—along the coasts for fisheries, the Midwest for meat packing and the South Central states for poultry.

The top-five states for cold storage facilities are California, Washington, Florida, Texas and Wisconsin. Large metro areas contain most of the cold storage inventory, such as Northern New Jersey, Chicago, Los Angeles, Atlanta, Dallas/Ft. Worth and Lehigh Valley, Pa. Furthermore, gateway markets are pivotal for the industry as food products that are imported and exported through the seaports are handled by cold storage operators in markets like Los Angeles, Seattle, Oakland, Houston, Northern New Jersey and Miami.

Click image below to view interactive map

Cold storage logistics companies provide a wide array of services to their customers. For example, Americold offers the following services as part of its warehouse operations:

- **Product Receipt and Handling**
  - Receipt, handling and placement of products into warehouses for storage and preservation.

- **Product Retrieval**
  - Retrieval of products from storage upon customer request.

- **Blast Freezing**
  - The rapid freezing of non-frozen products, including individual quick freezing for agricultural produce and seafood.

- **Kitting and Repackaging**
  - Assembling custom product packages for delivery to retailers and consumers, and labeling services.

- **Order Assembly and Load Consolidation**
  - Store order fulfillment for both conventional and e-commerce needs.

- **Export and Import Support Services**
  - Handling of perishable products coming in and out of the country.

- **Storage Inspection**
  - Government-approved, temperature-controlled storage inspection services.

- **Cross-Docking**
  - Transferring inbound products to outbound trucks utilizing warehouse docks without storing the products in the warehouses.

- **Product Retrieval**
  - Retrieval of products from storage upon customer request.

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  - Retrieval of products from storage upon customer request.

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  - Retrieval of products from storage upon customer request.

Overall, the market forces fueling the cold storage industry are expected to generate growing demand for refrigerated warehousing. Gateway markets will continue to capture much of the demand for cold storage space, while smaller metro areas with growing populations likely will see a greater need for these types of facilities. Grocery stores are becoming smarter and developing ways to get food to consumers quicker and easier; consequently, online grocery shopping is expected to become a much greater portion of retail sales, driving refrigerated warehouse demand. Indeed, there are risks to the industry, including labor shortages, trucking issues, national security threats and agricultural production threats. The major players must mitigate these risks by being nimble and having the capacity to adjust accordingly when challenges arise.

WHAT’S NEXT
The two upcoming additional installments of this CBRE Research series on cold storage include:

- Development profile: construction costs & development pipeline
- Capital markets perspective: risk profile, capital pool & cap rates.

FIGURE 5: TOP-10 INDUSTRIAL COLD STORAGE STATES

<table>
<thead>
<tr>
<th>INDUSTRIAL COLD STORAGE CUBIC FEET (MILLIONS)</th>
<th>INDUSTRIAL COLD STORAGE FOOTPRINT* MILLIONS SQ. FT.</th>
<th>POPULATION (MILLIONS)</th>
<th>COLD STORAGE CUBIC FEET PER CAPITA</th>
</tr>
</thead>
<tbody>
<tr>
<td>California 396.5</td>
<td>16.5</td>
<td>39.5</td>
<td>10</td>
</tr>
<tr>
<td>Washington 271.3</td>
<td>11.3</td>
<td>7.4</td>
<td>36.6</td>
</tr>
<tr>
<td>Florida 259.4</td>
<td>10.8</td>
<td>21.0</td>
<td>12.4</td>
</tr>
<tr>
<td>Texas 231.4</td>
<td>9.6</td>
<td>28.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Wisconsin 228.1</td>
<td>9.5</td>
<td>5.8</td>
<td>39.4</td>
</tr>
<tr>
<td>Pennsylvania 213.5</td>
<td>8.9</td>
<td>12.8</td>
<td>16.7</td>
</tr>
<tr>
<td>Illinois 188.0</td>
<td>7.8</td>
<td>12.8</td>
<td>14.7</td>
</tr>
<tr>
<td>Georgia 183.5</td>
<td>7.6</td>
<td>10.4</td>
<td>17.6</td>
</tr>
<tr>
<td>Oregon 139.6</td>
<td>5.8</td>
<td>4.1</td>
<td>33.7</td>
</tr>
<tr>
<td>New Jersey 136.7</td>
<td>5.7</td>
<td>9.0</td>
<td>15.2</td>
</tr>
</tbody>
</table>

*Sq. ft. estimated from USDA cubic ft. using a height of 24 ft. and 85% footprint efficiency. Source: USDA – Capacity of Refrigerated Warehouses, Census, CBRE Research.
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